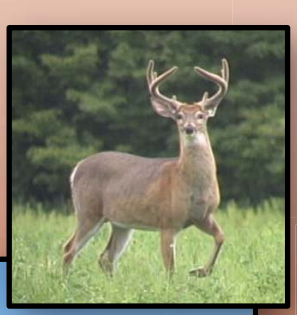
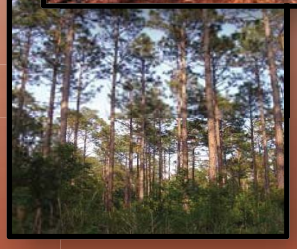
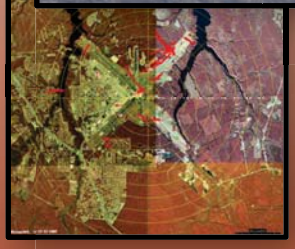
Marine Corps Air Station Cherry Point
Integrated Natural Resources Management Plan
2012 – 2022







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NAVFAC Atlantic Biological Resource Services

Contract # N62470-08-D-1008; Task Order 52

Marine Corps Air Station Cherry Point Integrated Natural Resources Management Plan 2012 – 2022

FINAL May 2012

Prepared for:
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INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN

MARINE CORPS AIR STATION CHERRY POINT COMPLEX

Plan Years
2012–2022

Approving Officials:

MCAS Cherry Point Commanding Officer	Date
Atlantic Division Naval Facilities Engineering Command Natural Resources Section	Date
MCAS Cherry Point Natural Resources Manager	Date

Annual Review	**Date**

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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
ALF	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
NCDENR	North Carolina Department of Environment and Natural Resources
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
OLF	Marine Corps Outlying Airfield
OPNAVINST	Chief of Naval Operations Instruction
P	Proposed Species

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
SWP3	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
WebDARS	Web-enabled Bird-radar Data Analysis and Retrieval System
WFMP	Wildland Fire Management Plan
WWII	World War II

EXECUTIVE SUMMARY

The first Integrated Natural Resources Management Plan (INRMP) for Marine Corps Air Station Cherry Point Complex (MCAS Cherry Point) was approved September 2001. Since that time MCAS Cherry Point has made significant progress in the following areas:

- Development and implementation of a sea turtle and marine mammal monitoring program, and Marine Mammal Protection Act coordination with National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS) for receipt of an Incidental Harassment Authorization (IHA) and Biological Opinion (BO) for potential impacts and management of federally protected sea turtle and marine mammal species;
- Real-time acoustic monitoring of marine mammals;
- Development and implementation of a Wildland Fire Management Plan;
- Timber conversion of 17 acres for longleaf pine (Pinus palustris) restoration;
- Annual prescribed burning of non-commercial forest lands, and cooperative assistance and agreements with U.S. Forest Service (USFS) and U.S. Fish and Wildlife Service (USFWS) for cooperative wildland fire suppression and controlled burns;
- Design and implementation of a Clear Zone Management Plan;
- Completion of a wetland delineation at Marine Corps Outlying Airfield (OLF) Atlantic;
- Completion of a pre-settlement vegetation assessment;
- Maintenance of wildlife clearings (28 acres);
- Ecological surveys for amphibians within a proposed wetland mitigation area;
- Annual fish stocking of installation ponds;
- Maintenance of an active game program, including participation in hunts (waterfowl and deer) in support of the Wounded Warrior Project;
- Completion of an Essential Fish Habitat Assessment;
- Full time staffing of three Conservation Law Enforcement (CLE) Officers;
- Implementation of a Bird/Wildlife Aircraft Strike Hazard (BASH) Program, including staffing of United States Department of Agriculture, Animal Plant Health Inspection Service, Wildlife Services biologists, BASH patrols, wildlife removal, and installation of a Bird-Radar system and collection of bird movement data;
- Avian species monitoring (point-count and call-playback surveys);
- Completion of invasive species surveys and restoration projects;
- Participation in North Carolina Onslow Bight Conservation Forum meetings; and,
- Cooperating with regional conservation partners to prevent encroachment.

This INRMP update was required to update the 2001 document with these improvements, and update the natural resources management goals, objectives, and actions. The 2001 INRMP plan period ended in 2010.

Plan Highlights

Cooperative Preparation and Public Comment – in accordance with Sikes Act requirements, this INRMP has been prepared in cooperation with the USFWS, and North Carolina (State) fish and wildlife agencies and must reflect the mutual agreement of those agencies wherever practical. Cooperating agencies were provided an opportunity to comment on the Pre-Final INRMP in October 2011.

The public was given an opportunity to comment on the original 2001 Draft INRMP and Environmental Assessment (EA) in 2000. That document was made available at local libraries, with notices published in the local newspaper. Comments received from federal and State agencies are included in the EA on file at Main Station. Agency comments on the 2001 Draft INRMP were received from North Carolina Division of Marine Fisheries, NMFS, and a private environmental consultant. No comments from the public were received.

Stakeholders that helped scope and coordinate the development of this INRMP include the USFWS, NMFS, and North Carolina Wildlife Resources Commission (NCWRC).

Natural Resources Priorities **–** In accordance with Headquarters, U.S. Marine Corps (HQ USMC) guidance, natural resources priorities were identified to serve as the basis for developing INRMP objectives and actions. MCAS Cherry Point has identified six natural resources priorities that must be satisfied for the military mission to be met without disruption:

(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 Clean Water Act.
(6) Regional Ecosystem Management – Preserve/enhance natural resources of regional importance.

Natural Resource Objectives **–** specific objectives were developed for each of the following natural resource management areas:

- Protected Species Management
- Migratory Birds
- Forest Management and Protection
- Aquatic Resources and Water Quality Management
- Land Management
- Wildlife and Fisheries Management
- Public Access, Outdoor Recreation and Enforcement
- Regional Conservation
- Conservation Outreach and Education

Action, Measures of Success, and Funding **–** A total of 60 actions and their respective "measures of success" were developed for the various natural resource management objectives and natural resources priorities. Actions were divided into two funding categories: Must-fund Class (compliance and regulatory requirement projects), and Class 2 and Class 3 (desirable projects that are not required). All actions proposed in this INRMP are subject to available funds.

Critical Habitat **–** In accordance with recent Congressional authority, the INRMP places high priority on providing an exemption from any threatened and endangered species critical habitat designation for MCAS Cherry Point. To provide this exemption, the INRMP must satisfy the following USFWS or NMFS criteria:

- the INRMP must provide a benefit to the species;
- the INRMP must be effective; and,
- the INRMP must provide assurance of implementation.

The Main Station of MCAS Cherry Point supports a breeding population of American alligator (*Alligator mississippiensis*), a federally threatened species. American alligator is also listed as threatened in the State. The alligator is common in the areas of Hancock and Slocum creeks, and nests have been found in Jack's Branch. Four species of federally protected sea turtles and the West Indian manatee (*Trichechus manatus*) are known to occur in offshore waters of Bombing Target (BT) BT-9 and BT-11.

This INRMP is intended to provide benefit to American alligator, green sea turtle (*Chelonia mydas*), Kemp's ridley sea turtle (*Lepidochelys kempii*), leatherback sea turtle (*Dermochelys coriacea*), loggerhead sea turtle (*Caretta caretta*), and West Indian manatee; however, a critical habitat exemption is not required for these species. The USFWS has considered the American alligator recovered, and the BO received from NMFS for impacts to sea turtles and the West Indian manatee indicates that the military activities conducted at BT-9 and BT-11 will not impact critical habitat of these species (NMFS in preparation).

Endangered Species Restrictions **–** Federally listed species known to occur at MCAS Cherry Point include the American alligator, green sea turtle, Kemp's ridley sea turtle, leatherback sea turtle, loggerhead sea turtle, and West Indian manatee. The American alligator is listed as threatened due to similarity of appearance with the American crocodile (*Crocodylus acutus*), a federally endangered species. Despite this listing, the American alligator is considered recovered, and actions that may affect it do not trigger USFWS Section 7 consultation, and special restrictions to protect this species are not required. MCAS Cherry Point currently has a sea turtle and marine mammal monitoring program in place for BT-9 and BT-11 that provides protection for these federally protected species in accordance with requirements of the BO and IHA received from NMFS.

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1.0 INTRODUCTION

Marine Corps Air Station Cherry Point Complex (MCAS Cherry Point) is home to approximately 968 officers, 8,877 enlisted Marines and Sailors, and 4,780 civilian personnel (USMC 2010a). 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). MCAS Cherry Point Complex comprises eight widely dispersed properties located in Craven, Carteret, 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).

1.1 BACKGROUND

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.

1.2 INTEGRATED NATURAL RESOURCES MANAGEMENT PLANS

1.2.1 Purpose

The primary purpose of this INRMP is to provide guidance to the MCAS Cherry Point natural resource management program in accordance with the 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), the Endangered Species Act (ESA) of 1973, USC 1531 et. seq., as amended by the National Defense Authorization Act of 2004 (NDAA), Public Law 108–136 and 117 Statute 1392, 1433 (codified at 16 USC §1533).

1.2.2 Scope

This INRMP outlines conservation efforts and establishes procedures to ensure compliance with related environmental laws and regulations for Fiscal Year (FY) 2012 through FY2022. 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 and archery ranges. License agreements are in place for these areas that allow access privileges to club members in exchange for their management of the designated areas.

1.2.3 Authority

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.

1.2.4 Development

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 base sections were consulted during INRMP development as necessary.

1.2.5 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 October 2011 and a meeting was held on January 5, 2012 to further receive and 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.

1.2.6 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 Base 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 Environment and Natural Resources (NCDENR) 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, the Base'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.

1.2.7 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, planned actions, and proposed actions will be reviewed with appropriate managers to document progress, identify additional actions required or desired, and revise implementation schedules and priorities. As part of these reviews the USFWS, NMFS, and NCWRC will be involved in evaluation of processes, results, and implementation of established milestones and timelines for specific projects and programs, and consider ecosystem, species, and habitat goals contained in existing conservation management plans. Following each INRMP review new projects, data, information on natural processes and species, and lessons learned from completed and ongoing projects and management practices will be incorporated into the INRMP as appropriate.

1.2.8 Environmental Compliance

Implementation of this INRMP will help ensure that MCAS Cherry Point complies with federal, State, regional and local statutes, regulations and initiatives. Most notable are those associated with wetlands and water quality (e.g., CWA, EO 11990 - Protection of Wetlands; and North American Wetlands Conservation Act - 103 Stat. 1968, 16 USC 4401–4412, and Public Law 101–233) and fish and wildlife management (e.g., ESA, Fish and Wildlife Coordination Act, Lacey Act, and MBTA). Consistency with the Coastal Zone Management Act Reauthorization Amendment (CZMARA) is addressed in the 2001 INRMP/EA.

1.2.9 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).

> 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.*
>
> Source: USMC 2010b

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, Project Descriptions 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. American alligator (*Alligator mississippiensis*) is the only federally listed species known to occur; however MCAS Cherry Point is not seeking to receive critical habitat exemption for this species, as USFWS has considered this species recovered.

MCAS Cherry Point has also consulted with the NMFS to acquire an Incidental Take Statement (ITS) and Incidental Harassment Authorization (IHA) for military and training activities performed at the Piney Island (BT-11) and the offshore Brant Island Shoal (BT-9) that may potentially impact the green sea turtle (*Chelonia mydas*), Kemp's ridley sea turtle (*Lepidochelys kempii*), loggerhead sea turtle (*Caretta caretta*), leatherback sea turtle (*Dermochelys coriacea*), common bottlenose dolphin (*Tursiops truncatus*), and the West Indian manatee (*Trichechus manatus*). The Biological Opinion (BO) received from NMFS states that military activities conducted at BT-9 and BT-11 are not expected to impact designated critical habitat associated with these species (NMFS in preparation). Section 4.0 of this document provides additional information for threatened and endangered species and species at-risk.

1.3 MCAS Cherry Point Military Mission and Operations

1.3.1 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).

The military mission at MCAS Cherry Point is met through the operation of seven 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 (Main 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. The Main Station is also home to Combat Logistics Company 21 (CLC 21), Combat Logistics Regiment 25, Center for Naval Aviation Technical Training Marine Unit (CNATT Marine Unit), Fleet Readiness Center-East (FRC-East), and Naval Health Clinic Cherry Point. Per Code of Federal Regulations CFR) 334.430 portions of the Neuse River and Slocum and Hancock creek tributaries located adjacent or on the Main Station that 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 (BT-11) and Raccoon Island

Piney Island (BT-11) is approximately 11,913 acres in size, and is located on a low-lying peninsula in Pamlico Sound, Carteret County, North Carolina. 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 restricted radius around a barge target located in the northern half of the island (33 CFR 334.420). All of Rattan Bay is included in the 1.8-mile restricted area. All restricted 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 Station Commanding Officer. Raccoon Island is a land mass (approximately 114 acres in size) associated with Piney Island, located approximately 0.4 miles northeast of the Piney Island target area.

Marine Corps Outlying Airfield (OLF) Atlantic

Marine Corps Outlying Airfield (OLF) Atlantic is approximately 1,493 acres in size, and is located in northeastern Carteret County, North Carolina. OLF 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 OLF 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 OLF Atlantic, which will increase use of the site for military training.

Marine Corps Auxiliary Landing Field (ALF) Bogue

Marine Corps Auxiliary Landing Field (ALF) Bogue is approximately 853 acres in size, and is located on Bogue Sound in southwestern Carteret County, North Carolina. ALF Bogue is used for aircraft training and field training exercises. The airfield contains replicas of carrier and amphibious assault ship decks that are used for pilot qualifications training for carrier landings. No aircraft are permanently stationed at ALF Bogue.

Pamlico Point, Maw Point, and Cat Island

Pamlico Point is approximately 141 acres in size, and is located in northeastern Pamlico County, North Carolina, approximately 11 miles north of Maw 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 6 miles northwest of Piney Island. Cat Island is a small island, approximately 18 acres in size, and is located in Bogue Sound, western Carteret County, North Carolina, approximately 3 miles east of ALF Bogue. All three 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 (BT-9)

Brant Island Shoal (BT-9) is approximately 18,000 acres in size, is located completely offshore, and is used as a water-based target within Pamlico Sound, Pamlico County, North Carolina. BT-9 is located approximately 10 miles north of BT-11, and approximately 6 miles northeast of Maw 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 Station Commanding Officer (33 CFR 334.420).

1.3.2 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 the Main Station, BT-11, and the two outlying airfields (OLF Atlantic and ALF 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, and,
- Explosives handling.

Water based training activities occur at 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 that take place at BT-9 and BT-11, include, but are not limited to:

- Insertions and extractions,
- Air-to-surface training,
- Surface-to-surface training,
- Small arms training,
- Explosives training,
- Rescues,
- Interdictions, and,
- Platform integration testing and training.

Special use airspace training activities and exercises also take place over BT-9, BT-11, and the two outlying airfields. BT-11 is used primarily for air-to-ground training, and BT-9 is primarily used for air-to-water surface training. Training within the airspace above OLF Atlantic primarily involves rotary-wing aircraft, with operations extending to BT-9 and BT-11. Exercises include air-to-ground tactics, and low-altitude and electronic warfare training, such as insertion/extraction training using night-vision goggles and inter air-to-ground weapons delivery operations. MCAS Cherry Point also uses offshore range areas for air-to-ground and air-to-water surface training involving units from MCAS Cherry Point, Marine Corps Base (MCB) Camp Lejeune, Fleet Forces Command, and other United States (U.S.) Army, Navy, Air Force, and Coast Guard units.

1.3.3 MCAS Cherry Point Unit Missions

The mission of the 2d MAW is to conduct air operations for support of Marine Forces, including Offensive Air Support, Anti-air Warfare, Assault Support, Aerial Reconnaissance, Electronic Warfare, and Control of Aircraft and Missiles. For additional security purposes the 2d MAW may participate in other Navy functions as directed by the Fleet Commander.

The mission of the CLC 21 is to provide intermediate supply support and intermediate motor transport and engineer ground equipment maintenance to the 2d MAW; operate the Aerial Port of Embarkation/Debarkation under the guidance of II MEF; and provide personnel to the Fleet Assistance Program to support legal, postal, exchange, security (military police), personnel administration, freight/passenger transportation and bulk fuel support.

The mission of CNATT Marine Unit is to provide aviation maintenance and specialized training to operate and maintain weapon systems and sub-systems to support:

- Organizational and Intermediate Level Maintenance AV-8 Harrier Communities;
- Organizational and Intermediate Level Maintenance C/KC-130 Hercules Communities;
- Cryogenics Communities;
- Intermediate Level Maintenance Avionics; and,
- Organizational and Intermediate Level Maintenance Aviation Ordnance.

The mission of FRC-East is to provide unsurpassed service to the Fleet and relentless focus on quality, environment, and occupational health and safety. The mission of the Naval Health Clinic Cherry Point is to meet the healthcare needs of those entrusted with their care.

1.3.4 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 of operations and training areas is limited to an expansion of facilities at OLF Atlantic. Plans to install a Military Operations on Urbanized Terrain (MOUT) facility at OLF Atlantic have been approved, and will involve construction of pre-fabricated metal containers that simulate urban structures and support facilities, including a power substation, communications tower, airfield control tower, fuel farm, passenger terminal, and bus terminal. The simulated modular facilities of the MOUT will provide for a more dynamic and realistic training environment than is currently available.

Plans to increase USMC forces by FY2011 are proposed, and include increasing force size at MCAS Cherry Point. An EIS titled *USMC Grow the Force in North Carolina* was prepared by the USMC in 2009 that analyzed environmental impacts of growing the force size at MCB Camp Lejeune, Marine Corps Air Station (MCAS) New River, and MCAS Cherry Point. The proposed increase in force size at MCAS Cherry Point would result in an increase of approximately 5.7 percent (%), or 784 active duty and civilian personnel, and an approximate 5.0% increase in the dependent population (USMC 2009a). New construction at MCAS Cherry Point associated with the preferred alternative analyzed in the EIS would occur in mostly developed areas, with the exception of some impacts to forested areas in the Ordnance Storage Area and along Roosevelt Boulevard. Up to 70 acres of forest habitat would be lost, and impacts to up to 15 acres of wetlands is expected under the preferred alternative. The preferred alternative is not expected to affect terrestrial special status species; however, it may affect, but not likely adversely affect the West Indian manatee as a result of upgrades to bridges (USMC 2009a).

1.3.5 Encroachment and 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

Planning & 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.

Development adjacent to the Main Station and ALF Bogue is limited to the City of Havelock, North Carolina, and the Town of Bogue, North Carolina. Much of the lands surrounding MCAS Cherry Point parcels are agricultural, rural residential, or lands managed by the U.S. Forest Service (USFS). The DoD has established an Encroachment Partnering (EP) program, which was authorized under 10 USC §2684a (Agreements to Limit Encroachments and other Constraints on Military Training, Testing and Operations), and authorizes military services to enter into cost-sharing partnerships with states, their political subdivisions, and/or conservation minded NGOs to acquire lands from willing sellers. This serves to limit development or use of the acquired property, or preservation of habitat that supports military readiness requirements.

The current encroachment strategy for MCAS Cherry Point focuses on compatibility with the military mission: the Piney Island area of interest (AOI) includes bombing targets (BT-9 and BT-11) and OLF Atlantic; the Cherry Point AOI, which encompasses the Main Station and surrounding areas; and the ALF Bogue AOI. At ALF Bogue, additional encroachment pressures originate in the form of noise complaints from various communities including the Town of Emerald Isle, Cedar Key, and subdivisions within the incorporated community of Cape Carteret. Recent efforts have resulted in conservation of 5,735 acres of land around Piney Island, and 349 acres of land near the Main Station. An additional 15,550 acres are currently under consideration for conservation in future years around the Piney Island AOI and under important special use airspace. The USMC has also acquired restrictive easements on 1,279 acres of land beyond the boundary of MCAS Cherry Point. These easements were purchased from landowners and allow the USMC to restrict certain activities on the property considered to be incompatible with airfield operations (e.g., residential construction) (USMC 2009a). The primary objective of the MCAS Cherry Point encroachment program is to ensure encroachment does not threaten the ability of an installation to achieve its military mission.

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 2.3.3.

1.4 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 for more than 40 years, 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...*"

It is clear that Congress intended 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.

1.4.1 Base 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.

1.4.2 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 non-1iving 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 40 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 Base 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 2016, 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.

From the Millennium Ecosystem Assessment (2005) there are a multitude of resources and processes that are supplied by natural ecosystems. Collectively, these benefits are known as

ecosystem services and include products like clean drinking water, decomposition of wastes, habitat benefits for individual species, and forested communities that provide outdoor recreation opportunities. Ecosystem services are grouped into four broad categories: provisioning, such as the production of food and water; regulating, such as the control of climate and disease; supporting, such as nutrient cycles and crop pollination; and cultural, such as spiritual and recreational benefits. To the extent practical, MCAS Cherry Point will investigate new management approaches that consider ecosystem services as a baseline for decision making.

1.4.3 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.

1.4.4 History of the MCAS Cherry Point Natural Resources Program

The natural resources of MCAS Cherry Point have been under professional management since the late 1960's. 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:

- Fishing ponds were constructed in 1953, 1962, and 1967;
- A soils map was prepared in 1957 and updated in 1979 by the USDA NRCS;
- The USFS established continuous forestry inventory plots in 1963;
- Wildlife habitat management was initiated in 1963;
- A staff forester position was established in 1964 to direct the forestry program;
- A long-term Draft Fish and Wildlife Management Plan was prepared in 1968 by Naval Facilities Engineering Command, Atlantic (NAVFAC Atlantic);
- The Natural Resources and Environmental Affairs Division was established in 1972 to direct the wildlife and forestry programs;
- A wildlife biologist position was established in 1972;
- A Draft Forest Management Plan was developed in 1975, and updated in 1980, 1990, and 1998;
- 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 2006;
- A comprehensive Natural Heritage Inventory was completed by NCDENR 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 2009b);
- Pest Management Plan Forest Inventory (USMC 2004);
- Invasive Species Plant Survey and Management Plan (Navy 2006);
- Annual Water Quality Report (USMC 2009c); and
- Assessment of the Commercial and Recreational Usage of Waters Surrounding Piney Island and Brant Island Shoal (USMC 2010d).

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 Program is overseen by MCAS Cherry Point CLE Officers. 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.

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 described.

2.1 LOCATION

The Main Station 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 eight separate parcels and includes approximately 26,073 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. The Main Station is located in Craven County; BT-11, OLF Atlantic, ALF Bogue, and Cat Island are located in Carteret County; and BT-9, Pamlico Point, and Maw Point are located in Pamlico County.

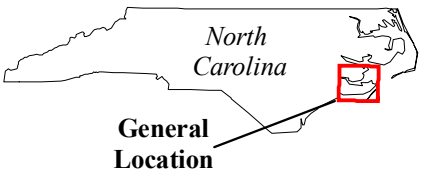
The Main Station is located in the City of Havelock, North Carolina, approximately 30 miles east of the City of Jacksonville, North Carolina and MCB Camp Lejeune. The Outer Banks of North Carolina, a 200-mile long string of narrow barrier islands, are located along the coastline east of the Main Station, and includes popular North Carolina tourist destinations such as Kitty Hawk, Nags Head, Cape Hatteras, and Cape Lookout National Seashore.

Other military installations tied to MCAS Cherry Point include MCB Camp Lejeune and MCAS New River located in Jacksonville, North Carolina, approximately 32 miles southwest of the Main Station, and the Port of Embarkation at Morehead City, North Carolina, located approximately 14 miles southeast of the Main Station.

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.



Source:
USMC 2010e, ESRI 2004, NCCGIA 2006, USFS 2010, and USFWS 2010a.

Legend

- Installation Areas
- National Forests/Game Lands
- National Wildlife Refuges
- Roads
- Highways
- Counties

0 3 6 12 Miles

0 4 8 16 Kilometers

N

Figure 2.1. General Location of Marine Corps Air Station Cherry Point and Surrounding Areas.

Prepared for: Marine Corps Air Station Cherry Point.
Date: 06/2011

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- **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 slash pine (*Pinus elliottii*). Southern areas of the section contain primarily 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 wild turkey (*Meleagris gallopavo*), northern bobwhite (*Colinus virginianus*), and the mourning dove (*Zenaida 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 (*Polioptila caerulea*), hooded warbler (*Wilsonia citrina*), and Carolina wren (*Thryothorus ludovicianus*). Common herpetofauna include box turtle (*Terrapene* spp.), common garter snake (*Thamnophis sirtalis*), eastern diamondback rattlesnake (*Crotalus adamanteus*), timber rattlesnake (*Crotalus horridus*), and American alligator.
- **Climate** – Average annual precipitation is approximately 46 inches, with average temperatures of 55–57 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 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. 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. Major rivers in this section include the St. John, Altamaha, Santee, Pee Dee, and Neuse rivers.

- **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. The Main Station 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.

A list of hydric soils for North Carolina is available on the NRCS website:

http://soils.usda.gov/use/hydric/lists/state.html

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.

Main Station

The topography of the Main Station 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 the Main Station 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 the Main Station, 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 Main 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 the Main Station range from well drained soils to very poorly drained soils. Areas of low relief contain soils that have low water retention capacity, with well drained soils generally associated with slopes of streams and rivers. Major well drained soils series of the Main Station 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 the Main Station. Approximately 75% of soils classified as Urban land are covered by asphalt and buildings (USMC 2001).

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 a canal.

Table 2.1. Major Soils of the Main Station.

Soil Series	Acres	Hydric?	Description[1]
Norfolk loamy fine sand, 2–6% slopes (NoB)	1,873.5	Yes	Well drained, loamy fine sand and sandy clay loam; occurs on broad interstream divides on marine terraces, and on ridges of marine terraces.
Rains fine sandy loam (Ra)	1,433.7	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.
Goldsboro loamy fine sand, 0–2% slopes (GoA)	1,050.3	Yes	Moderately well drained, loamy fine sand, fine sandy loam, sandy clay loam, and clay loam.
Urban land (Ur)	1,040.1	No	Developed areas, typically poorly drained due to pavement, structures, or other impermeable surfaces.
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.
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.
Autryville loamy sand, 0–6% slopes (AuB)	702.4	Yes	Well drained, loamy fine sand, loamy sand, sand, and sandy loam; occurs on marine terrace flats, and ridges of marine terraces.
Lynchburg fine sandy loam (Ly)	522.7	Yes	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.
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.
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.

Soil Series	Acres	Hydric?	Description[1]
Goldsboro–Urban land complex, 0–2% slopes (GuA)	422.2	Yes	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.
Norfolk loamy fine sand, 0–2% slopes (NoA)	411.6	Yes	Well drained, loamy fine sand, sandy clam loam, and sandy loam; occurs on ridges of marine terraces, and broad interstream divides of marine terraces.
Onslow loamy sand (On)	406.9	Yes	Moderately well drained, loamy fine sand and sandy clam loam; occurs on broad interstream divides of marine terraces, and flats of marine terraces.
Udorthents, loamy (Ud)	351.8	No	Well drained, sandy clay loam; occurs on ridges.
Seabrook loamy sand (Se)	143.0	Yes	Moderately well drained, loamy sand and sand; occurs on depressions of marine terraces and depressions of stream 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.
Lynchburg–Urban land complex (Lc)	133.9	Yes	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.
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.
Longshoal muck, very frequently flooded (LF)	55.4	Yes	Very poorly drained, muck; occurs on tidal marshes.
Conetoe loamy sand, 0–5% slopes (CnB)	46.4	Yes	Well drained, loamy sand, sandy loam, loamy sand, and sand; occurs on ridges of stream terraces.
Lenoir silt loam (Le)	40.0	Yes	Somewhat poorly drained, loam, clay, and sandy clay; occurs on flats of broad interstream divides and terraces.
Arapahoe fine sandy loam (Ap)	26.6	Yes	Very poorly drained, fine sandy loam and loamy sand; occurs on depressions and flats.

Soil Series	Acres	Hydric?	Description[1]
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.
Tarboro sand, 0–6% slopes (TaB)	16.8	No	Somewhat excessively drained, sand and gravelly sand; occurs on ridges of stream terraces.
Augusta fine sandy loam (Ag)	13.5	Yes	Somewhat poorly drained, fine sandy loam, sandy clay loam, and sandy loam; occurs on stream terraces.
Leon sand (Ln)	0.3	Yes	Poorly drained, sand and fine sand; occurs on flats of marine 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.
Water acreage	62.3	N/A	N/A
Soils Total	**11,537.6**		

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

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.
Water acreage	5.5	N/A	N/A
Soils Total	**11,842.1**		

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

OLF Atlantic

The land surface of OLF 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 State Road (SR) 1387.

Six soil series occur on OLF 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 OLF 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.

ALF Bogue

The land surface of ALF 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.

Table 2.3. Major Soils of OLF 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.
Water acreage	117.4	N/A	N/A
Soils Total	**1,456.6**		

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

There are seven different soil series on ALF 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 OLF Atlantic 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.

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.

Table 2.4. Major Soils of ALF Bogue.

Soil Series	Acres	Hydric?	Description[1]
Wando–Urban land complex, 0–6% slopes (WuB)	242.3	Yes	Well drained, fine sand; occurs on ridges of marine terraces.
Wando fine sand, 0–6% slopes (WaB)	236.9	Yes	Well drained, fine sand; occurs on ridges of marine terraces.
Leon sand (Ln)	166.0	Yes	Poorly drained, sand and fine sand; occurs on flats of marine terraces.
Seabrook fine sand (Se)	143.0	Yes	Moderately well drained, loamy sand and sand; occurs on depressions of marine terraces and depressions of stream terraces.
Carteret sand, frequently flooded (CH)	48.9	Yes	Very poorly drained, sand, and fine sand; occurs on tidal marshes.
Arapahoe fine sandy loam (Ap)	7.6	Yes	Very poorly drained, fine sandy loam and loamy sand; occurs on depressions and flats.
Masontown mucky loam, frequently flooded (MA)	0.3	Yes	Very poorly drained, mucky loam, fine sandy loam, and sand; occurs on floodplains.
Soils Total	**845.0**		

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

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.

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 (Ator et al. 2005). 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).

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.
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

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. These warmer temperatures are often offset by the Labrador Current, located between the Gulf Stream and the North Carolina coast, which flows in the opposite direction. The effect of the Labrador Current offsets warmer temperatures associated with the Gulf Stream by bringing in cooler air towards the coast. 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.

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.

Average relative humidity of the Coastal Plain region is 75%, with an average of 58–65 sunny days, 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).

Main Station

The Main Station comprises 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 the Main Station (Table 2.6 and Figure 2.2). Pine forest is the dominant natural community, totaling 4,222 acres of habitat distributed throughout the Main Station. Within the pine community type, loblolly pine dominates the canopy in broad interstream areas. Loblolly forests located at the Main Station 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.

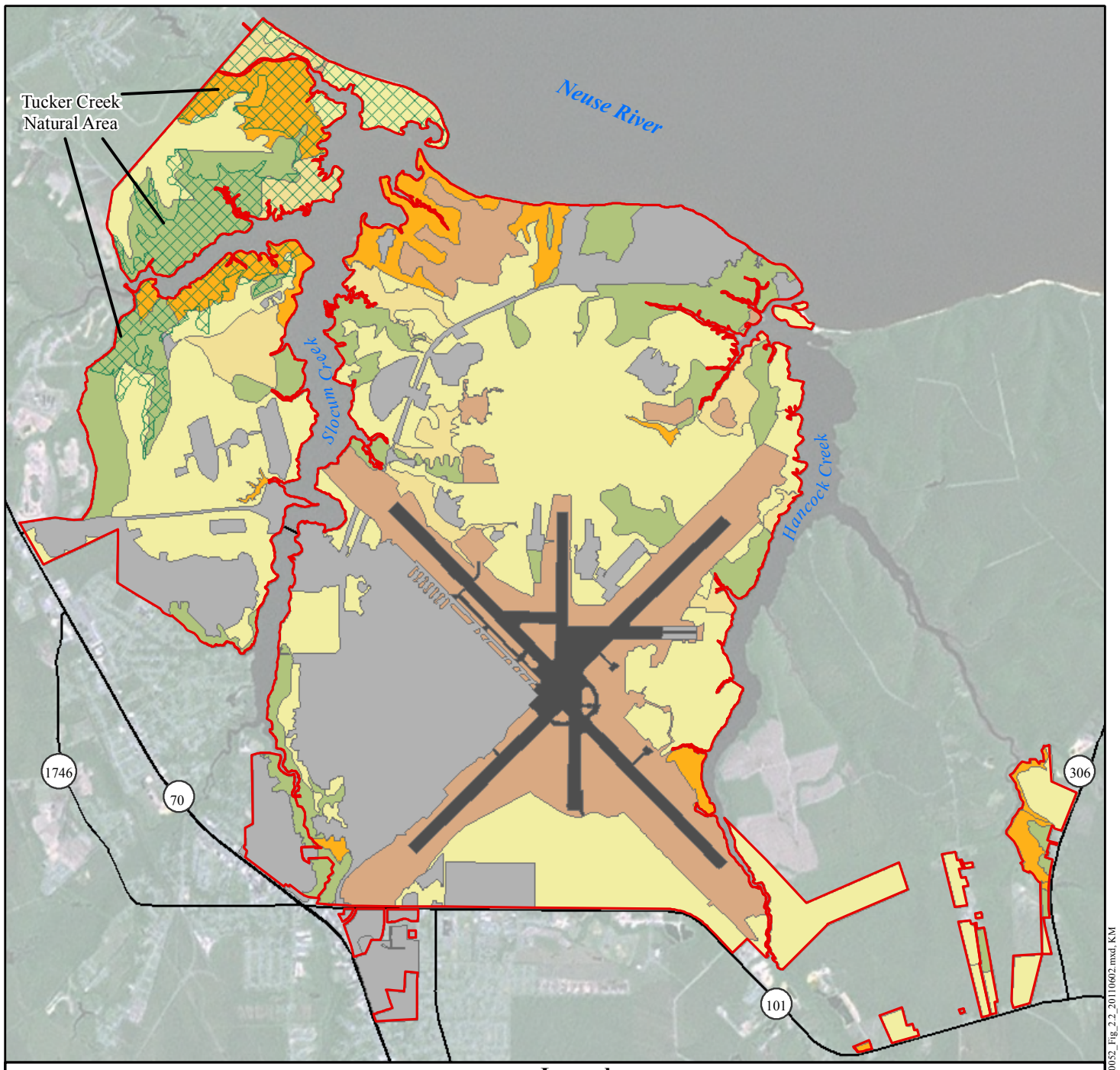
Table 2.6. Natural Community Types of the Main Station.

Natural Community Type	Acres
Pine	4,222
Grassland	1,631
Pine–Hardwood	1,499
Hardwood	670
Hardwood–Pine	522
Total	**8,544**

Source: USMC 2010e

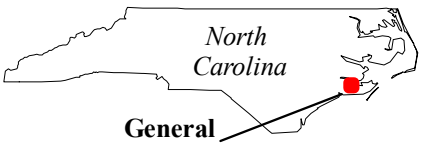
Approximately 1,631 acres of pine–hardwood community are located along Slocum and Tucker creeks, the Neuse River and in smaller areas around the airfield. Lower slope forests of the Main Station contain a mesic mixed hardwood–pine community, including loblolly pine, live oak, Darlington oak (*Quercus hemisphaerica*), 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*). 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 the Main Station 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.



Legend

- Installation Areas
- Military Facilities
- Airfield
- Grassland
- Hardwood
- Hardwood-pine
- Pine
- Pine-hardwood
- SNHAs
- Roads



General Location

Source:
USMC 2010e, ESRI 2004, ESRI 2010, and NCDENR 2010.

0 0.5 1 2 Miles

0 0.5 1 2 3 Kilometers

Figure 2.2. Main Base Significant Natural Heritage Areas (SNHAs) and Land Cover.

Prepared for: Marine Corps Air Station Cherry Point.
Date: 06/2011

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Piney Island (BT-11)

Similar to pre-settlement conditions, Piney Island vegetation is dominated by brackish marshland covering approximately 11,691 acres (Figure 2.3 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).

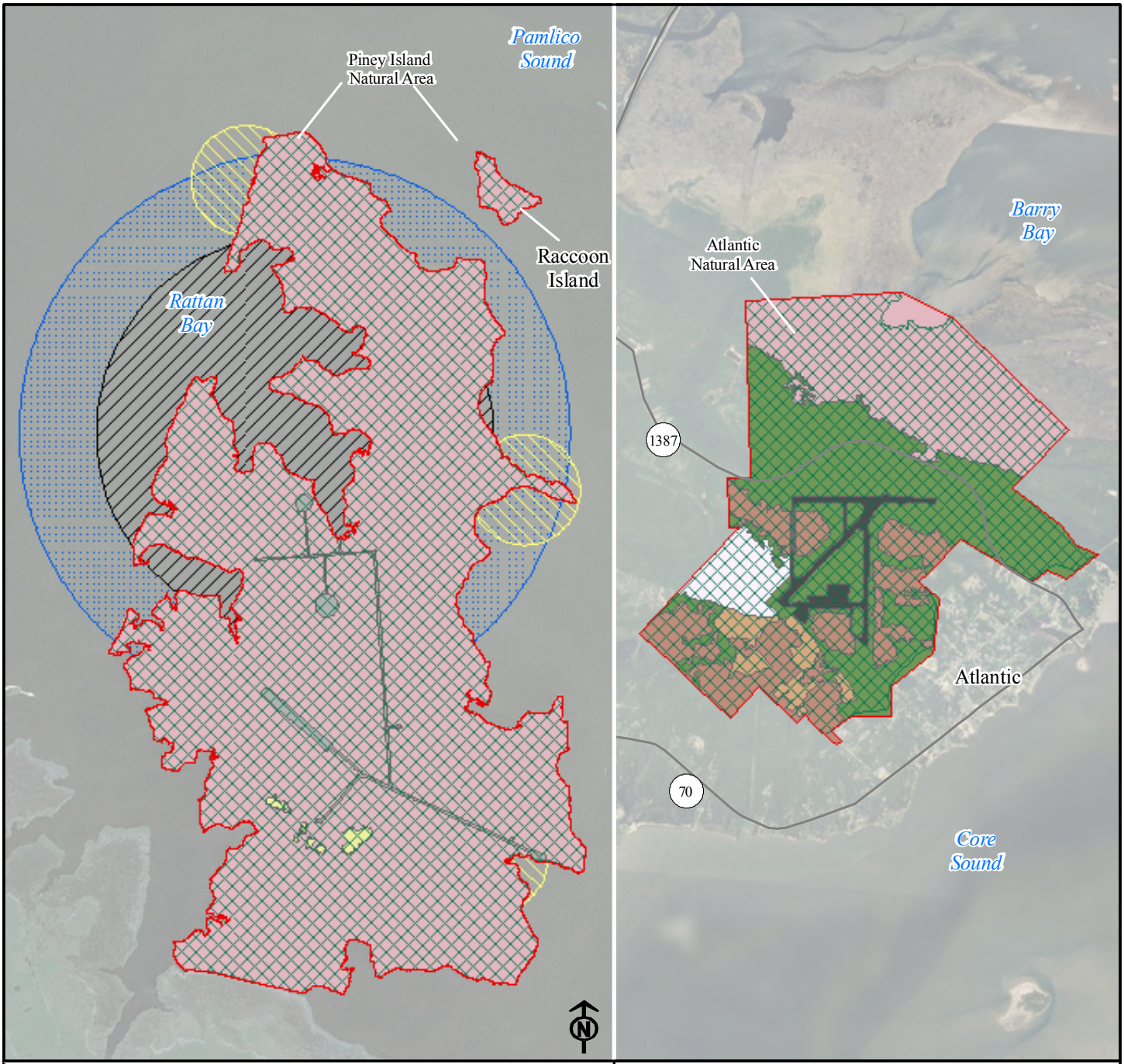
Natural Community Type	Acres
Brackish Marshland	11,691
Pine	48
Total	**11,739**

Source: USMC 2010e

Remnant pocosin dominated by pond pine on Piney Island.

Source: Mickler 2006

Black needlegrass rush 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 wetland pine community is remnant of a pocosin and is characterized by a very sparse pond pine canopy, with dense growth of sweetgum, red maple, wax myrtle (*Morella cerifera*), and swamp bay (*Persea palustris*) in the understory (USMC 2001).



Piney Island (BT-11)

0 1 2 4 Miles

0 1.5 3 6 Kilometers

MCOLF Atlantic

0 0.4 0.8 1.6 Miles

0 0.5 1 2 Kilometers

Source:
USMC 2010e, ESRI 2004, ESRI 2010, and NCDENR 2010.

Legend

- Installation Areas
- Military Facilities
- Airfield
- Carolina Bay
- Marshland
- High Pocosin
- 33 C.F.R. § 334.420 Prohibited Area
- 33 C.F.R. § 334.420 Restricted Areas
- 33 C.F.R. § 334.420 Intermittent Danger Zone
- Pine
- Woodland
- Grassland
- SNHAs
- Roads

Figure 2.3. Piney Island (BT-11) and MCOLF Atlantic Significant Natural Heritage Areas (SNHAs) and Land Cover.

Prepared for: Marine Corps Air Station Cherry Point.
Date: 04/2012

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OLF Atlantic

Plant communities associated with OLF Atlantic include woodland, marshland, high pocosin, Carolina bay, and grassland (Figure 2.3 and Table 2.8). Approximately 617 acres of woodland 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 OLF Atlantic, along the southwest shore of Barry Bay. Much of this area is comprised of brackish marsh that is dominated by black needlerush rush with saltmeadow cordgrass and swamp sawgrass becoming more common in fresher inland areas of the community.

Table 2.8. Natural Community Types of OLF Atlantic.

Natural Community Type	Acres
Woodland	617
Marshland	428
High Pocosin	262
Carolina Bay	75
Grassland	55
Total	**1,437**

Source: USMC 2010e

Several patches of high pocosin community occur throughout the southern half of OLF 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).

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 and live oak in the subcanopy. 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 OLF Atlantic (Table 2.8). Most of the grassland habitat occurs interspersed among the high pocosin habitat at the south end of the site (Figure 2.3).

Historical habitat of OLF 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.

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

Source: Mickler 2006

ALF Bogue

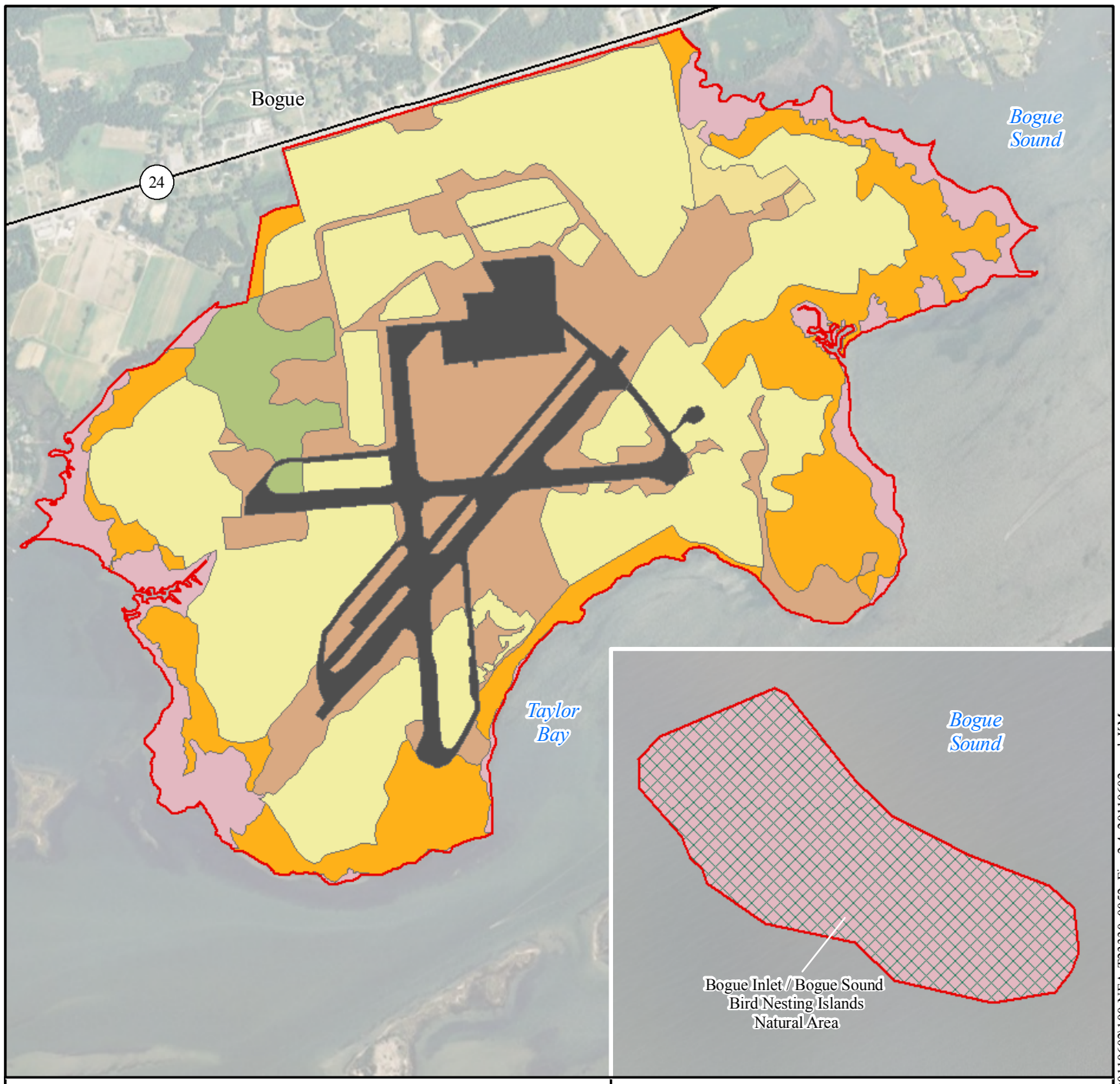
Vegetation communities at ALF Bogue include pine, grassland, hardwood, marshland, and mixed pine–hardwood/hardwood–pine habitat (Figure 2.4 and Table 2.9). The majority of unimproved land at ALF Bogue is pine forest, which covers approximately 360 acres and is distributed in areas around the airfield. 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 ALF Bogue. An infestation of loblolly pines at ALF 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 ALF Bogue are in regeneration.

Table 2.9. Natural Community Types of ALF Bogue.

Natural Community Type	Acres
Pine	360
Grassland	176
Hardwood	133
Marshland	69
Pine–Hardwood	27
Hardwood–Pine	9
Total	**774**

Source: USMC 2010e

The next most abundant community types are grassland and hardwood communities. A majority of the 176 acres of grassland habitat is located throughout the central airfield area of ALF Bogue (Figure 2.4). Hardwood 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 water oak (*Quercus nigra*) and loblolly pine, and also includes a live oak maritime forest community. 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. Salt spray, storm surge, and high winds from these hurricanes



MCALF Bogue

0 0.2 0.4 0.8 Miles

0 0.25 0.5 1 Kilometers

Cat Island

0 0.05 0.1 0.2 Miles

0 0.1 0.2 0.4 Kilometers

Source:
USMC 2010e, ESRI 2004, ESRI 2010, and NCDENR 2010.

Legend

- Installation Areas
- Airfield
- Marshland
- Grassland
- Hardwood-pine
- Pine-hardwood
- Pine
- Hardwood
- SNHAs
- Roads

N

Figure 2.4. MCALF Bogue and Cat Island Significant Natural Heritage Areas (SNHAs) and Land Cover.

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Date: 06/2011

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defoliated and felled trees over much of the site, and these trees were subsequently salvaged during timber management operations conducted after 1996.

Marshlands encompass approximately 69 acres of ALF Bogue, forming a fringe that borders much of the coastal waters, especially in the northeast and southwest (Figure 2.4). 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 ALF Bogue, one to the northwest of the airstrip and the other to the northeast (Figure 2.4).

Pamlico Point, Brant Island Shoal, 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 2.5 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 2.4 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

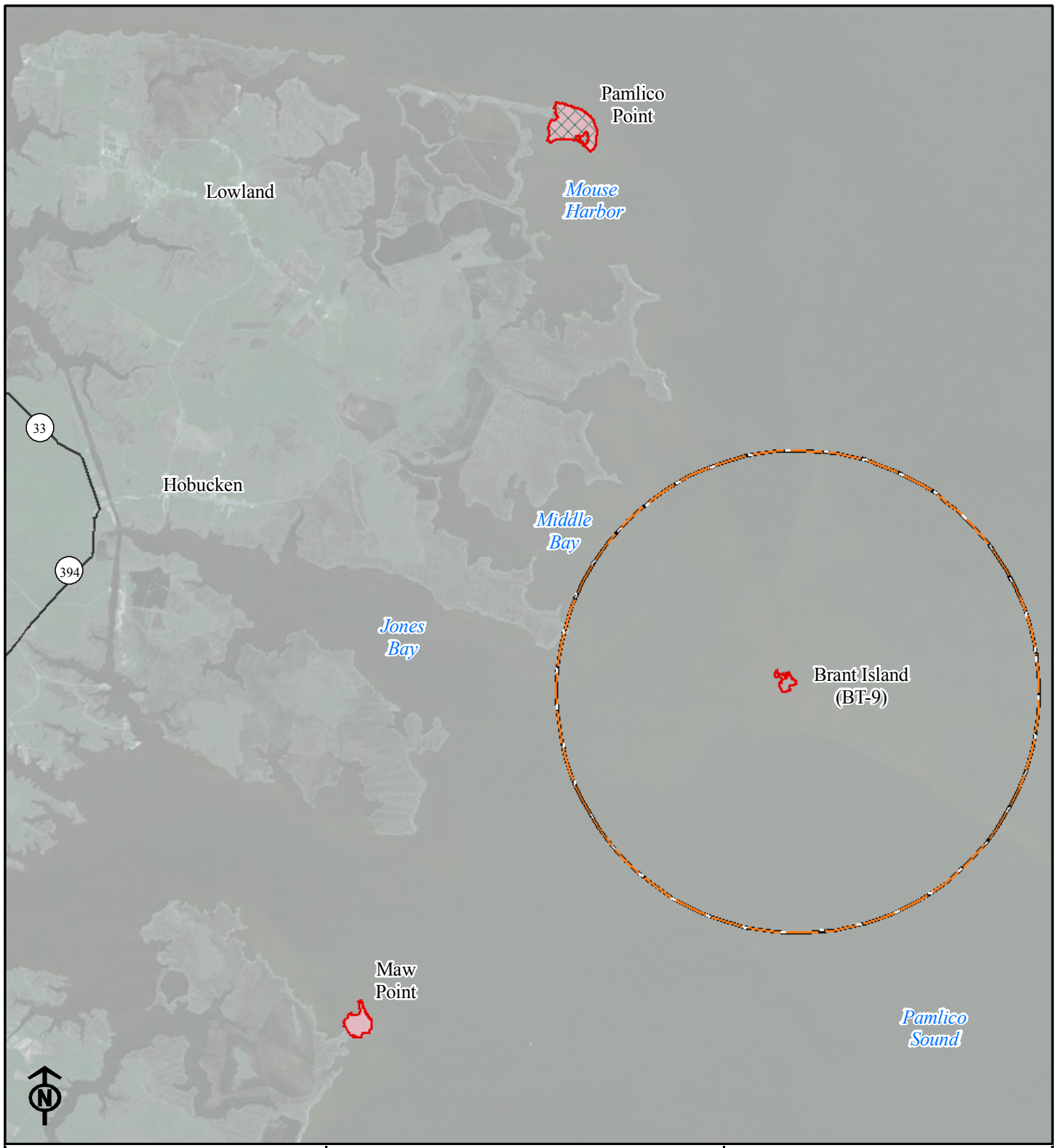
Source: USMC 2010e

2.2.5 Water Resources

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

Neuse River Watershed

The Main Station, 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, originating at Falls Lake



North Carolina

General Location

Source:
USMC 2010e, ESRI 2004, ESRI 2010, and NCDENR 2010.

Legend

- Installation Areas
- Military Facilities
- Marshland
- SNHAs
- Roads
- 33 C.F.R. § 334.420 Prohibited Area

0 1 2 4 Miles

0 1 2 4 Kilometers

Figure 2.5. Brant Island Shoal (BT-9), Maw Point, and Pamlico Point Significant Natural Heritage Areas (SNHAs) and Land Cover.

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Date: 06/2011

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Reservoir Dam near Raleigh, 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. Aside from the Neuse River, other major tributaries of the watershed include Crabtree, Swift and Contentnea creeks; and Eno, Little, and Trent rivers. In the area of New Bern, North Carolina, freshwater of the Neuse River becomes brackish, and the river widens significantly 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 $^{1}/_{6}$ 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

Pamlico Point is 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 consider 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 (North Carolina Office of Environmental Education 2010). Other major tributaries contained within the watershed include the Swift, Fishing and Tranters creeks, and Cokey Swamp. One of the main tributaries of the lower basin is the 30-mile Pungo River. 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. The largest natural lake, Lake Mattamuskeet, located in Mattamuskeet National Wildlife Refuge (NWR), is located within the Tar–Pamlico River Watershed, and is approximately 40,000 acres in size.

White Oak Watershed

OLF Atlantic, ALF 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.

Main Station

The Main Station is located within the Neuse River Basin (Figure 2.6). 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 the Main Station: Slocum and Hancock creeks. Slocum Creek is located on the west side of the Main Station and flows north into the Neuse River (Figure 2.6). Hancock Creek bounds the Main Station to the east and also flows north into the Neuse River. Tucker Creek, a tributary to Slocum Creek, flows onto the Main Station 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.

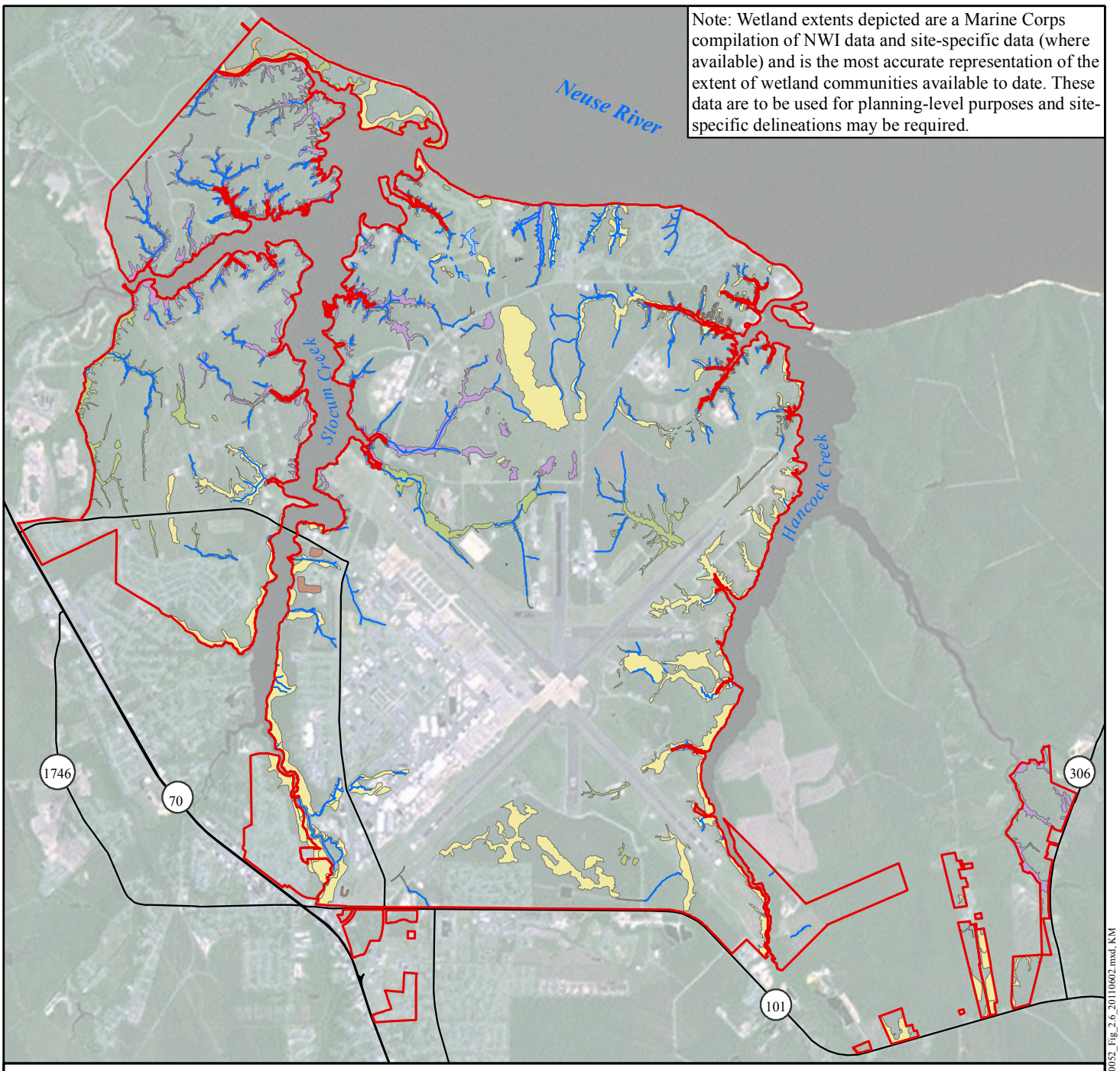
There are 1,234 acres of wetlands at the Main Station, covering approximately 11% of the land area (Table 2.11). Several types of wetlands are present; however, the majority associated with forested palustrine systems. Approximately 734 acres of forested wetland are located primarily in the riparian 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 2.11. Wetlands at the Main Station.

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 the Main Station 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*).



Legend

- Installation Areas
- Roads
- Open Water
- Water Courses
- Emergent Wetland
- Forested Wetland
- Scrub-shrub Wetland
- Unconsolidated Bottom
- To Be Determined

Source:
USMC 2010e, ESRI 2004, and ESRI 2010.

0 0.5 1 2 Miles

0 0.5 1 2 3 Kilometers

Figure 2.6. Main Base Water Resources.

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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.

There are approximately 12,000 acres of wetlands at Piney Island, which account for approximately 98% of the property (Figure 2.7 and Table 2.12). 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. No wetland information is available for Raccoon Island.

Table 2.12. Wetlands at Piney Island (BT-11).

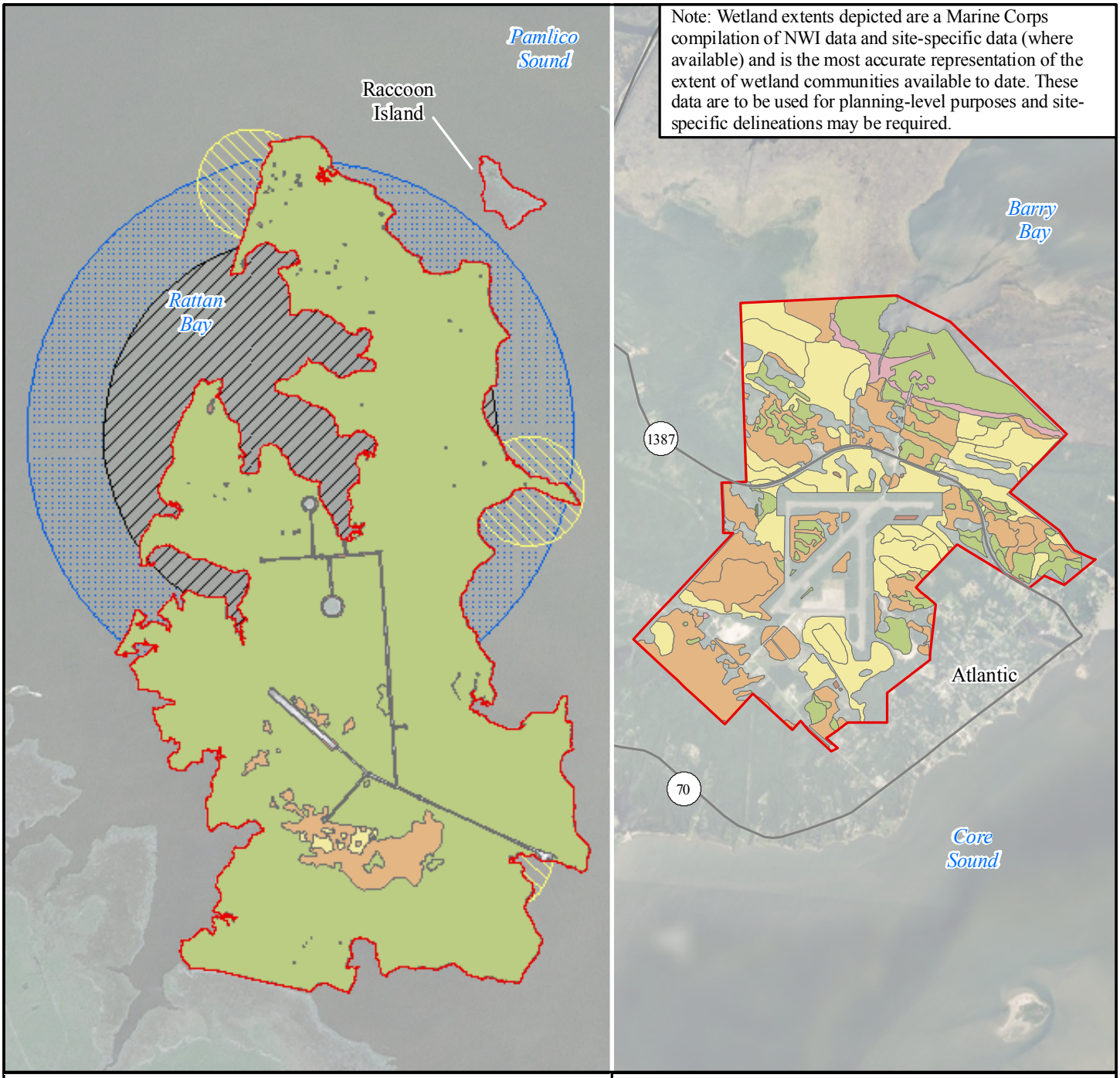
Wetland Community Type	Acres
Emergent Wetland	11,148
Scrub–Shrub Wetland	365
Unconsolidated Bottom	82
Forested Wetland	46
Total Wetland Acreage	**11,641**

Source: USFWS 2010f

OLF Atlantic

OLF 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 relict 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.

The majority of the 999 acres of wetland habitat that occur at OLF Atlantic is either forested or scrub–shrub community (Table 2.13 and Figure 2.7). In addition, approximately 239 acres of OLF Atlantic are covered by emergent wetland community.



Piney Island (BT-11)

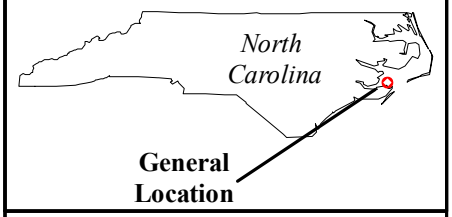
0 1 2 4 Miles

0 1.5 3 6 Kilometers

MCOLF Atlantic

0 0.4 0.8 1.6 Miles

0 0.5 1 2 Kilometers



Legend

- Installation Areas
- Emergent Wetland
- Forested Wetland
- Scrub-shrub Wetland
- Unconsolidated Bottom
- Unconsolidated Shore
- 33 C.F.R. § 334.420 Prohibited Area
- 33 C.F.R. § 334.420 Restricted Areas
- 33 C.F.R. § 334.420 Intermittent Danger Zone
- Roads
- Aquatic Bed

N

Source:
USMC 2010e, ESRI 2004, and ESRI 2010.

Figure 2.7. Piney Island (BT-11) and MCOLF Atlantic Water Resources.

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Date: 04/2012

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Table 2.13. Wetlands at OLF 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

ALF Bogue

ALF Bogue is located in the White Oak River Basin, on the north shore of Bogue Sound (Figure 2.8). Bogue Sound is subject to lunar tides, and contains commercial fish and shellfish resources. In some areas, such as in the northern area of ALF Bogue, groundwater that is near the surface serves as the headwaters for many streams associated with the site.

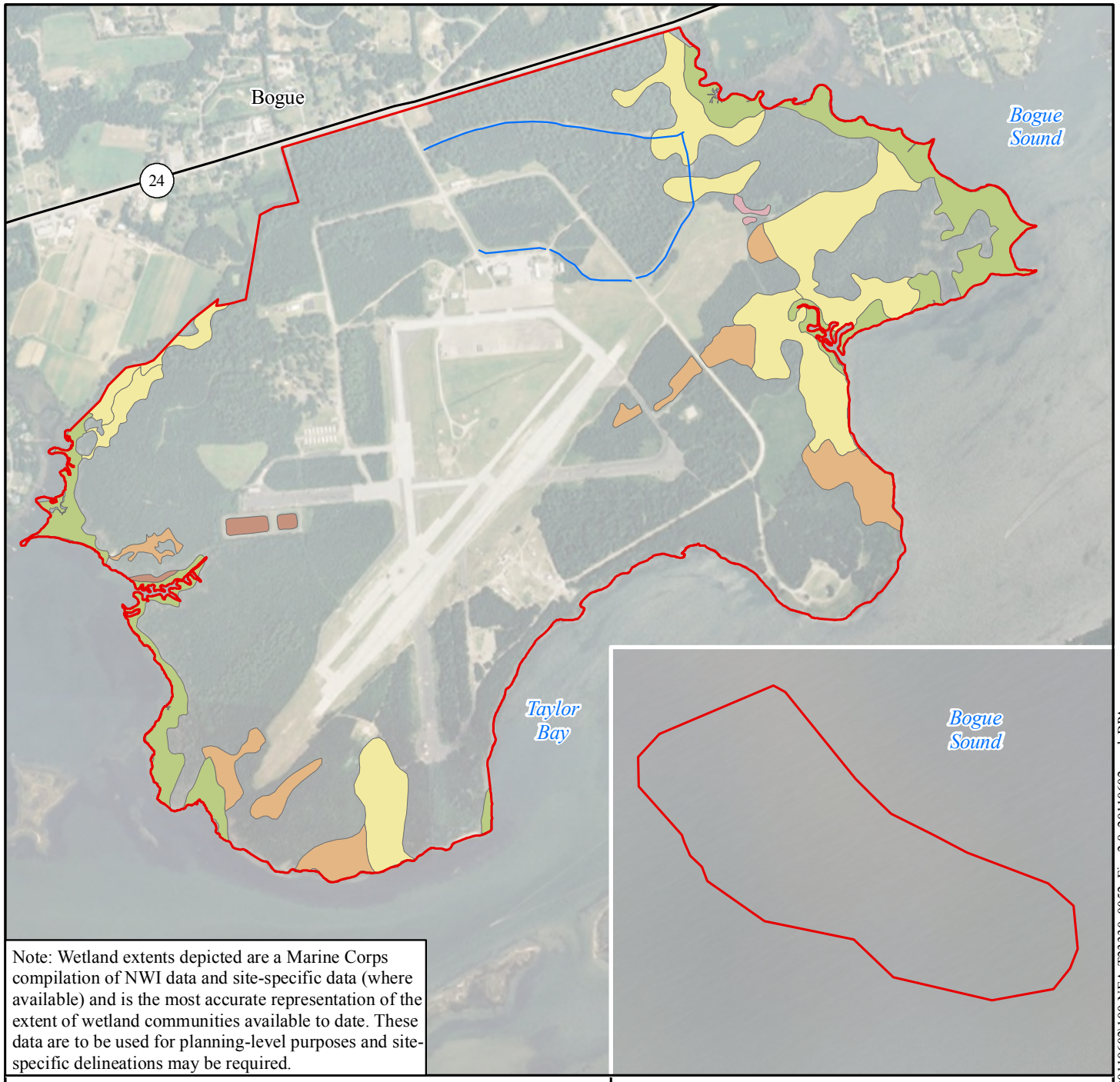
Approximately 132 acres of wetlands occur on this site, comprising approximately 15% of the land area (Table 2.14). The vegetated wetlands communities occur primarily on the edge of ALF Bogue. The most common types of wetlands are forested (63 acres) and emergent (41 acres) wetlands, the latter of which is mostly brackish marsh. A total of 25 acres of scrub–shrub wetland also occur at ALF Bogue.

Table 2.14. Wetlands of ALF 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

NCDENR, Division of Water Quality has classified Western Bogue Sound as an Outstanding Resource Water (ORW). NCDENR, 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 (NCDENR, Division of Water Quality 2010), and waters with excellent water quality are classified as High Quality Waters, or



Note: Wetland extents depicted are a Marine Corps compilation of NWI data and site-specific data (where available) and is the most accurate representation of the extent of wetland communities available to date. These data are to be used for planning-level purposes and site-specific delineations may be required.

MCALF Bogue

0 0.2 0.4 0.8 Miles

0 0.25 0.5 1 Kilometers

Cat Island

0 0.05 0.1 0.2 Miles

0 0.1 0.2 0.4 Kilometers

Source:
USMC 2010e, ESRI 2004, and ESRI 2010.

Legend

- Installation Areas
- Water Courses
- Emergent Wetland
- Forested Wetland
- Scrub-shrub Wetland
- Unconsolidated Bottom
- Unconsolidated Shore
- Roads

N

Figure 2.8. MCALF Bogue and Cat Island Water Resources.

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Date: 06/2011

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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).

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 2.9 and Table 2.15) (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 also completed covered by 54 acres of emergent wetland and approximately 1 acre of unconsolidated shore. NWI wetland data are not available for Cat Island; however, based available natural community data, this site is also expected to be completely covered by wetland habitat.

Table 2.15. 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

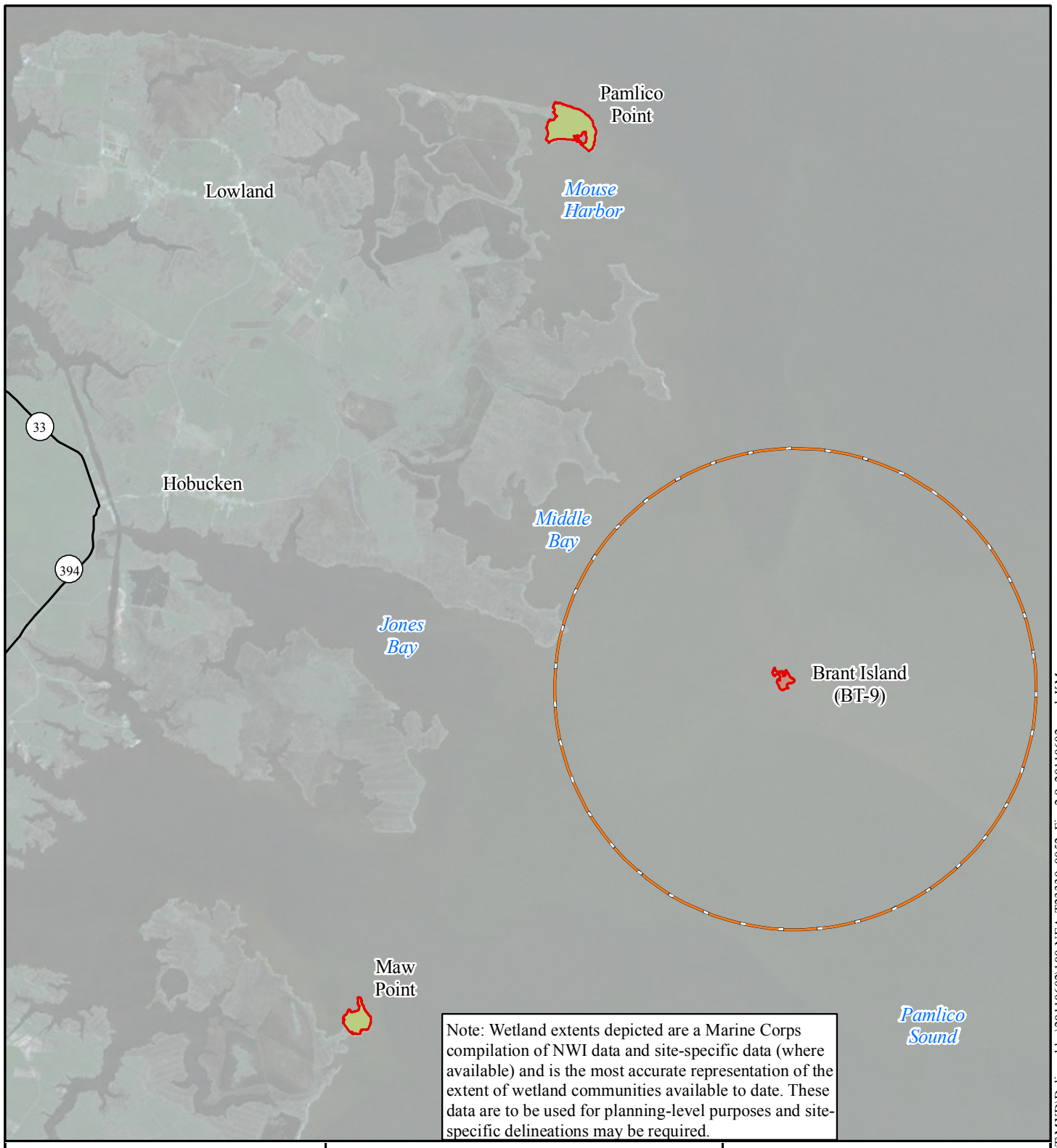

Figure 2.9. Brant Island Shoal (BT-9), Maw Point, and Pamlico Point Water Resources.

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Date: 06/2011

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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).

2.3 CONSERVATION SIGNIFICANCE OF THE AREA

There are many areas in proximity to MCAS Cherry Point that are considered ecologically important. The largest regional ecological areas include the Coastal Plain, Croatan National Forest, Cedar Island NWR, MCB Camp Lejeune, and Holly Shelter Game Lands, all of which are part of the Onslow Bight landscape.

The Atlantic Coastal Plain defines the area along the eastern seaboard of the U.S. from the New York Bight, south to Florida. North Carolina is located within the Middle Atlantic Coastal Plain region which stretches from Delaware Bay and the Delmarva Peninsula south to Jacksonville, Florida. The inland width of the Middle Atlantic Coastal Plain ranges from a few miles to approximately 70 miles in the North Carolina and South Carolina region (U.S. Geological Survey 2010). The Coastal Plain region of North Carolina supports a rich biodiversity, including a broad range of plant species, and rare species (TNC 2010a).

The Onslow Bight, located in the Coastal Plain region of North Carolina, is a natural area comprised of unique landforms, including barrier islands, marshes, riverine wetlands, pocosins, longleaf pine savannahs, and other coastal ecosystems. The Onslow Bight extends from the Pamlico River and Cape Lookout, North Carolina, south to the lower Cape Fear River and Cape Fear, North Carolina (USFWS 2010b), and includes offshore waters areas and land area extending approximately 30 miles inland. Onslow Bight is considered a water-based area of conservation significance due to the unique composition of saltwater marshes, riverine wetlands, pocosins, longleaf pine savannahs, and other coastal ecosystems. Habitats found within Onslow Bight support a diverse community of flora and fauna, including many special status plant and animal species, several of which are endemic to the Bight region. Other significant features of the Onslow Bight region include presence of federally threatened and endangered species such as red-cockaded woodpecker (RCW) (*Picoides borealis*), green sea turtle and loggerhead sea turtle; Carolina bays and Carolina sandhills; and rare plant and animal communities supported by North Carolina's pocosin habitat, dunes and estuaries. Many large areas located within the Bight region are managed for conservation, and the region also includes several smaller scale conservation sites and SNHAs.

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). OLF Atlantic is located directly adjacent to the eastern 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 and are strategically located within the Onslow Bight landscape.

2.3.1 Significant Natural Heritage Areas (SNHAs)

NHP is part of the Office of Natural Resources Planning and Conservation within NCDENR. NHP has catalogued the most rare and significant elements of natural diversity in North Carolina (NCDENR NHP 2010a), 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 (NCDENR 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.

NHP often groups related natural areas that are located in proximity to one another into macrosites to promote the long-term viability and ecological significance of the area. Where multiple natural areas occur that have shared ecological functions, all associated lands in the complex are designated as a macrosite (NCDENR Natural Resources Planning and Conservation 2009). When one or more macrosites and other smaller natural areas are associated to one another, the site is designated by NHP as a megasite. Identification of SNHAs associated with

MCAS Cherry Point that are part of a macrosite or megasite are included in the following SNHA discussion.

Six SNHAs encompassing 14,417 acres were identified in the NHP report for MCAS Cherry Point (NCDENR 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 the Main Station and outlying properties are described below.

Main Station

Cherry Point Tucker Creek Natural Area, a Significance C SNHA, is located in the northwest portion of the Main Station 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 (NCDENR Natural Resources Planning and Conservation 2009). Total area of Tucker Creek Natural Area within the boundaries of the Main Station 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).

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 (NCDENR 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 OLF 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.

OLF Atlantic

Marshlands and forests north of SR 1387 and forests along the west and southwest sides of OLF 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). There is a high density of rare plants on the

property (see Section 4.0); however no federally listed animal or plant species have been observed.

Pamlico Point

Pamlico Point marsh habitat and impoundments are listed as a Significance B Natural Heritage Area (NCDENR Natural Resources Planning and Conservation 2009) and total approximately 138 acres. Pamlico Point Marshes and other sites compose the Southern Pamlimarle 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*) (NCDENR NHP 1990). A pair of black-necked stilts historically has been observed in the summer months, but nesting has not been confirmed. 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 and ALF Bogue

Pamlico Point and Maw Point each contain small areas of high quality wildlife habitat; however no SNHAs have been designated at these sites.

2.3.2 North Carolina Onslow Bight Conservation Forum

The OBCF was formed in 2002, 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 and other 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 however to sustainable natural resource management, providing for human needs while retaining our natural heritage. Toward this end, 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. In 2005 this conservation partnership was recognized by the White House at its Conference on Cooperative Conservation (TNC 2010b).

MCAS Cherry Point collaborates with Conservation Forum 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.

2.4 SOCIOECONOMIC SETTING

The 2009 Federal Census provides demographic information for Craven, Carteret, and Pamlico counties (U.S. Census Bureau 2009). 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 2009 Craven County population was 98,529 (U.S. Census Bureau 2009), which includes approximately 35,157 military and civilian employees, and their family member (USMC 2010a). For the period of 2006–2008 population of Craven County was predominately white (70%), female (51%), with a median age of 36.8 years. Percentage of minorities making up the county population were estimated as 23% Black or African American, 4% Hispanic or Latino, 1% Asian, and 3% other race. For the same 3-year time period approximately 88% of Craven County's residents had at least a high school diploma, and approximately 21% had a Bachelor's degree or higher. Approximately 12,940 residents of Craven County were civilian veterans in 2006–2008. Since 2000 the population of Craven County has increased by approximately 7%, with a 17% increase in the county population since 1990 (81,613) (U.S. Census Bureau 2009).

Carteret County

The 2009 Carteret County population was 64,423 (U.S. Census Bureau 2009). For the period of 2006–2008 population of Carteret County was predominately white (88%), female (50%), with a median age of 44 years. Percentage of minorities making up the county population were estimated as 7% Black or African American, 2% Hispanic or Latino, 1% Asian, and 2% other race. For the same 3-year time period approximately 87% of Carteret County's residents had at least a high school diploma, and approximately 23% had a Bachelor's degree or higher. Approximately 7,660 residents were civilian veterans in 2006–2008. Since 2000 population of Craven County has increased by approximately 8%, with a 19% increase in the county population since 1990 (52,556) (U.S. Census Bureau 2009).

Pamlico County

The 2009 Pamlico County population was 12,422 (U.S. Census Bureau 2009). The 2000 population of Pamlico County was predominately white (73%), male (50%), with a median age of 43 years. Percentage of minorities making up the county population were estimated as 25% Black or African American, 1% Hispanic or Latino, less than 1% Asian, and 1% other race. Approximately 75% of Pamlico County's residents had at least a high school diploma, and approximately 15% had a Bachelor's degree or higher. Approximately 1,741 residents were civilian veterans in 2000. Since 2000, the population of Craven County has decreased by less than 1%, with an overall 9% increase in the county population since 1990 (11,372) (U.S. Census Bureau 2009).

2.4.1 Economic Character

Craven County

For the 2000 census a total of 44,830 persons living within Craven County were within the labor force (or 63% of population 16 years and over). 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 approximately 37% not within the labor force (U.S. Census Bureau 2000). The largest occupation sectors of Craven County are management, professional, and related occupations (29%); sales and office occupations (23%); and service occupations (17%). The largest industries in Craven County are educational, health and social services (21%); manufacturing (14%), and retail (12%).

Median household income for Craven County families in 1999 was $35,966. MCAS Cherry Point is one of the largest employers in eastern North Carolina, contributing significantly to the economy of North Carolina (USMC 2010a). Economic impact for FY2009 was $2.2 billion, with civilian and military personnel salaries totaling $1.4 billion, and $160 million allocated to contracts.

The work force of MCAS Cherry Point for FY2009 was estimated as 15,210 people (USMC 2010a). This estimate includes the following:

- 8,877 active duty enlisted Marines and Sailors,
- 4,780 civilian employees,
- 968 active duty officers, and
- 585 non-appropriated funds employees.

Carteret County

For the 2000 census a total of 22,932 persons living within Carteret County were within the labor force (or 60% of population 16 years and over). Approximately 56% 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 40% not within the labor force (U.S. Census Bureau 2000). The largest occupation sectors of Carteret County are management, professional, and related occupations (29%); sales and office occupations (24%); and

construction, extraction, and maintenance occupations (17%). The largest industries in Carteret County are educational, health and social services (18%); retail (13%); and construction (11%). Median household income for Carteret County families in 1999 was $38,344.

Pamlico County

For the 2000 census a total of 5,348 persons living within Pamlico County were within the labor force (or 51% of population 16 years and over). Approximately 51% 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 49% not within the labor force (U.S. Census Bureau 2000). The largest occupation sectors of Pamlico County are management, professional, and related occupations (25%); sales and office occupations (23%); and production, transportation, and material moving occupations (18%). The largest industries in Pamlico County are educational, health and social services (20%); manufacturing (13%), and retail (12%). Median household income for Pamlico County families in 1999 was $34,084.

2.5 LAND USE AND HISTORY

2.5.1 Craven County Land Use

The Craven County LUP was approved in 2009, 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 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.

2.5.2 Carteret County Land Use

The Carteret County Draft LUP was approved in 2009, 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).

2.5.3 Pamlico County Land Use

The Pamlico County LUP was approved in 2004, 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 2004). 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 2004).

2.5.4 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 the Main Station 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 ALF 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 OLF 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. ALF 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. ALF 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 ALF 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 ALF 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.

2.5.5 MCAS Cherry Point Facilities

Main Station

Land at the Main Station 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

Example of MCAS Cherry Point base housing

Source: USMC 2010g

indoor practice areas. Undeveloped/forested areas include forested or undeveloped areas not currently used for training activities.

Current and planned land use at the Main Station 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 the Main Station 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 the Main Station 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.

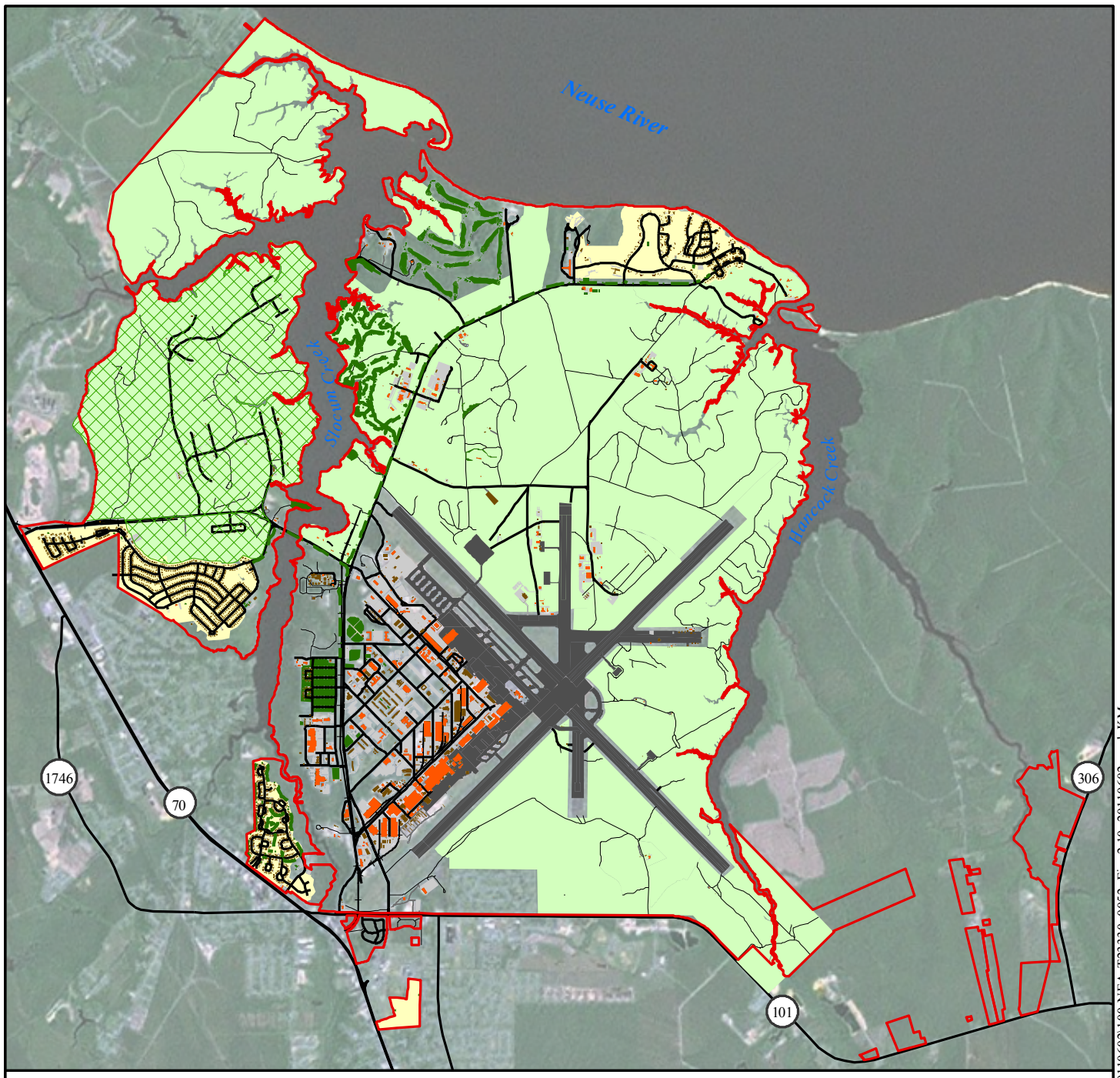
West of Roosevelt Boulevard, land uses include family housing, personnel support facilities, recreational facilities, and the ordnance area. The remainder of the Main Station is largely undeveloped forestland and primarily classified as open/conservation areas. Within this undeveloped area, however, 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.

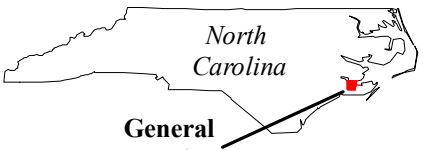
OLF Atlantic

OLF 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 OLF Atlantic (USMC 2001). Except for routine helicopter shuttle flights, aircraft use the facility only during special training exercises. No aircraft are permanently stationed at OLF Atlantic.



Legend

- Installation Areas
- Structures
- HAZMAT Storage Areas
- Paved Areas
- Airfield
- Community/Housing
- Training Areas
- Ordnance Areas
- Recreational Areas
- Primary Roads
- Secondary Roads
- Railroads



Source:
USMC 2010e, ESRI 2004, and
ESRI 2010.

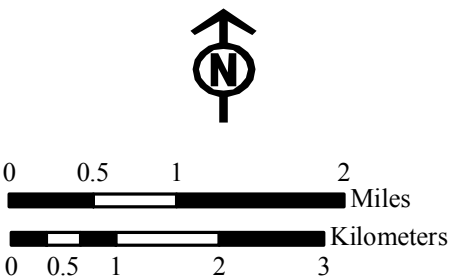


Figure 2.10. Main Base Site Details.

Prepared for: Marine Corps Air Station Cherry Point.
Date: 06/2011

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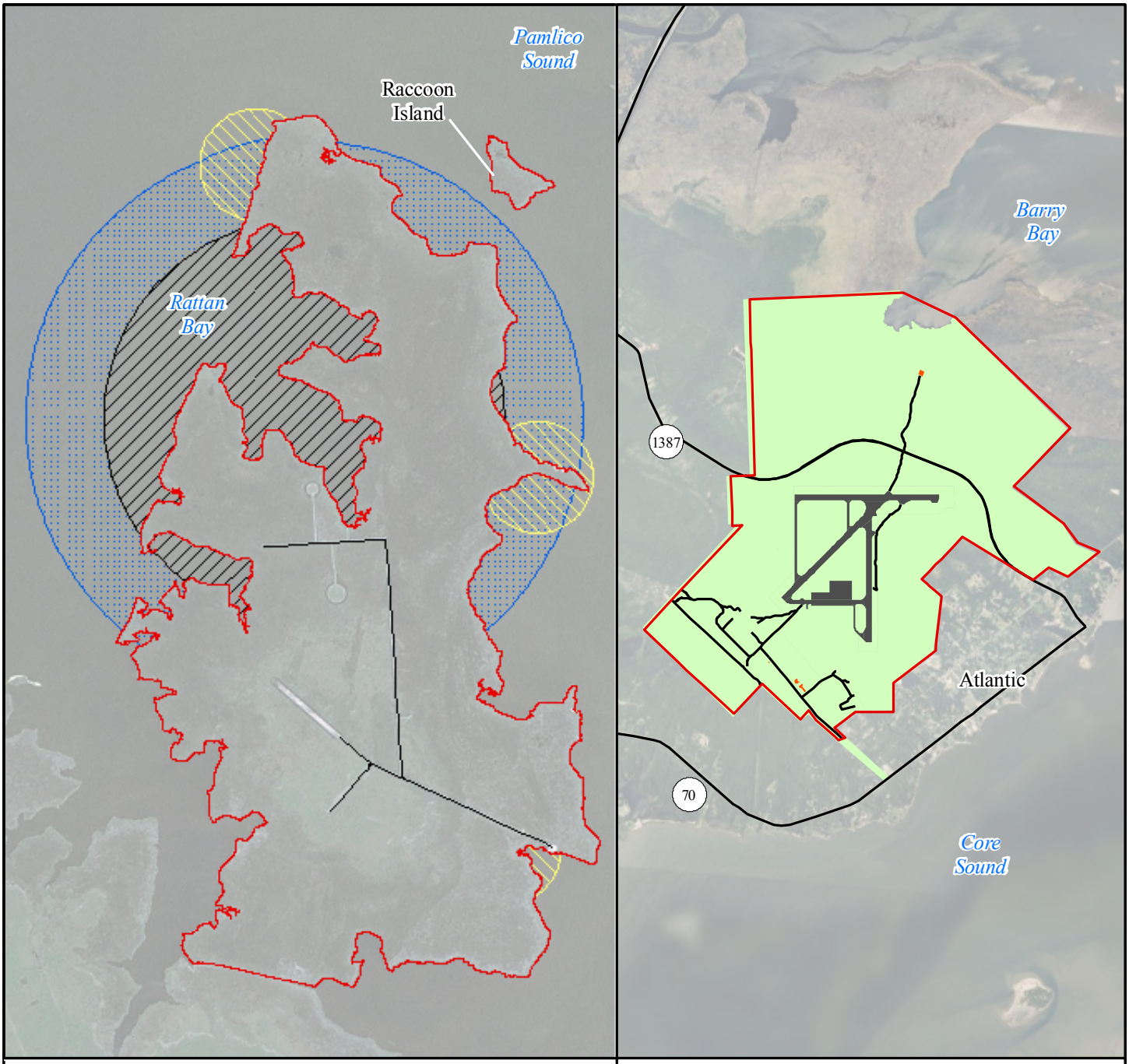

Piney Island (BT-11)

0 1 2 4 Miles

0 1.5 3 6 Kilometers

MCOLF Atlantic

0 0.4 0.8 1.6 Miles

0 0.5 1 2 Kilometers

Source:
USMC 2010e, ESRI 2004, and ESRI 2010.

Legend

- Installation Areas
- Training Areas
- HAZMAT Storage Areas
- Airfield
- Primary and Secondary Roads
- 33 C.F.R. § 334.420 Prohibited Area
- 33 C.F.R. § 334.420 Restricted Areas
- 33 C.F.R. § 334.420 Intermittent Danger Zone

Figure 2.11. Piney Island (BT-11) and MCOLF Atlantic Site Details.

Prepared for: Marine Corps Air Station Cherry Point.
Date: 04/2012

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ALF Bogue

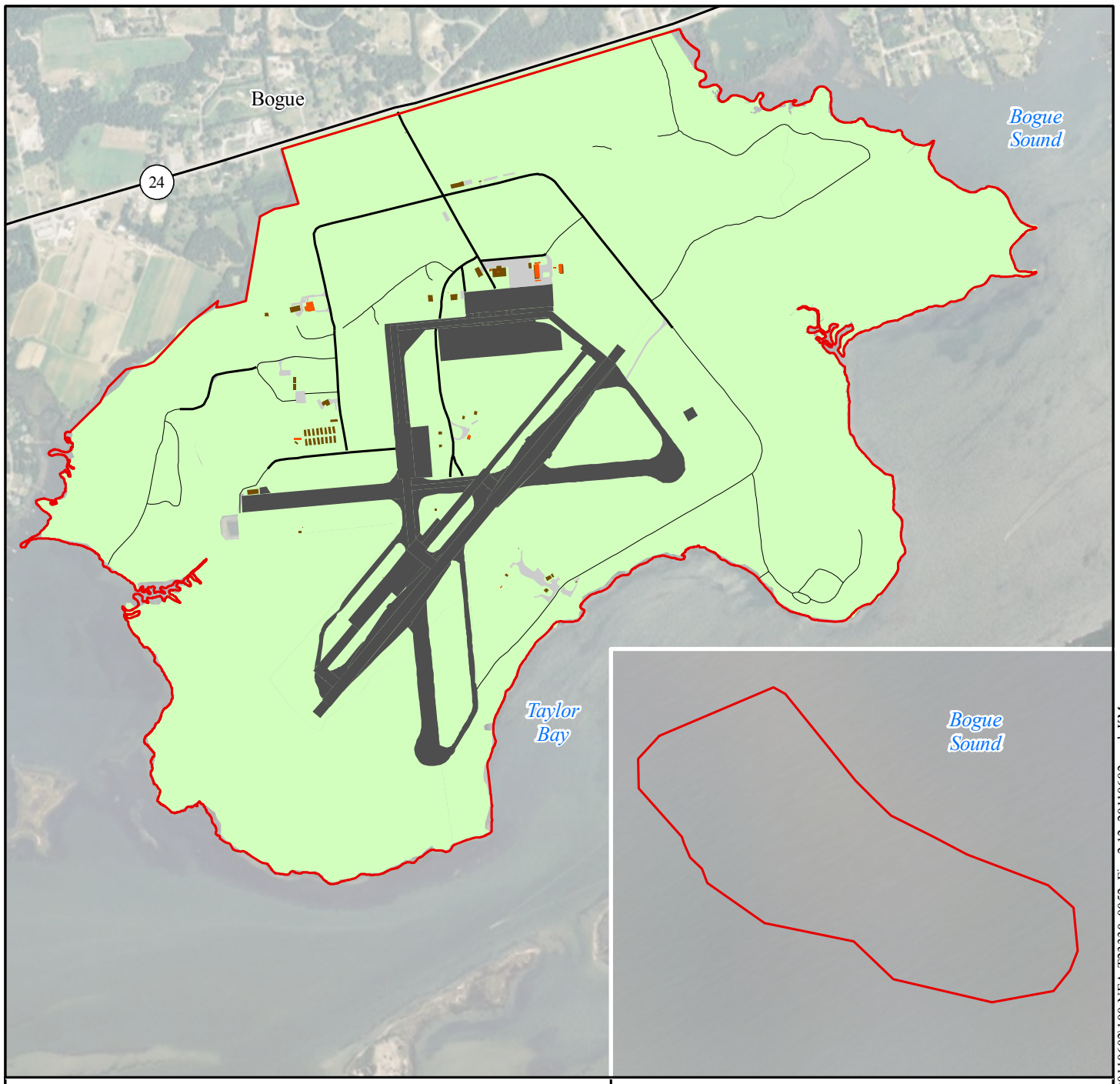
ALF Bogue includes an airfield that is used to support aircraft training and field training exercises (Figure 2.12). The airfield is marked to simulate an aircraft carrier and amphibious assault ship decks, and is used for carrier landing qualifications training. No aircraft are permanently stationed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

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.



MCALF Bogue

0 0.2 0.4 0.8 Miles

0 0.25 0.5 1 Kilometers

Cat Island

0 0.05 0.1 0.2 Miles

0 0.1 0.2 0.4 Kilometers

Source:
USMC 2010e, ESRI 2004, and ESRI 2010.

Legend

- Installation Areas
- Airfield
- HAZMAT Storage Areas
- Paved Areas
- Structures
- Training Areas
- Primary and Secondary Roads

N

Figure 2.12. MCALF Bogue and Cat Island Site Details.

Prepared for: Marine Corps Air Station Cherry Point.
Date: 06/2011

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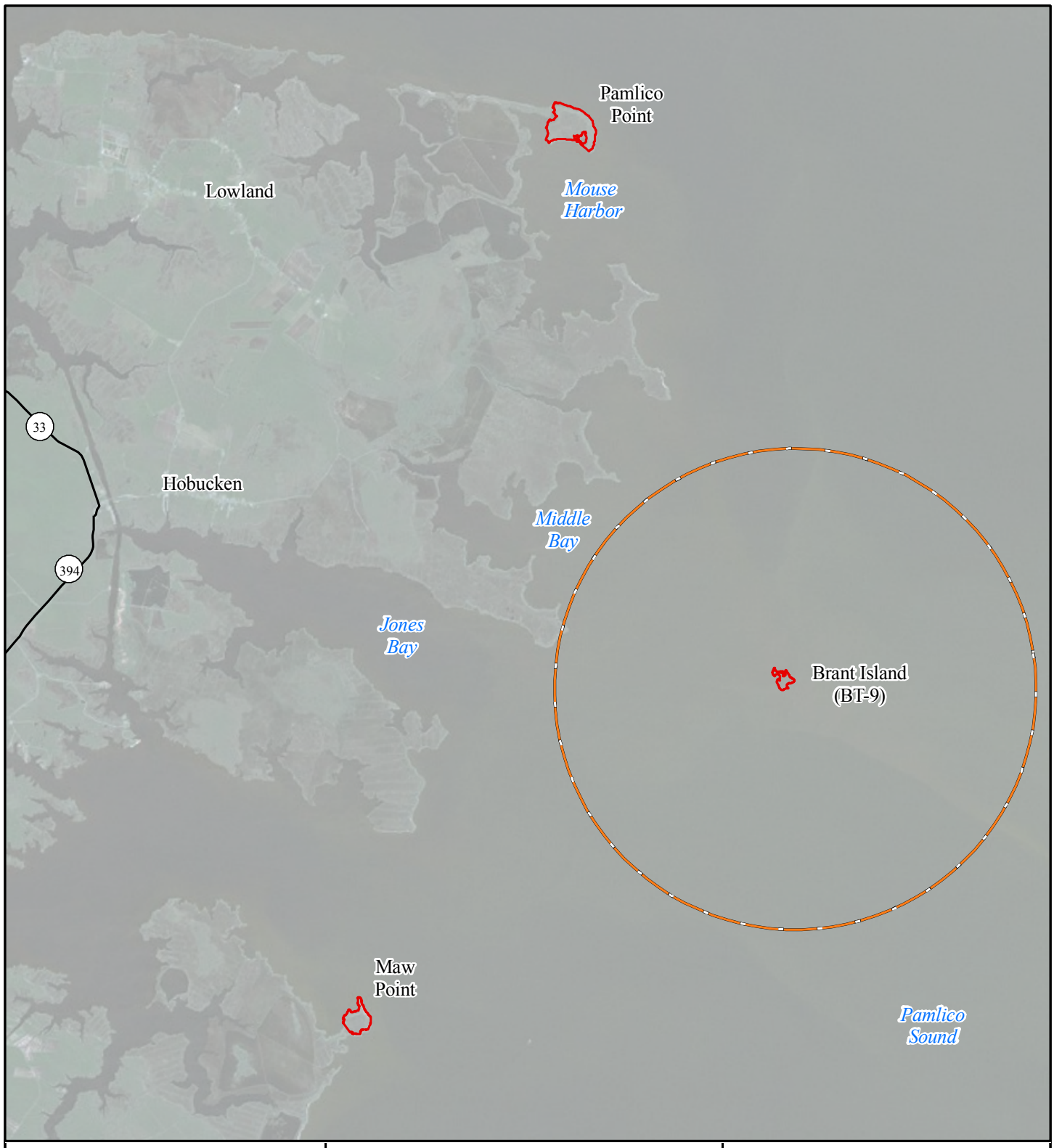

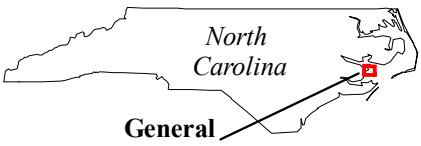

General Location

Source:
USMC 2010e, ESRI 2004, and ESRI 2010.

Legend

Installation Areas

Roads

33 C.F.R § 334.420 Prohibited Area

0 1 2 4 Miles

0 1 2 4 Kilometers

Figure 2.13. Brant Island Shoal (BT-9), Maw Point, and Pamlico Point Site Details.

Prepared for: Marine Corps Air Station Cherry Point.
Date: 06/2011

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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.

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 NCDENR. 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

This INRMP provides specific priorities, action items and management goals identified for the 2012–2022 plan 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 siviculture 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.

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). Nineteen 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	*Lysimachia asperulifolia*	Main Station and OLF Atlantic (P)	E	E
Seabeach amaranth	*Amaranthus pumilus*	BT-11 (P)	T	T
Sensitive (Virginia) joint-vetch	*Aeschynomene virginica*	Main Station (P)	T	E
Fish				
Shortnose sturgeon	*Acipenser brevirostrum*	Main Station, BT-11, OLF Atlantic, Pamlico Point, Maw Point, Cat Island, and BT-9 (P)	E	E
Herpetofauna				
American alligator	*Alligator mississippiensis*	Main Station (O) OLF Atlantic, ALF Bogue, and BT-11 (P)	T (SAT)	T
Atlantic hawksbill sea turtle	*Eretmochelys imbricata imbricata*	BT-9, BT-11 (P)	E	E
Green sea turtle	*Chelonia mydas*	BT-9, BT-11 (O[1])	E[2]	T
Kemp's ridley sea turtle	*Lepidochelys kempii*	BT-9, BT-11 (O[1])	E	E
Leatherback sea turtle	*Dermochelys coriacea*	BT-9, BT-11 (O[1])	E	E
Loggerhead sea turtle	*Caretta caretta*	BT-9, BT-11 (O[1])	T	T

Common Name	Scientific Name	MCAS Cherry Point Status and Location	Federal Status	North Carolina Status
Birds				
Piping plover	*Charadrius melodus*	BT-11, ALF Bogue (P)	E	E
Red-cockaded woodpecker	*Picoides borealis*	Main Station, OLF Atlantic, and ALF Bogue (P)	E	E
Roseate tern	*Sterna dougallii*	Main Station, OLF Atlantic, BT-9, BT-11, ALF Bogue (P)	E	E
Marine Mammals				
Fin whale[3]	*Balaenoptera physalus*	BT-9, BT-11 (P)	E	–
Humpback whale	*Megaptera novaeangliae*	BT-9, BT-11 (P)	E	–
North Atlantic right whale	*Eubalaena glacialis*	BT-9, BT-11 (P)	E	–
Sei whale	*Balaenoptera borealis*	BT-9, BT-11 (P)	E	–
Sperm whale	*Physeter macrocephalus*	BT-9, BT-11 (P)	E	–
West Indian manatee	*Trichechus manatus*	BT-9 (O) Main Station, BT-11, and ALF Bogue (P)	E	–

[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]Fin whales 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, NCDENR NHP 2010b

4.1.1 Plants

Roughleaf Loosestrife

Roughleaf loosestrife (*Lysimachia asperulifolia*) is a federal and North Carolina endangered species that could potentially occur at the Main Station and OLF Atlantic. Roughleaf loosestrife is endemic to North and South Carolina coastal plain and sandhill habitats (Center for Plant Conservation 2010). 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 (Center for Plant Conservation 2010).

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 federally threatened species and a North Carolina endangered species that occurs in intertidal zone areas that are flooded twice daily. This species could potentially occur at the Main Station 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 Invertebrates

No federally listed invertebrate species are known to occur at any of the MCAS Cherry Point properties.

4.1.3 Fish

Shortnose Sturgeon

(*Acipenser brevirostrum*) is a federal and North Carolina endangered species that has the potential to occur in offshore waters of the Main Station, Piney Island, OLF 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 the Main Station, 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).

4.1.4 Herpetofauna

American Alligator

The federally and State threatened American alligator occurs at the Main Station (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).

The Main Station 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). OLF Atlantic, ALF 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).

Sea Turtles

Federally endangered Atlantic hawksbill sea turtle, green sea turtle, Kemp's ridley sea turtle, and leatherback sea turtle and the federally threatened loggerhead 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 turtles sightings have been reported from Carteret, Dare, Hyde, New Hanover, Onslow, and Pender counties (NCDENR NHP undated). 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). Similarly 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 are 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 turtles 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).

4.1.5 Birds

Piping Plover

The piping plover breeds on coastal beaches from Newfoundland and southeastern Quebec to North Carolina. These 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 ALF Bogue, although no actual occurrences have been recorded.

Red-Cockaded Woodpecker

RCW is a federally endangered and North Carolina 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 the Main Station, 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 the Main Station 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 the Main Station, there is a potential for RCW to occur. There is also a potential for RCW to occur at OLF Atlantic and ALF due to the presence of longleaf pine habitat. Surveys at ALF Bogue have not identified RCW, nor were suitable cavity trees identified that could be used by RCW for roosting and nesting. There are some RCW colonies located within 1 mile of Bogue Field, at Croatan National Forest, and it is possible that RCW could migrate to, and utilize ALF Bogue habitat. The longleaf pine habitat at ALF Bogue is not considered to be of high quality for this species, which lowers their potential for occurrence.

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).

4.1.6 Mammals

Marine Mammals

Five whale species could potentially occur in waters adjacent to MCAS Cherry Point properties and range areas, including 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). All of these 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). Manatees were sighted in July 2000 in the Atlantic Intracoastal Waterway north of State Highway 101, August 1999 near Calico Creek, August 1999 along the Beaufort waterfront, June 1998 near Hammocks Beach State Park, August 1994 near Sportsman Pier in Atlantic Beach, August 1994 near the

U.S. Coast Guard Station at Fort Macon, November 1992 in Barden Inlet, October 1990 in Peltier Creek, and August 1983 in the nearshore area off the western end of Shackleford Banks (USFWS undated).

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 in regards to 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 in regards to programmatic actions such as ongoing delivery of ordnance at BT-9 and BT-11 has already been conducted by the NEPA program in regards to marine mammals and sea turtles as discussed in Section 4.2.6. In addition, MCAS Cherry Point has also received USFWS concurrence in regards to 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 is 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 shortnose sturgeon is MCAS Cherry Point's only federally listed fish species. 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). This species is 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 aquatic resource protection programs is supported.

4.2.3 Invertebrates

There are no federally listed invertebrate species listed for MCAS Cherry Point.

4.2.4 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.

Sea turtle management is discussed in Section 4.2.7.

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

4.2.6 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 coordinated with NMFS to obtain an IHA in regards to marine mammals, and that IHA was received in December 2010 (NMFS 2010).

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 regards 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.

4.2.7 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 IHA (issued 18 November 2010 for the period of 1 December 2010 through 30 November 2011, NMFS 2010), 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 implemented upon completion of the PAM system that is being developed for BT-9.

Hydrophone being deployed to listen for dolphin whistles.

Source: Secretary of Defense and Secretary of the Navy 2008

In addition to monitoring sweeps performed by Search and Rescue helicopters, 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 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.

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 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 cellular phone receives SMS communication indicating the potential presence of one or more dolphins in the BT-9 area. If BT-9 is active, responses to SMS communications could include:Range Operations trackers alerting pilots using the BT-9 area of the potential presence of dolphins;
- Pilot reporting of any potential animal sightings within the BT-9 area to Range Operations;
- Initiation of a camera search via the two stationary video systems set up at BT-9 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 SMS communications (with the appropriate time, date, personnel, and action information) received during active training at BT-9.

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 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 IHA received from NMFS, dated 18 November 2010 (NMFS 2010).

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 IHA received from NMFS, dated 18 November 2002 (NMFS 2010).

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 IHA received from NMFS, dated 18 November 2002 (NMFS 2010).

4.4 SPECIES AT-RISK

Species at-risk is defined for this INRMP as those species that are not federally listed, but are of conservation concern because of their rarity, proportion of the species population occurring at MCAS Cherry Point, or potential for the species to impact the military mission if it were to become listed. Thirty-six (36) species at-risk have been identified for MCAS Cherry Point based on information contained in North Carolina NHP reports, and studies and inventories conducted by MCAS Cherry Point NRD staff (USMC 2001), including bird data collected as part of the BASH program. Species include those considered rare by USFWS, NCWRC, or North Carolina NHP; federal species of concern and North Carolina special concern species; and species that are listed as threatened or endangered in North Carolina by NCWRC, but are not federally listed (Table 4.2). USFWS bird species of conservation concern known to occur at MCAS Cherry Point are also identified in Table 4.2. Table 4.2 includes status information (observed – O; potential to occur – P; or presence determined from BASH data – BASH) and the MCAS Cherry Point property they are associated with. The following classification system is used for species at-risk identified in Table 4.2:

- ***North Carolina Natural Heritage Program*** **(NHP) –** rare plant species designated by North Carolina NHP as follows:
  - **NHP SR-L –** significantly rare species having a limited range in North Carolina;
  - **NHP SR-O –** other significantly rare species having a sporadic range, or cannot be described by other SR categories;
  - **NHP SR-P –** significantly rare species located at periphery of their range in North Carolina;
  - **NHP SR-T –** significantly rare species throughout range; and,
  - **NHP W1 –** Watch List species that are rare, but relatively secure.
- ***North Carolina Endangered*** **(SE) –** any native or once-native species of wild animal whose continued existence as a viable component of North Carolina's fauna is determined by NCWRC to be in jeopardy, or any species of wild animal determined to be an "endangered species" pursuant to the ESA.
- ***North Carolina Threatened*** **(ST) –** any native or once-native species of wild animal which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range as determined by NCWRC, or one that is designated as a threatened species pursuant to the ESA.
- ***Federal Species of Concern*** **(FSC) –** species considered by USFWS as candidates for possible listing under the ESA;
- ***North Carolina Special Concern Species*** **(SCS) –** 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) –** any species which has not been listed by NCWRC as endangered, threatened, or special concern species, but which exists in North Carolina in small numbers and has been determined by NC NHP to need monitoring.
- ***Marine Mammal Protection Act*** **(MMPA) –** marine mammal species designated by NMFS for protection under the MMPA.

- ***USFWS Birds of Conservation Concern* (BCC) –** bird species, subspecies, and populations identified by USFWS as in need of additional conservation action for Bird Conservation Region 27 (Southeastern Coastal Plain).

Table 4.2. Species At-Risk Known, or with the Potential to Occur at MCAS Cherry Point Complex.

Common Name	Scientific Name	MCAS Cherry Point Status and Location	Federal	North Carolina
Plants				
Beach false foxglove (branched gerardia)	*Agalinis fasciculata*	OLF Atlantic (O) Main Station, BT-11, ALF Bogue, Pamlico Point, Maw Point, and Cat Island (P)	–	NHP SR-P
Beaked spikerush	*Eleocharis rostellata*	OLF Atlantic (O) Main Station, BT-11, ALF Bogue, Pamlico Point, Maw Point, and Cat Island (P)	–	NHP SR-O
Carolina goldenrod	*Solidago pulchra*	OLF Atlantic (O) Main Station (P)	FSC	NHP SR-L
Chapman's sedge	*Carex chapmanii*	Main Station and ALF Bogue (O)	FSC	NHP W1
Globe beaksedge	*Rhynchospora globularis* var. *pinetorium*	OLF Atlantic (O) Main Station and ALF Bogue (P)	–	NHP SR-P
Gulf Coast spikerush	*Eleocharis cellulosa*	BT-11 (O) Main Station, OLF Atlantic, ALF Bogue, Pamlico Point, Maw Point, and Cat Island (P)	–	NHP SR-T
Lanceleaf primrose-willow	*Ludwigia lanceolata*	OLF Atlantic (O) Main Station, BT-11, ALF Bogue, Pamlico Point, Maw Point, and Cat Island (P)	–	NHP SR-P
Moundlily yucca	*Yucca gloriosa*	Cat Island (O) BT-11, ALF Bogue, Pamlico Point, Maw Point, and Cat Island (P)	–	NHP SR-P
Shortbristle beaksedge	*Rhynchospora breviseta*	OLF Atlantic (O) Main Station (P)	–	NHP SR-P
Smooth sawgrass	*Cladium mariscoides*	OLF Atlantic (O) Main Station, BT-11, ALF Bogue, Pamlico Point, Cat Island and Maw Point (P)	–	NHP SR-O
Shortleaf yelloweyed grass	*Xyris brevifolia*	OLF Atlantic (O)	–	NHP SR-P
Springflowering goldenrod	*Solidago verna*	Main Station (O) OLF Atlantic and ALF Bogue (P)	FSC	ST

Common Name	Scientific Name	MCAS Cherry Point Status and Location	Federal	North Carolina
West Indian meadowbeauty	*Rhexia cubensis*	OLF Atlantic (O) Main Station and ALF Bogue (P)	–	NHP SR-P
Winged primrose-willow	*Ludwigia alata*	Main Station and OLF Atlantic (O) BT-11, ALF Bogue, Pamlico Point, Maw Point, and Cat Island (P)	–	NHP SR-P
Invertebrates				
Graceful clam shrimp	*Lynceus gracilicornis*	Main Station (O) BT-11, OLF Atlantic, ALF Bogue, Pamlico Point, Maw Point, and Cat Island (P)	–	SCS
Fish				
Bridle shiner	*Notropis bifrenatus*	Main Station (O)	–	SE
Herpetofauna				
Carolina gopher frog	*Rana capito capito*	Main Station (P)	–	ST
Carolina pigmy rattlesnake	*Sistrurus miliarius miliarius*	Main Station (O) OLF Atlantic and ALF Bogue (P)	–	SCS
Carolina watersnake	*Nerodia sipedon williamengelsi*	BT-11 and Pamlico Point (O) OLF Atlantic and Maw Point (P)	–	SCS
Neuse River waterdog	*Necturus lewisi*	Main Station (P)	–	SCS
Northern diamondback terrapin	*Malaclemys terrapin terrapin*	BT-11, OLF Atlantic, Pamlico Point, Maw Point, and Cat Island (O) ALF Bogue (P)	FSC	SCS
Timber rattlesnake	*Crotalus horridus*	Main Station, OLF Atlantic, ALF Bogue (P)	–	SCS
Birds				
Bachman's sparrow	*Aimophila aestivalis*	Main Station, OLF Atlantic, ALF Bogue (P)	FSC	SCS
Bald eagle	*Haliaeetus leucocephalus*	Main Station (O) BT-11, OLF Atlantic, ALF Bogue, Pamlico Point, Maw Point, and Cat Island (P)	BCC (b) and Eagle Act	ST
Black-necked stilt	*Himantopus mexicanus*	BT-11 (O) ALF Bogue, Pamlico Point, Maw Point, and Cat Island (P)	–	SR
Black rail	*Laterallus jamaicensis*	BT-11 and OLF Atlantic (O) Pamlico Point and Maw Point (P)	FSC and BCC	SCS

Common Name	Scientific Name	MCAS Cherry Point Status and Location	Federal	North Carolina
Black skimmer	*Rhynchops niger*	BT-11 (O) ALF Bogue, Pamlico Point, Maw Point, and Cat Island (P)	FSC and BCC	SCS
Common tern	*Sterna hirundo*	BT-11, Pamlico Point, Maw Point, and Cat Island (O) Main Station (BASH)	–	SCS
Eastern painted bunting	*Passerina ciris*	OLF Atlantic, ALF Bogue (P)	–	SCS
Gull-billed tern	*Gelochelidon nilotica aranea*	BT-11 (O) OLF Atlantic, ALF Bogue, Pamlico Point, Maw Point, and Cat Island (P)	BCC	ST
Henslow's sparrow	*Ammodramus henslowii*	BT-11, OLF Atlantic, ALF Bogue (P)	FSC	SCS
Little blue heron	*Egretta caerulea*	BT-11 and Cat Island (O) Pamlico Point and Maw Point (P)	–	SCS
Northern harrier	*Circus cyaneus*	BT-11 (O) OLF Atlantic, Pamlico Point and Maw Point (P)	FSC	SR
Short-billed dowitcher	*Limnodromus griseus*	Main Station (BASH)	BCC (non-breeding)	–
Snowy egret	*Egretta thula*	BT-11 and Cat Island (O) Pamlico Point and Maw Point (P)	–	SCS
Tricolored heron	*Egretta tricolor*	BT-11 and Cat Island (O) Pamlico Point and Maw Point (P) Main Station (BASH)	–	SCS
Marine Mammals				
Common bottlenose dolphin	*Tursiops truncatus*	Main Station, BT-11, ALF Bogue, Pamlico Point, Maw Point, Cat Island, and BT-9 (O)	MMPA	–

Status codes: O – occurs; P – potential to occur; BASH – Bird/Wildlife Aircraft Strike Hazard data; BCC – USFWS Birds of Conservation Concern; Eagle Act – Bald and Golden Eagle Protection Act; FSC – federal species of concern; SCS – NCWRC special concern species; SE – NCWRC endangered species; SR – North Carolina significantly rare species; ST – NCWRC threatened species; NHP SR-L – NHP significantly rare, limited range in North Carolina; NHP SR-O – NHP significantly rare, other (range sporadic or cannot be described by other SR categories); NHP SR-P – NHP significantly rare, at periphery of range in North Carolina; NHP SR-T – NHP significantly rare, throughout range; NHP W1 – NHP Watch List, rare, but relatively secure; and MMPA –Marine Mammal Protection Act

Sources: LeBlond et al. 1994, USMC 2001, NCDENR NHP 2004, NCWRC 2008, USFWS 2008b, USFWS 2009, North Carolina Department of Agriculture and Consumer Services 2010, NCDENR NHP 2010b, Tetra Tech 2012.

4.4.1 Plants

Unless otherwise indicated, the habitat and species description information provided in the following sections was taken from Weakley's Flora Manual (UNC Herbarium 2010 [http://www.herbarium.unc.edu/WeakleyFlora2010Mar.pdf]). Similarly, information on species distribution was taken from USDA PLANTS Database (USDA NRCS 2011 [http://plants.usda.gov/java/]).

Beach False Foxglove (Branched Gerardia)

Beach false foxglove (*Agalinis fasciculata*) (common name reported as branched gerardia in NCDENR NHP 2004 and LeBlond et al. 1994) is a North Carolina NHP significantly rare species that has been observed in pine habitat of OLF Atlantic during rare plant surveys (Table 4.2) (LeBlond et al. 1994, USMC 2001). Probability of occurrence at other MCAS Cherry Point parcels is low. This plant has been documented in the south east and south central portions of the State, on the Coastal Plain from Craven County to Carteret County southward. Beach false foxglove is associated with prairie, sandy open ground, thickets, woodland edges, and fallow field habitats and flowers from August through October (Missouri Department of Conservation 2010).

Beaked Spikerush

Beaked spikerush (*Eleocharis rostellata*) has a limited range in the Coastal Plain of eastern North Carolina and has been identified within marshland habitat of OLF Atlantic (Table 4.2) (LeBlond et al. 1994, USMC 2001). There is good to excellent potential for this species to occur at BT-11, and a low to moderate potential for occurrence at the Main Station, ALF Bogue, Pamlico Point, Maw Point, and Cat Island. Beaked spikerush is considered significantly rare by NHP because it has a sporadic range, or because it cannot be described by other NHP significantly rare categories. Beaked spikerush is uncommon in North Carolina, occurring on the outer Coastal Plain from Currituck to Brunswick counties (LeBlond et al. 1994); however beaked spikerush is widespread throughout North America. This rush occurs in brackish and freshwater tidal marshes, often in association with other salt marsh species such as those in the genera *Scirpus* and *Spartina* (USDA Forest Service 2011). Beaked spikerush has a flowering period spanning July through September.

Carolina Goldenrod

Carolina goldenrod (*Solidago pulchra*) has been identified in the wet pine flatwood community, located north of SR 1387 near the western boundary of OLF Atlantic (Table 4.2) (USMC 2001). It occurs within burned pond pine tall pocosin habitat near the west side of the runway complex, in a scrape located near the southwest corner of the runway complex, in a powerline corridor located just south of SR 1387, and in a powerline corridor located near the southwest boundary. Carolina goldenrod is listed as a NHP significantly rare plant species with a limited range in the Coastal Plain of southeast North Carolina. This species occurs in wet pine savannas and seepage bogs and flowers from July–September. The distinct basal leaves and very long petiole of Carolina goldenrod make it relatively easy to discern from similar species (e.g., *Solidago stricta*

and *S. gracillima*). Following fire events, sterile rosettes often outnumber flowering plants 100 to 1.

Chapman's Sedge

Chapman's sedge (*Carex chapmanii*) is a federal species of concern that occurs in the eastern part of the State and has been observed at the Main Station and ALF Bogue in floodplain swamps of small non-tidal streams (Table 4.2) (LeBlond et al. 1994, USMC 2001). Five populations of this species are known to occur, and are associated with habitat located along the upper edge of floodplains of small streams located inland from the reach of tidal influence. Populations of Chapman's sedge at the Main Station are located at Miry Branch, a tributary of Tucker Creek, along the tributary of Anderson Creek, along Bartlett Creek, and along a tributary of the Neuse River near the Bachelor Officers' Quarters. Chapman's sedge is a NHP Watch List plant species that is considered rare, but relatively secure (NCDENR NHP 2004).

Globe Beaksedge

Globe beaksedge (*Rhynchospora globularis* var. *pinetorium*) is a North Carolina NHP significantly rare species that has been observed within wet scrapes at OLF Atlantic (Table 4.2) (LeBlond et al. 1994, USMC 2001). There is a low potential for this species to occur at the Main Station and ALF Bogue. It is classified as significantly rare due to populations located at the periphery of their range in the southeast corner of North Carolina, with known occurrences in Carteret, Pender, Brunswick, and Columbus counties, where it is at the northern limits of its range. Globe beaksedge occurs in sandy or peaty depressions, wet ditches, transmission line corridors, and savannas; and flowers from June to September. The variety *pinetorium* can be distinguished from other varieties of globe beaksedge using certain characteristics of the achenes.

Gulf Coast Spikerush

Gulf Coast spikerush (*Eleocharis cellulosa*) is a significantly rare plant species that has been identified within the marshland habitat of BT-11 (Table 4.2) (USMC 2001). This species is classified as significantly rare throughout its range (NCDENR NHP 2004), and at Piney Island it has been observed along the shoreline in sandy areas. Gulf Coast spikerush is also has an excellent potential to occur at OLF Atlantic, and a low to moderate potential to occur at the Main Station, ALF Bogue, Pamlico Point, Maw Point, and Cat Island due to the presence of suitable habitat. Gulf Coast spikerush occurs mainly in the eastern part of the State in interdunal swale ponds with a variety of salinity levels and flowers from July to September. In North Carolina it is known only from Carteret, Dare, Hyde, and Onslow counties, where it occurs at the northern limits of its range (LeBlond et al.1994).

Lanceleaf Primrose-willow

Lanceleaf primrose (*Ludwigia lanceolata*) is a North Carolina NHP significantly rare species that has been observed at OLF Atlantic within wet scrapes and borrow ponds (Table 4.2) (LeBlond et al. 1994, USMC 2001). At the time of the survey (1993), the population of lanceleaf primrose-willow documented at OLF Atlantic represented one of two known populations of this species in

the State, near the northern limit of its range. This species is classified as significantly rare due to populations located at the periphery of their range in North Carolina. Lanceleaf primrose-willow has a low potential to occur at the Main Station, BT-11, ALF Bogue, Pamlico Point, Maw Point, and Cat Island due to the presence of marginal suitable habitat. Lanceleaf primrose is a coastal species that occurs in interdunal ponds and open wet areas and flowers from August to September.

Moundlily Yucca

Moundlily yucca (*Yucca gloriosa*) is a NHP listed significantly rare plant that occurs on Cat Island within maritime forest habitat (LeBlond et al. 1994). This species does not contain any State or federal protection status, but is considered a significantly rare NHP plant species due to populations located at the periphery of their range in North Carolina. Moundlily yucca is secure in most of its range but is an uncommon inhabitant of the North Carolina coast. It occurs on dunes and shell middens. There is a low to moderate potential for this species to occur at ALF Bogue, and there is a low probability for this species to occur at BT-11, OLF Atlantic, Pamlico Point, and Maw Point.

Shortbristle Beaksedge

Shortbristle beaksedge (*Rhynchospora breviseta*) is a North Carolina NHP significantly rare species that has been observed within a savannah-like wet scrape at OLF Atlantic (Table 4.2) (LeBlond et al. 1994, USMC 2001). This species also has a low potential for occurrence at the Main Station. Shortbristle beaksedge is classified as significantly rare due to populations located at the periphery of their range in North Carolina. In the State this species is restricted to the outer Coastal Plain south of the Neuse River, where it is at the northern limits of its range (LeBlond et al. 1994). It occurs primarily in wet savannas, but is also known to colonize disturbed areas such as roadsides and transmission line corridors. Shortbristle beaksedges are in flower between July and September.

Smooth Sawgrass

Smooth sawgrass (*Cladium mariscoides*) has been observed in the marshland habitat of OLF Atlantic (LeBlond et al. 1994). This species is considered significantly rare by NHP because it has a sporadic range, or because it cannot be described by other NHP significantly rare categories. Smooth sawgrass prefers strongly acidic to circumneutral soils such as seeps on the edges of brackish marshes, pond pine and pond cypress flats, mucky seepage bogs, and montane fens and bogs. While secure in much of its range, it is rare in North Carolina, South Carolina, and Florida. It is in flower between July and September. There is good to excellent potential for this species to occur at BT-11, and a low to moderate potential for occurrence at the Main Station, ALF Bogue, Pamlico Point, Maw Point and Cat Island (LeBlond et al. 1994).

Shortleaf Yelloweyed Grass

Shortleaf yelloweyed grass (*Xyris brevifolia*) is a North Carolina NHP significantly rare species that has been observed within wet scrapes at OLF Atlantic (Table 4.2) (LeBlond et al. 1994, USMC 2001). This species is classified as significantly rare due to populations located at the

periphery of their range in North Carolina, with occurrences known from Carteret, Onslow, Pender, Columbus, and Brunswick counties, where it occurs at the northern limits of its range. Yelloweyed grass occurs primarily in wet sandy soils of pinelands and in the margins of Carolina bay sand rims. This species flowers from June to August.

Springflowering Goldenrod

Springflowering goldenrod (*Solidago verna*) is a federal species of concern and a NCWRC threatened species that has been observed within the pine habitat of the Main Station (Table 4.2) (LeBlond et al. 1994, USMC 2001). There are 12 known populations of springflowering goldenrod at the Main Station (USMC 2001). Four populations are located in cleared areas adjacent to the airfield, and adjacent woods located between the airfield area and the Hancock housing area located off-site along North Carolina Highway 101. Other populations have been found in the following areas: along the edge of, and in the woods adjacent to Gaston Road in the Ordnance Area; in a powerline corridor southwest of Bartlett Pond; and in woods adjacent to Cinder Road, south of Roosevelt Boulevard. This species has a very low probability to occur at OLF Atlantic and ALF Bogue (LeBlond et al. 1994). Springflowering goldenrod normally occurs in open or sparsely wooded areas on Rains soils where competition has been reduced by burning or mowing. It is associated with pine savannahs, pocosins, and pine barrens (USMC 2009a). In North Carolina this species is restricted to the southeastern area of the State, with known occurrences in Jones and Craven counties representing the most and largest populations of this species within its range.

West Indian Meadowbeauty

West Indian meadowbeauty (*Rhexia cubensis*) is a North Carolina NHP significantly rare species that has been observed within wet scrapes and borrow ponds at OLF Atlantic (Table 4.2) (LeBlond et al. 1994, USMC 2001). There is a low potential for occurrence of this species at the Main Station and ALF Bogue. This species is classified as significantly rare due to populations located at the periphery of their range in North Carolina. In the State it is only known from Carteret, Onslow, New Hanover, and Brunswick counties, where it is at the northern limit of its range. West Indian meadowbeauty is primarily associated with limesink ponds.

Winged Primrose-willow

Winged primrose-willow (*Ludwigia alata*) is a North Carolina NHP significantly rare species that has been observed within the tidal, freshwater marsh habitat of the Main Station, and wet scrapes and borrow ponds of OLF Atlantic (Table 4.2) (LeBlond et al. 1994, USMC 2001). This species is classified as significantly rare due to populations located at the periphery of their range in North Carolina, and is known to occur on the outer Coastal Plain from Pasquotank County to Brunswick County. Winged primrose-willow has a low potential for occurrence at the Main Station, BT-11, ALF Bogue, Pamlico Point, Maw Point, and Cat Island due to the presence of marginal suitable habitat. Preferred habitats include interdunal ponds and fresh to slightly brackish marshes.

4.4.2 Invertebrates

Graceful Clam Shrimp

Graceful clam shrimp (*Lynceus gracilicornis*) is a NCWRC special concern species that is widespread and common throughout much of its range in the southeastern states. This invertebrate was documented in a temporary pool at the Main Station; and has a low probability of occurrence at other MCAS Cherry Point parcels (Table 4.2) (LeBlond et al. 1994, USMC 2001). The graceful clam shrimp is an inhabitant of temporary wetlands and vernal pools and has adapted a reproductive strategy to suit the temporary nature of its environment (NatureServe Explorer 2010). This species has been documented at several sites within the Coastal Plain, but is otherwise known from four counties in Texas and one county in Florida (LeBlond et al. 1994).

4.4.3 Fish

Bridle Shiner

Bridle shiner (*Notropis bifrenatus*) is a NCWRC special concern species that has a historical record of occurrence in the 1960 Natural Heritage Inventory of Tucker Creek at the Main Station (Table 4.2) (LeBlond et al. 1994, USMC 2001). Subsequent surveys of Tucker Creek have not identified this species and it is currently thought to be extirpated from North Carolina (USMC 2001). The historic east coast range of this species included Maine south to North Carolina (NatureServe Explorer 2010). Bridle shiners are found in a 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 (NatureServe Explorer 2010).

4.4.4 Herpetofauna

Carolina Gopher Frog

Carolina gopher frog (*Rana capito capito*) is a NCWRC threatened species that has the potential to occur at the Main Station (Table 4.2) (LeBlond et al. 1994, USMC 2001). Although ALF Bogue is located within the range of Carolina gopher frog, the site does not contain suitable habitat to support this species. Carolina gopher frogs occur in the sandhills and southeastern Coastal Plain regions and require fishless ponds for breeding, virtually all of which are upland ephemeral ponds found in longleaf pine forests (wiregrass habitat for much of the year) (NCWRC 2012). The potential for occurrence at MCAS Cherry Point is low due to the presence of fish in the on-site ponds, and the lack of freshwater ponds within the existing and limited longleaf pine habitat.

Carolina Pigmy Rattlesnake

Carolina pigmy rattlesnake (*Sistrurus miliarius miliarius*) is a NCWRC special concern species that has been observed at the Main Station, and also has the potential to occur at OLF Atlantic and ALF Bogue (Table 4.2) (LeBlond et al. 1994, USMC 2001). Carolina pigmy rattlesnake is associated with pine flatwoods and sandy, open woodlands with pines, wiregrass, and scrub oaks, and is frequently observed near cypress ponds and other waterbodies (USMC 2009a). It is

expected to occur infrequently at the Main Station due to the low quality and extent of preferred habitat. Due to the presence of suitable habitat probability of occurrence at OLF Atlantic is excellent, with a moderate probability of occurrence expected at ALF Bogue (LeBlond et al. 1994).

Carolina Watersnake

Carolina watersnake (*Nerodia sipedon williamengelsi*) is a NCWRC special concern species that has been observed at Piney Island and Pamlico Point, and has the potential to occur at OLF Atlantic and Maw Point due to the presence of suitable habitat (Table 4.2) (USMC 2001). The BT-11 population appears to be quite large, with good to excellent habitat present at OLF Atlantic and Maw Point (LeBlond et al. 1994). Carolina watersnake (formerly Carolina saltmarsh snake) is endemic to North Carolina and occupies similar brackish marsh/salt marsh habitats that northern diamondback terrapin occurs in; however, the Carolina watersnake has a larger terrestrial component for such activities as basking, non-aquatic foraging, resting, and probably over-wintering. Aquatic foraging for small fish normally occurs in shallow, near-shore waters.

Neuse River Waterdog

Neuse River waterdog (*Necturus lewisi*) is a NCWRC special concern species that has the potential to occur in portions of the Neuse River located adjacent to the Main Station (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.

Northern Diamondback Terrapin

Northern diamondback terrapin (*Malaclemys terrapin terrapin*) is a federal species of concern and a NCWRC special concern species that has been observed nesting at BT-11 and Maw Point, and foraging at OLF Atlantic, Pamlico Point, and Cat Island (Table 4.2) (LeBlond et al. 1994, USMC 2001). This species occurs in brackish marsh/salt marsh habitats and tidal channels of sounds and estuaries that are bordered primarily by *Spartina* spp. (USMC 2009a). On Piney Island northern diamondback terrapin occurs in a relatively narrow strip of habitat that separates freshwater systems of BT-11 from the ocean, and excellent habitat for nesting and foraging are present, including the entire periphery of the island and man-made canals constructed on the island. This northern subspecies of diamondback terrapin is at its southern range limit in Pamlico Sound, and the population of northern diamondback terrapins of Rattan Bay at BT-11 is possibly the largest population of this species in North Carolina (LeBlond et al. 1994).

Foraging habitat at OLF Atlantic is considered good to excellent; however nesting habitat at this location is poor (LeBlond et al. 1994). At Pamlico Point the foraging and nesting habitat is considered good. Foraging habitat is also good at Cat Island; however nesting habitat is considered poor due to the presence of extensive bird rookeries. Northern diamondback terrapin

also has the potential to occur at ALF Bogue due to moderate quality foraging habitat; however this location lacks suitable nesting habitat.

Timber Rattlesnake

NCNHP records indicate that timber rattlesnakes (*Crotalus horridus*), a NCWRC special concern species, are known to occur in Carteret, Craven, and Pamlico counties (NCDENR NHP 2011). Individuals of this species, found in the lowlands of eastern North Carolina, are also known as "canebrake snakes" and are stout-bodied pit vipers that tend to be very light in coloration, often having a pinkish-tan color and dark chevrons (Snakes of North Carolina 2011). In the south, timber rattlesnakes are common in forested areas, especially cane thickets and swamps where they forage primarily on rodents (Conant and Collins 1998). The Main Station, OLF Atlantic, and ALF Bogue parcels contain suitable habitat to support timber rattlesnakes; however, this species has not been observed.

4.4.5 Birds

Species information including natural history and range for birds described in this section was taken from the Cornell Lab of Ornithology *All About Birds* website (Cornell Lab of Ornithology 2011 [http://www.allaboutbirds.org/Page.aspx?pid=1189]), except where otherwise indicated.

Bachman's Sparrow

NCNHP records indicate that Bachman's sparrow (*Aimophila aestivalis*), a federal species of concern and NCWRC special concern species, occurs in Carteret and Craven counties (NCDENR NHP 2011). Historically, this sparrow was most common in mature pine woodlands subject to frequent fires resulting in dry and dense grass understory and sparse shrub and mid-canopy strata (NatureServe Explorer 2010). Because most mature forest has been cut over throughout much of its range, Bachman's sparrow has adapted to open habitats such as clearcuts and utility rights-of-way, where a grassy understory occurs. This sparrow also inhabits overgrown fields, grassy orchards, and may occupy restored pine lands managed for the endangered RCW (Dunning 2006). The Main Station, OLF Atlantic, and ALF Bogue parcels all contain suitable habitat to support Bachman's sparrow; however, this species has not been observed at MCAS Cherry Point.

Another passerine also has the common name of Bachman's sparrow (*Vermivora bachmanii*), and is listed as federally endangered. Although this species range includes North Carolina, it is presumed to be extirpated, or possibly extirpated throughout all of its range (Ridgely et al. 2003), and is therefore not likely to occur at the Main Station or any of the outlying airfields.

Bald Eagle

Bald eagle (*Haliaeetus leucocephalus*) has been observed at the Main Station since 1983, and has the potential to occur at all other land parcels of MCAS Cherry Point (Table 4.2) (LeBlond et al. 1994, USMC 2001). A pair of bald eagles has routinely been observed nesting in a pine tree located adjacent to the ordnance area. This species was removed from the federal ESA species list in 2009, but is still listed as threatened by NCWRC. Federal protection for this species is

afforded by the Bald and Golden Eagle Protection Act (16 USC §668–668c) (Eagle Act), and USFWS has designated it as a BCC species for the area (USFWS 2009). Bald eagles create large nests of sticks lined with small-sized woody material in large trees. On occasion, a pair may create a nest on the ground or on a cliff. Bald eagles prefer fish but are opportunistic and so will feed on large birds, mammals, and carrion.

Black-necked Stilt

Black-necked stilt (*Himantopus mexicanus*) is North Carolina significantly rare species that has been observed at BT-11 (Table 4.2) (USMC 2001, Tetra Tech 2012). Due to the presence of suitable habitat, black-necked stilt has the potential to occur at ALF Bogue, Pamlico Point, Maw Point and Cat Island. These birds are associated with shallow fresh and saltwater wetlands where they feed on invertebrates while wading or swimming.

Black Rail

Black rail (*Laterallus jamaicensis*) is a federal species of concern, a NCWRC special concern species, and a BCC species for the region that has been observed at BT-11 and OLF Atlantic (Table 4.2) (LeBlond et al. 1994, USMC 2001, Tetra Tech 2012). In 1992 territorial male black rails were heard calling at 19 sites within the brackish marsh community on Piney Island (USMC 2001). Although this survey identified this species in areas adjacent to dikes at Piney Island, it likely occurs and breeds to some extent throughout the marsh habitat. In May and April 2011, a marsh bird survey was conducted at BT-11 using playback calls (Tetra Tech 2012). The black rail was one of the focal species of this survey. Six detections were recorded in April and six in May (Tetra Tech 2012). 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 OLF 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.

Black Skimmer

Black skimmer (*Rhynchops niger*) is a federal species of concern and a NCWRC special concern species that has been observed nesting at BT-11 (Table 4.2) (LeBlond et al. 1994, Tetra Tech 2012) within a bird colony that also contained common terns (*Sterna hirundo*) and nesting gull-billed terns (*Gelochelidon nilotica aranea*) (USMC 2001). Black skimmer is also a USFWS BCC species for the region. There is a potential for this species to also occur at ALF Bogue, Pamlico Point, Maw Point, and Cat Island due to the presence of suitable habitat. Black skimmers are observed along the shore where they forage for fish by flying over the water surface while dragging their lower bill through the water and grabbing fish when encountered. These are ground-nesting birds and large nesting colonies are known to occur on North and South Core Banks, Cape Lookout National Seashore.

Common Tern

Common tern is a NCWRC special concern species and a BCC species for the region observed at BT-11 in association with a colony containing black skimmers and gull-billed terns (Table 4.2) (USMC 2001). Common tern has also established rookeries at Pamlico Point, Maw Point, and Cat Island (USMC 2001). BASH data also suggests that this species likely occurs at the Main Station. This species of tern build nests of dead vegetation on the ground on islands, marshes, or beaches adjacent to lakes and ocean. They forage for fish and insects by hovering for a brief period before plunging into the water after a prey item.

Eastern Painted Bunting

NCNHP records indicate that eastern painted buntings (*Passerina ciris*), a NCWRC special concern species, are known to occur in Carteret County (NCDENR NHP 2011). These ground feeders prefer scrub–shrub and open woodlands along the Atlantic Coast, but are also found in hedges and yards where they forage on invertebrates and seeds. Painted bunting nests are a woven hollow nodule of plant material lined with hair or fine grass, and is usually placed in low vegetation. Both OLF Atlantic and ALF Bogue contain suitable habitat for eastern painted bunting; however, this species has not been observed at MCAS Cherry Point.

Gull-billed Tern

Gull-billed tern is a NCWRC threatened species, and a USFWS BCC species for the region that has been observed nesting at BT-11 in association with a bird colony containing black skimmers and common terns (Table 4.2) (LeBlond et al. 1994, USMC 2001, Tetra Tech 2012). Colonies of ground-nesting water birds are a typical feature of Piney Island, although the numbers of birds are typically small, with nesting site locations shifting from year to year. Gull-billed tern nesting sites are limited to sandy shores located around the periphery of the island. Several birds and eight nests containing eggs were identified nearshore in the upper beach community near Newstump Point. Gull-billed tern has the potential to occur at the two outlying airfields and the three historic bombing targets due to the presence of suitable habitat. This species of tern nests on gravelly or sandy beaches and feeds on a variety of items including fish, insects, lizards, aquatic animals, occasionally the young of other species.

Henslow's Sparrow

NCNHP records indicate that Henslow's sparrows (*Ammodramus henslowii*), a federal species of concern and NCWRC special concern species, are known to occur in Carteret County (NCDENR NHP 2011). This grassland sparrow inhabits large fields with a tall, dense grass layer absent of live woody vegetation. These birds have also been known to use drier portions of salt marshes. Henslow's sparrows forage on the ground and will lay two to five, white-speckled eggs in grass nests placed just above the ground. Although the BT-11, OLF Atlantic, and ALF Bogue parcels contain suitable habitat for Henslow's sparrow, this species has not been observed at these locations.

Little Blue Heron

Little blue heron (*Egretta caerulea*) is a NCWRC special concern species that has been observed at BT-11 and Cat Island (Table 4.2) (USMC 2001, Tetra Tech 2012). Pamlico Point and Maw Point also have the potential to support this species due to the presence of suitable habitat. Little blue herons are birds of aquatic systems including swamps, estuaries, rivers, ponds and lakes. These birds nest in colonies with other herons in trees or shrubs, and in 1993 176 little blue heron nests were identified at Cat Island, representing the second largest nesting site for little blue herons in the State for 1993 (LeBlond et al. 1994). Little blue herons have a varied diet including small fish, amphibians and aquatic invertebrates.

Northern Harrier

Northern harrier (*Circus cyaneus*) is a federal species of concern and a North Carolina significantly rare species that has been observed at BT-11 (Table 4.2) (USMC 2001, Tetra Tech 2012). It also has the potential to nest and breed within marsh habitat of OLF Atlantic, Pamlico Point, and Maw Point, although this is expected to occur rarely (LeBlond et al. 1994). Northern harriers prefer open habitat including wetlands, meadows, pastures, prairies, grasslands, croplands, and riparian woodlands. They hunt while flying low over open habitat for a variety of prey including small mammals, birds, reptile, and frogs. Harriers build platform nests of vegetation on the ground in open meadows.

Short-billed Dowitcher

Short-billed dowitcher (*Limnodromus griseus*) is likely present as a winter resident at the Main Station based on a reported aircraft strike with this species in the BASH dataset (Table 4.2). The non-breeding population of this species is a USFWS BCC for the region. Short-billed dowitchers breed in the north but winter on coastal mud flats and brackish lagoons. During migration, this species prefers tidal flats, beaches, and salt marshes but is also occurs in freshwater mud flats and flooded agricultural fields. Short-billed dowitchers forage on aquatic invertebrates by probing soft substrate and occasionally submerging the head.

Snowy Egret

Snowy egret (*Egretta thula*) is a NCWRC special concern species that has been observed at BT-11 and nesting at Cat Island (Table 4.2) (LeBlond et al. 1994, USMC 2001, Tetra Tech 2012). Pamlico Point and Maw Point also have the potential to support this species due to the presence of suitable habitat. Snowy egrets are a bird of both freshwater and saline marsh communities that nest in trees in mixed-species colonies. These birds forage on invertebrates by stalking.

Tricolored Heron

Tricolored heron is a NCWRC special concern species that has been observed at BT-11 and nesting at Cat Island (Table 4.2) (LeBlond et al. 1994, USMC 2001, Tetra Tech 2012). Pamlico Point and Maw Point could potentially support this species due to the presence of suitable habitat, and presence of tricolored heron at the Main Station is supported by a BASH record for this species. Tricolored herons prefer marsh communities, and nest in trees in mixed-species

colonies. In 1993 466 tricolored heron nests were identified at Cat Island, the largest nesting site for tricolored herons observed in 1993 within the State (LeBlond et al. 1994). These birds forage on fish by stalking.

4.4.6 Marine Mammals

Common Bottlenose Dolphin

Common bottlenose dolphin is protected by MMPA and has been observed in offshore waters adjacent to all land parcels of MCAS Cherry Point, with the exception of OLF Atlantic (Table 4.2) (USMC 2001). At the Main Station this dolphin species has been observed in the Neuse River and Slocum Creek. It has also been observed in the vicinity of BT-9 and within Pamlico Sound. Pelagic populations of this species inhabit offshore waters along the continental shelf while coastal populations often migrate into bays. Dolphins are usually observed in groups of a dozen or so individuals and feed on invertebrates and fish (NMFS 2011). MCAS Cherry Point will be implementing a PAM monitoring program for common bottlenose dolphin that is described in Section 4.2.7.

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.
- **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.

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 a number of 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 the Main Station. Point count stations were established at OLF Atlantic and ALF 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. 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 ALF 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. 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 the Main Station. 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 OLF 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 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 SAMBI.
- **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.

6.0 FOREST MANAGEMENT AND PROTECTION

Undeveloped forested areas are essential to military training, offering expanses of land that provide a variety of conditions under which to develop combat skills. Maintaining the health and integrity of these areas so that the mission will continue to be supported is the primary goal of MCAS Cherry Point's forest management program. 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, maintenance of fire breaks, stand conversion, reforestation, road construction and maintenance, and fire and insect disease protection.

6.2 RESTORATION OF LONGLEAF PINE FOREST

MCAS Cherry Point is currently implementing a program to restore longleaf pine habitat due to its historic significance and importance to wildlife, and the overall ecology of region. 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.

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.

Photograph showing one of the best stands of longleaf pine at Cherry Point.
Source: Mickler 2006

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. Longleaf pine stands are managed on a 120-year rotation to promote large diameter trees with large, seed producing crowns.

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 and often 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 longleaf restoration is desired. MCAS Cherry Point utilizes planting stock that consists of containerized longleaf seedlings, contract grown from seed collected locally to ensure seedlings are genetically suited to MCAS Cherry Point.

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. In regenerated pine stands pre-commercial thinning is often used to remove undesirable species and reduce densities and competition to promote growth. Mechanical methods such as 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.

6.3 WILDLAND FIRE MANAGEMENT, FIRE SUPPRESSION, AND PRESCRIBED BURNS

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 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

Representative photograph of a prescribed fire in forest habitat. Nantahala National Forest, North Carolina. USDA Forest Service photograph.

Source: Rachelle 2008

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 WFMP (USMC 2009b) is the primary guidance outlining MCAS Cherry Point's activities for meeting these goals. Developed in accordance with MCO 5090.2A, the Cherry Point 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), OLF Atlantic, and ALF 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.

6.4 WILDLAND FIRE RISK ASSESSMENT

Development of the WFMP included preparation of a wildfire risk assessment that utilized a fuel model developed by USFS (USMC 2009b). 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 assessment is also conducted each year that considers precipitation levels (precipitation and drought), compares the current wildland fire potential and fuel loads with historical conditions and fire patterns, and assesses the status of current fuel loads (disease, dieback, or blowdown). 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 assessment 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.

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

6.6 FOREST PEST MANAGEMENT

The southern pine beetle is one of the primary forest pests at MCAS Cherry Point. This beetle has heavily impacted the loblolly pine population of ALF Bogue, which received damage from Hurricanes Bertha and Fran in 1995 (USFS 1997). Timber harvesting at ALF Bogue to prevent the spread of the beetle infestation currently has approximately 80% of the loblolly pine compartments in several stages of regeneration (USMC 2009b). MCAS Cherry Point will continue to monitor stands and implement remedial actions as necessary to control beetle infestations.

6.7 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.

- **Action 6-01 –** Align forest management with the military mission, such as providing accessibility and recreation.
- **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 –** Control southern pine beetle infestations.

OBJECTIVE FMP2: Promote responsible timber harvesting.

- **Action 6-05 –** Manage forests to maintain a sustainable flow of forest products.
- **Action 6-06 –** Maintain a forest inventory, prescriptions, and sales database.
- **Action 6-07 –** Cruise standing timber for volume estimations.
- **Action 6-08 –** Mark timber for sales.
- **Action 6-09 –** Execute timber sales.
- **Action 6-10 –** Ensure timber sale and restoration contract requirements are met (e.g., implementation of BMPs, hardwood protections).

OBJECTIVE FMP3: Implement WFMP.

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

7.0 AQUATIC RESOURCE AND WATER QUALITY MANGEMENT

MCAS Cherry Point is located in the Neuse River Basin. USACE-verified wetlands total approximately 1,600 acres, and wetland data for the Main Station and OLF Atlantic is currently being validated. 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 NCDENR 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 (NWPs), 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, residential construction, 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. or would exceed other criteria identified within NWPs is generally required (Federal Register Volume 67, pg. 2080). If project impacts are expected to exceed these criteria, an

individual permit that may require public review must be sought. Since 2005 MCAS Cherry Point has utilized NWPs for 12 projects.

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). Although permits may be obtained for filling of wetlands in accordance with EO 11990 and State and federal regulations, MCAS Cherry Point has effectively avoided any fill of jurisdictional wetlands over the past 10 years. 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).

In 2007, MCAS Cherry Point investigated the potential for off-site coastal wetland mitigation across multiple counties in eastern North Carolina. The potential for wetland mitigation in fresh–brackish wetland communities was also studied at discreet locations of MCAS Cherry Point. Off-site mitigation may provide a preferred alternative to meet watershed protection and ecosystem goals and meet future mission requirements. The enhancement and/or restoration of wetlands or streams on DoD property may also be an acceptable means for mitigating impacts on wetlands to meet permit conditions as required by USC Title 33 §1344. Post-restoration monitoring of created, restored, or enhanced wetlands would likely be required to ensure success of wetland mitigation projects.

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 $^{1}/_{3}$ 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 NCDENR 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 NCDENR are required to conduct a wetland delineation so that impacts can be assessed, avoided, and minimized. MCAS Cherry Point has conducted wetland delineations on most of its properties. The current focus of wetland management is to verify existing delineations and to close data gaps between NWI wetland acreages for MCAS Cherry Point and to replace this data with field verified wetland delineation data. Wetland delineations are approved by the USACE so an understanding of jurisdiction can be obtained.

7.2 WATERSHED PROTECTION

7.2.1 Neuse Watershed

The Neuse River flows approximately 200 miles from its headwaters in Orange and Person Counties in central North Carolina to its mouth at the Pamlico Sound, just downstream from the Main Station. The Neuse River is North Carolina's third largest river basin and has a drainage area of 6,234 square miles, which represents 8.8% of the State. Since it feeds one of the nation's largest and most productive coastal estuaries (Albemarle-Pamlico National Estuary), the Neuse River has played a prominent role in the State's fishing history. The Albemarle-Pamlico estuary system is a nursery for 90% of the commercial seafood landings within the State.

A portion of MCAS Cherry Point is situated within the Neuse River Basin and is therefore 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 NCDENR, 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, and apply to uses 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. The Neuse River Basin has protective rules in place, including protection and maintenance of riparian buffers, as administered by NCDENR for the river basin.

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.

7.3 FLOODPLAIN PROTECTION

USACE regulates discharges of dredged or fill materials within 100-year floodplains, as identified through FEMA's flood insurance rate. Most NWPs cannot be obtained for projects expected to impact 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. A Final Stormwater Pollution Prevention Plan (SWP3) (USMC 2005) was developed for the Main Station and outlying facilities in accordance with Section 402(p)(3)(B) of the CWA and provisions set forth by the NCDENR Division of Water Quality and MCAS Cherry Point's NPDES Permit. The purpose of the SWP3 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 SWP3 is subject to annual review by NCDENR Division of Water Quality, and MCAS Cherry Point is required to update the SWP3 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 SWP3 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 SWP3. Below the Program Manager are personnel responsible for on the ground-implementation of the SWP3 (Tier 2 and Tier 3). In addition, the Waste Water Advisory Board, which also serves as the Stormwater Pollution Prevention Team, assists the Program Manager with implementing, evaluating, and updating of the SWP3. This advisory board 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 March 9, 2011. There are five outfalls located on the Main Station that require monitoring as a condition of the MCAS Cherry Point NPDES Permit; these outfalls are located on Schoolhouse Branch, Sandy Branch, Luke Rowe's Gut, Mill Creek, and Jack's Branch. Monitoring requirements include water quality and quantitative monitoring, as well as qualitative monitoring. The purpose of the qualitative monitoring is to evaluate the effectiveness of the SWP3 and to identify any new sources of stormwater pollution. There are no monitoring requirements at any of the outlying fields.

In addition to stormwater runoff, industrial activities that occur at the Main 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 SWP3 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. All MCAS Cherry Point properties are located within North Carolina Coastal Zone counties.

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.

NCDENR 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 (NCDENR 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 (NCDENR 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 regards to water resource protection.
- **Action 7-03 –** Identify suitable wetland restoration areas and monitor sensitive wetland areas.
- **Action 7-04 –** Ensure BMPs recommended in the MCAS Cherry Point SWP3 and Integrated Contingency Plan (ICP) are implemented appropriately, and that the SWP3 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.

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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. 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 NCDENR 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 2006). In addition, MCAS Cherry Point's SWP3 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 2005).

The MCAS Cherry Point SWP3 is updated periodically to reflect current stormwater management issues. 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 2005). 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 2005). The land disturbing permit is obtained from the NCDENR Division of Land Quality and a project-specific stormwater management permit from the NCDENR Division of Water Quality is also required prior to commencing work.

Erosion and sediment control is practiced throughout MCAS Cherry Point, especially during construction projects (USMC 2005). The Facilities Maintenance 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 for all land-disturbing projects that will impact 1 acre or more of land.
- **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 landscape and vegetation management projects.
- **Action 8-06** – Support ecosystem services focused initiatives.

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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, their 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 regards 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 the Main Station, and hunting within designated areas of ALF Bogue and OLF Atlantic (MCAS Cherry Point NRD 2007). More than 60,000 hours of hunting and fishing activities are logged every two years at MCAS Cherry Point (Secretary of Defense and Secretary of the Navy 2008), and $12,410 in revenue was obtained from permits issued in 2009 (1,141 hunting, fishing, combination hunting/fishing, or trapping permits). A total of 2,040 hunter trips were logged in 2009, resulting in take of 77 deer, and over 300 takes of other wildlife species, including wild

turkey, dove, fox, waterfowl, and small mammals. The most frequently taken animal was dove (246 takes in 2009). MCAS Cherry Point also participates in the Wounded Warrior Project, which is described in more detail in Section 10.2. Hunts provided in support of the Wounded Warrior Project include a waterfowl hunt in 2008, a deer hunt in 2009 (USMC 2008, USMC 2009e), and opportunities for both methods of hunting provided in 2010.

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 28 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 the Main Station. As part the reintroduction program for this species, 15 fox squirrel nest boxes were installed in the Ordnance Area of the Main Station 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-base 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, and helped coordinate a project for MCAS Beaufort that demonstrated the capabilities and benefits of a Bird-Radar (BirdRad) unit. MCAS Cherry Point has been at the forefront of application of BirdRad technologies, at MCAS Cherry Point and nationally. The BirdRad platform uses a commercially available radar unit that is customized to interface with a computer software application (Accipiter®) that facilitates the viewing and analysis of the radar target tracking (Secretary of Defense and Secretary of the Navy 2008). The use of this software in combination with radar technology provides NRMs a "live" picture of the airfield environment related to bird movement activities and stores information in a retrievable format for later viewing and analysis. Playbacks of stored information provide for an analysis of the potential for bird aircraft strikes around military airfields so that remedial actions can be developed and proposed. The opportunity to stream this radar information to the desktop of natural resources and airfield operations personnel is a fundamental next step in the future use of this system. This project, Web-enabled Bird-radar Data Analysis and Retrieval System (WebDARS), will provide significant business process improvements for BASH awareness and management. Funding for this effort has already been secured, and development of this application is anticipated to be completed during the plan period for this INRMP.

Accipiter® software demonstrates a single hour of bird movements around MCAS Cherry Point, with tracks clearly visible.

Source: Secretary of Defense and Secretary of the Navy 2008

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 IWDM) program. Spotlight counts are conducted frequently to help managers monitor deer and other wildlife activity in the vicinity of the airfields. Thirty-one (31) deer were removed as part of the BASH program between 2007 and 2009. Nine turkeys removed in 2007 were relocated to MCB Camp Lejeune in 2007. In cooperation with NCWRC, seven wild turkeys were trapped and relocated to Croatan Game Lands in 2010. 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.

Beginning in 2008 routine BASH patrols were initiated to identify potential bird and wildlife hazards, with 455 patrols conducted in 2008 and 401 patrols conducted in 2009 (USMC 2008, USMC 2009e). All wildlife damage control techniques utilized at MCAS Cherry Point conform to federal and State permitting and legal requirements.

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. A Depredation Permit for bald eagles is also being sought for harassment of eagles that may pose an imminent threat to airfield safety.

MCAS Cherry Point has also 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. Through the BHWG, a newsletter has been developed to provide quarterly BASH updates to the operational community at MCAS Cherry Point. This newsletter, the *Engine Chow*, is a popular reading item for tenant 2d MAW units and MCAS Cherry Point staff.

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 umbellate*),
- 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*).

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, bats, woodchucks, 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 –** Control southern pine beetle infestations.
- **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 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.
- **Action 9-11 –** Continue to support WebDARS development and long-term data management of bird-radar information.

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 though 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

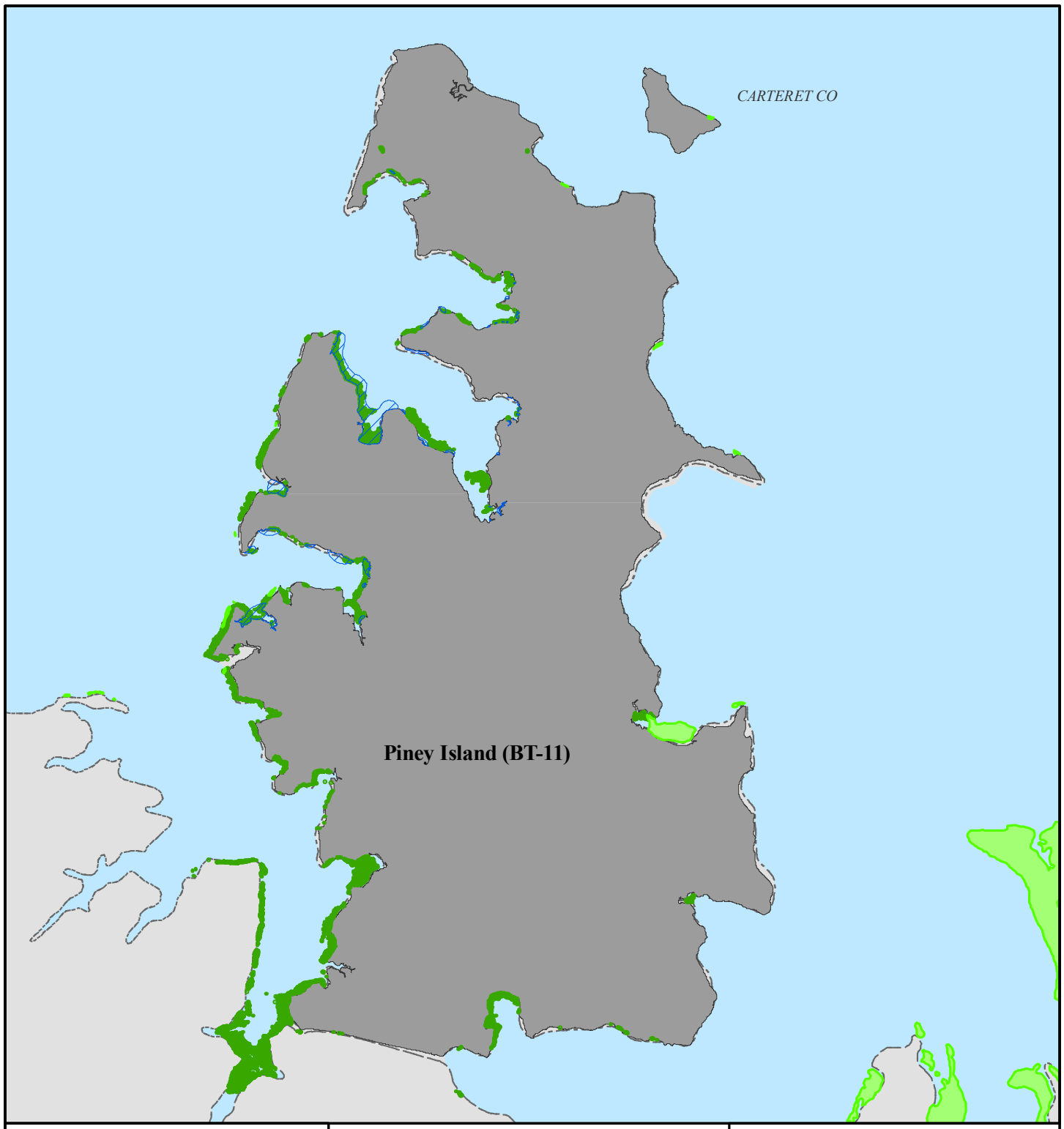
The Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) is the primary law governing marine fisheries management in federal waters of the U.S. The MSFCMA, enacted in 1976, created eight regional fishery management councils that are responsible for regional conservation and management of 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).

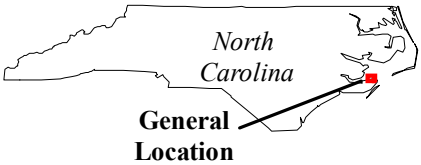
To comply with the MSFCMA, MCAS Cherry Point completed an EFH assessment study in 2007 that identified numerous wetland, nearshore, and offshore areas as EFH, as well as those areas that would meet the criteria of HAPC (Navy 2007). Detailed maps of all the EFH areas are provided in the report.

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).

Figure 9.1 depicts the estuarine and marine SAV that is located in the vicinity of BT-11.





Source:
USMC 2010g and ESRI 2004.

Legend

- Installation Areas
- Counties
- Submerged Aquatic Vegetation
- SAV - (Field Survey)
- SAV - (Hyperspectral Data Piney Island Only)

0 0.5 1 2 Miles

0 0.5 1 2 Kilometers

Figure 9.1. Estuarine and Marine Submerged Aquatic Vegetation of Piney Island (BT-11).

Prepared for: Marine Corps Air Station Cherry Point.
Date: 04/2012

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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 summaries 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	Main Station	Piney Island (BT-11)	OLF Atlantic	ALF Bogue	Brant Island Shoal (BT-9)
Temperate Species							
Bluefish	*Pomatomus saltatrix*	Juvenile	SBH	SBH	SBH	SBH	SBH
		Adult	SBH	SBH	SBH	SBH	SBH
Summer flounder	*Paralichthys dentatus*	Larva	SBH	SBH	SBH	SBH	SBH
		Juvenile	SBH	SBH	SBH	SBH	SBH
		Adult	SBH	SBH	SBH	SBH	SBH
Subtropical Species							
Black sea bass	*Centropristis striata*	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	*Farfantepenaeus aztecus*	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	*Rachycentron canadum*	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*
		Adult	EMS	EMS*, SNA, and BE*	EMS*,SNA, and BF*	EMS*, SNA, and BE*	EMS*, SNA, and BE*

Common Name	Scientific Name	Life Stage	Main Station	Piney Island (BT-11)	OLF Atlantic	ALF Bogue	Brant Island Shoal (BT-9)
Subtropical Species (cont'd)							
Gray Snapper	*Lutjanus griseus*	Juvenile				EMW, EMS, ORSB, UBS, and TC	
		Adult				EMS	
King mackerel	*Scomberomorus cavalla*	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	*Farfantepenaeus duorarum*	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	*Sciaenops ocellatus*	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	*Scomberomorus maculatus*	Egg	SNA	SNA	SNA	SNA	SNA
		Larva	SNA	SNA	SNA	SNA	SNA
		Juvenile	SNA	SNA	SNA	SNA	SNA
		Adult	SNA	SNA	SNA	SNA	SNA
White shrimp	*Penaeus setiferus*	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							

Common Name	Scientific Name	Life Stage	Main Station	Piney Island (BT-11)	OLF Atlantic	ALF Bogue	Brant Island Shoal (BT-9)
Atlantic sharpnose shark	*Rhizoprionodon terraenovae*	Neonate	BE	BE	BE	BE	BE
		Juvenile	BE	BE	BE	BE	BE
Dusky shark	*Carcharhinus obscurus*	Neonate	BE	BE	BE	BE	BE
		Juvenile	BE	BE	BE	BE	BE
Tiger shark	*Galeocerdo cuvier*	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

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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. In general, airfield operations and other training activities occurring at MCAS Cherry Point, including live firing ranges, require that it be closed to public access based on mission requirements for both safety and military security reasons.

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 participants in a sponsored program associated with hunting, fishing and trapping. 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 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.

- Horse stables.
- Archery range maintained by the Cherry Point Archery Club (part of the Down East Archery Coalition).
- 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.
- A total of 1,500 fish were stocked in the three freshwater recreational fishing ponds, and 300 deer, 10 wild turkeys, and hundreds of other small game were harvested during FY2007 and FY2008 by hunters (Secretary of Defense and Secretary of the Navy 2008).
- 12,000 acres of forests for hunting.

- Recreational users at MCAS Cherry Point have logged over 60,000 hours of hunting and fishing activities (Secretary of Defense and Secretary of the Navy 2008).
- Over 1,100 hunting, fishing and trapping permits were issued in 2009, resulting in over 2,000 hunter trips and $12,410 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 the Main Station.

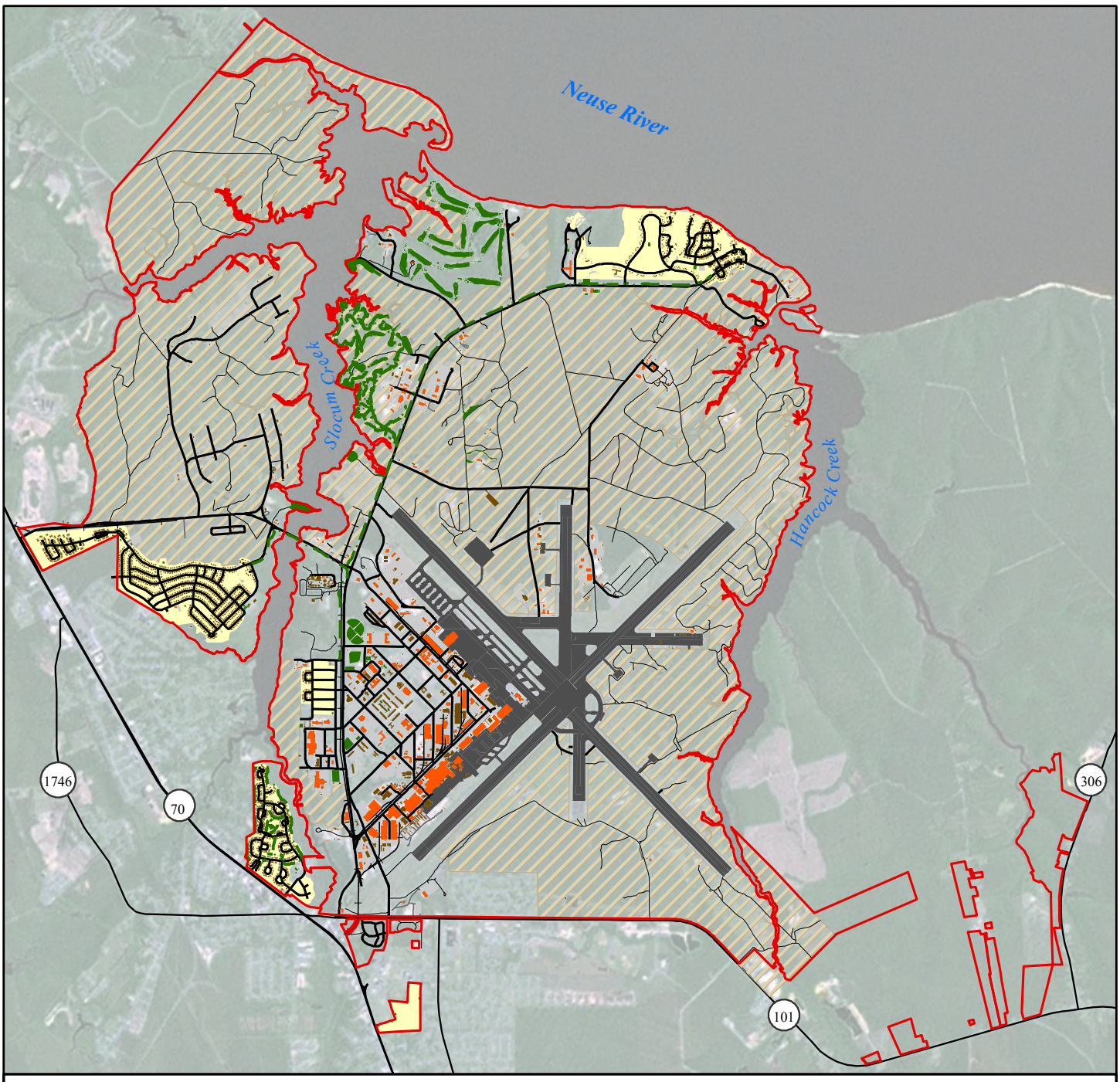
Hunting areas are designated at the Main Station, OLF Atlantic and ALF Bogue (Figure 10.1 and Figure 10.2). Hunting areas generally follow ground maneuver training area boundaries to provide a consistent approach for land management. Approximately 1,000 acres are reserved for archery only, and 11,000 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.

Over 60,000 hours of field time are logged by hunters at MCAS Cherry Point every 2 years.

Source: Secretary of Defense and Secretary of the Navy 2008

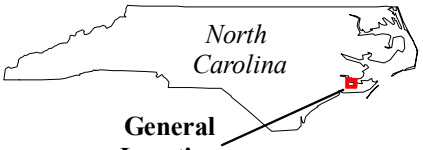
MCAS Cherry Point also provides recreational hunting opportunities to disabled service members through various events. An example is participation in the Wounded Warrior Project. The Wounded Warrior Project is a non-profit organization that provides support to severely wounded enlisted service members, by raising awareness and enlisting the public to assist severely injured service members, and by providing unique, direct programs and services to help meet the needs of severely injured service members (Wounded Warrior Project 2010). Outdoor recreation programs available to alumni of the Wounded Warrior Project include the Wounded Warrior Disabled Sports Project and Wounded Warrior Project Soldier Ride, and Wounded Warrior Hunts. Hunts provided in support of the Wounded Warrior Project include at minimum an annual deer and waterfowl hunt. The availability of adaptive equipment (mechanized-elevating hunting stands) enhances the quality of some activities.

MCAS Cherry Point also conducts an annual Kids Day Fishing Tournament at the Main Station in June of each year (USMC 2007, USMC 2008, USMC 2009a). This event takes place at the three ponds located at the Main Station (Bartlett, Duck and Catfish ponds) that are managed for freshwater recreational fishing through fish stocking.



Legend

- Installation Areas
- Structures
- HAZMAT Storage Areas
- Paved Areas
- Airfield
- Community/Housing
- Hunting Areas
- Recreational Areas
- Primary Roads
- Secondary Roads
- Railroads



Source:
USMC 2010e, ESRI 2004, and ESRI 2010.

0 0.5 1 2 Miles

0 0.5 1 2 3 Kilometers

Figure 10.1. Main Base Hunting Areas.

Prepared for: Marine Corps Air Station Cherry Point.
Date: 06/2011

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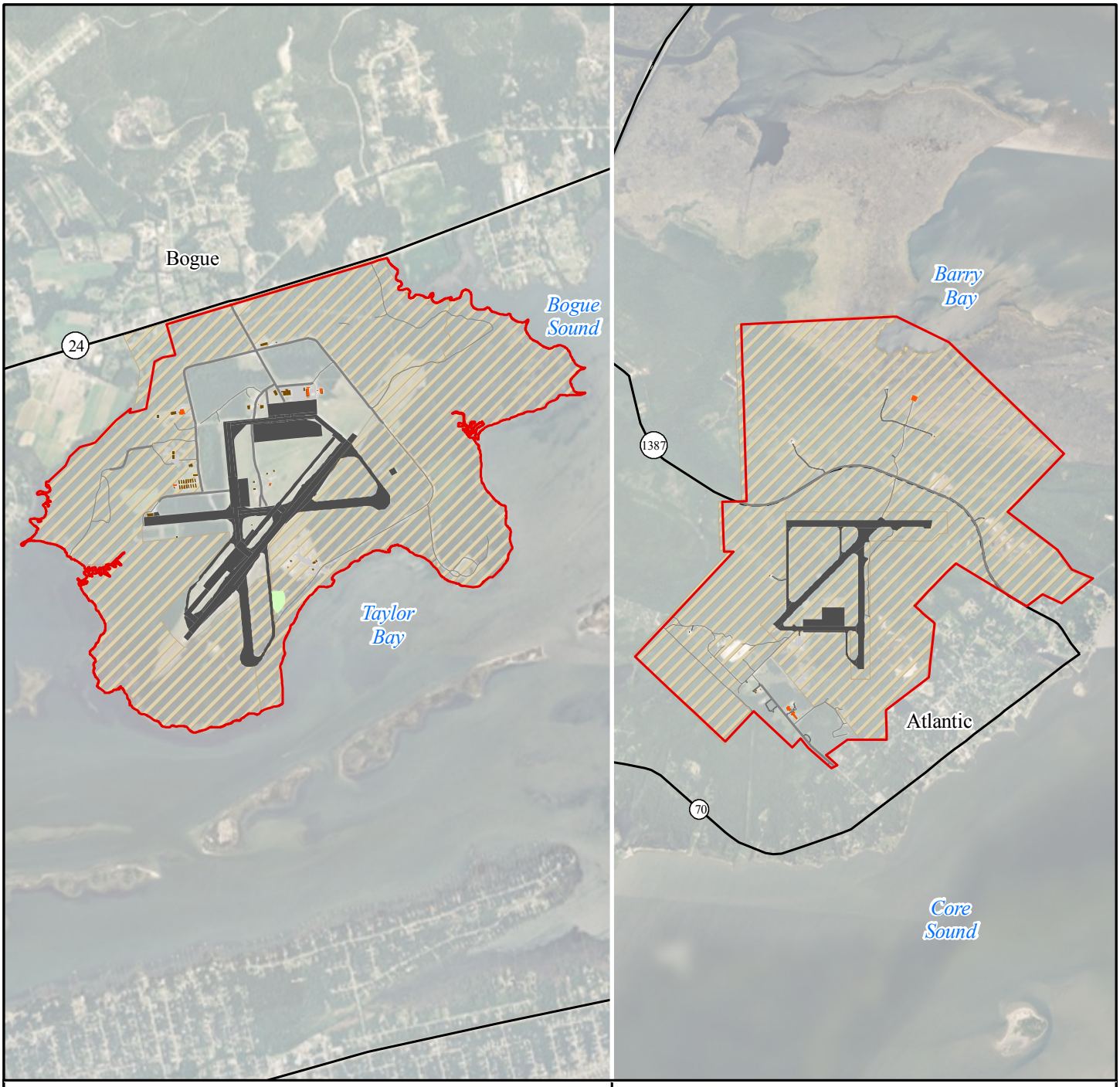

MCALF Bogue

0 0.4 0.8 1.6 Miles

0 0.5 1 2 Kilometers

MCOLF Atlantic

0 0.5 1 2 Miles

0 0.5 1 2 Kilometers

Source:
USMC 2010e, ESRI 2004, and ESRI 2010.

Legend

- Installation Areas
- Roads
- HAZMAT Storage Areas
- Airfield
- Paved Areas
- Structures
- Hunting Areas

N

Figure 10.2. MCOLF Atlantic and MCALF Bogue Hunting Areas.

Prepared for: Marine Corps Air Station Cherry Point.
Date: 06/2011

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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 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.

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11.0 CONSERVATION LAW ENFORCEMENT

The CLE Section 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 CLE Officers (USMC 2007, USMC 2008). CLE Officers 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. CLE Officers also provide valuable insight on species abundance and recommendations for protection and enforcement.

The CLE Officers 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 5090.4 (Conservation Law Enforcement Program), the Station Commanding Officer, and a cooperative agreement with the USFWS which allows the MCAS Cherry Point CLE Officers 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.

CLE Officers must attend the Federal Law Enforcement Training Center, Glynco, Georgia, to comply with the standard requirements of MCO 5090.4. CLE Officers 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 CLE Officers receive and comply with firearms training requirements. All CLE Officers must comply with all training standards set forth by MCO 5090.4.

MCAS Cherry Point CLE Officers 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 and pollution impacts. Regional development can also impact natural resources management and military training. MCAS Cherry Point is dedicated to working with partners such as the OBCF, to promote conservation in this ecologically-rich coastal area.

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, conservations 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. Toward this end, 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 1.3.5 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.

12.2 ENCROACHMENT PARTNERING

EP Programs were promulgated into law under 10 USC § 2684a. The legislation provided DoD agencies with the ability to "partner" with eligible entities (NGOs, State, and local municipalities) on obtaining easements and fee simple purchase of properties to limit encroachment and other constraints on military training, testing and operations. Based upon experience and success across DoD, the EP program has expanded to include numerous tools for addressing encroachment at individual installations. Military funding for this program generally comes from the Office of the Secretary of Defense under the Readiness and Environmental Protection Initiative.

One of the tools available for EP type acquisition lies in the "working" lands concept of encroachment control. Agricultural landscapes (farmland, sustainable forests, and other agricultural uses) are generally accepted as compatible with military training. When located in areas critical for sustaining military training (adjacent to ranges, under vital airspace, etc.) maintaining these lands in their current condition serves multiple benefits to the community and the military.

EP, as a program, is managed cooperatively between Environmental Affairs Department and Community Plans and Liaison Office. The EP program at MCAS Cherry Point is one aspect of a larger encroachment control program. Approximately 6,858 acres of land have been conserved from incompatible development around MCAS Cherry Point land holdings.

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 12-02 –** Participate in the refinement and update of the 2004 Onslow Bight Conservation Design Plan as conservation priorities and actions evolve.
- **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 local Encroachment Control Planning Team.

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.

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14.0 SUMMARY

14.1 INRMP PURPOSE

As discussed in Section 1.0, the purpose of this INRMP is to guide natural resources management for the 10-year period of 2012–2022 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 60 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.

14.2 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.

14.3 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 the American alligator, green sea turtle, Kemp's ridley sea turtle, leatherback sea turtle, loggerhead sea turtle, and West Indian manatee.

14.4 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 2001 INRMP. In addition, some permits or approvals maybe 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.

14.5 INRMP BENEFITS

14.5.1 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 2012–2022. 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.

14.5.2 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.

14.5.3 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, promoting an annual Kids Fishing Tournament, 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 NCDENR.

14.6 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.

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15.0 LITERATURE CITED

Ator, S.W., J.M. Denver, D.E. Krantz, W.L. Newell, and S.K. Martucci. 2005. Physiography of the Mid-Atlantic Coastal Plain. Available online at: http://pubs.usgs.gov/pp/2005/pp1680/pdf/Plate1.pdf (Accessed 25 April 2011).

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. 2005. Carteret County 2005 Land Use Plan Update. Carteret County, North Carolina. Available online at: http://www.carteretcountygov.org/pdfs/planning/Carteret%20LUP%20adoption%20hearing%20copyMarch182009.pdf (Accessed 16 November 2010).

Center for Plant Conservation. 2010. CPC National Collection Plant Profile: Lysimachia asperulifolia. Available online at: http://www.centerforplantconservation.org/collection/cpc_viewprofile.asp?CPCNum=2750 (Accessed 28 September 2010).

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: http://dcm2.enr.state.nc.us/planning/Craven%20Co/CAMA%20LUP%208-3-2009.pdf (Accessed 26 October 2010).

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.

Environmental Systems Research Institute (ESRI). 2004. Data & Maps and StreetMap USA. DVD 1.

Environmental Systems Research Institute (ESRI). 2010. ESRI World Imagery (i-cubed, U.S. Department of Agriculture Forest Service, U.S. Geological Survey, AEX, GeoEye, Getmapping, Aerogrid, and IGP). Available online at: http://server.arcgisonline.com/arcgis/services/World_Imagery/MapServer (Accessed December 2010).

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.

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.

Missouri Department of Conservation. 2011. *Agalinis fasciculata* (Ell.) Raf. Available online at: http://www.discoverlife.org/mp/20q?search=Agalinis+fasciculata&guide=Wildflowers (Accessed 14 February 2011).

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). 2010. 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 November 2010.

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. [Note: *MCAS Cherry Point expects to receive an updated BO in 2012*].

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).

NatureServe Explorer. 2010. An Online Encyclopedia of Life. Available online at: http://www.natureserve.org/explorer (Accessed 9 March 2011).

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, Natura, 201011. 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 Coastal Management. 2008. CAMA Permits: Will My Project Require a Permit? Available online at: http://dcm2.enr.state.nc.us/Permits/aecs.htm (Accessed 3 August 2011).

North Carolina Department of Environment and Natural Resources (NCDENR) Division of Water Quality, 2010. Surface Water Classifications. Available online at: http://portal.ncdenr.org/web/wq/ps/csu/classifications (Accessed 7 October 2010).

North Carolina Department of Environment and Natural Resources, Natural Heritage Program (NCDENR NHP). Undated. Green Sea Turtle Fact Sheet. Available online at: http://www.ncnhp.org/Images/39.pdf (Accessed 15 November 2010).

North Carolina Department of Environment and Natural Resources, Natural Heritage Program (NCDENR NHP). 1990. Executive Summary: Significant Natural Heritage Areas of Pamlico County, North Carolina. Available online at: http://www.ncnhp.org/Images/Pamlico030107.pdf (Accessed 17 February 2011).

North Carolina Department of Environment and Natural Resources, Natural Heritage Program (NCDENR NHP). 2004. Natural Heritage Program List of Rare Plant Species of North Carolina. Available online at: http://www.ncnhp.org/Images/Other%20Publications/2004%20Rare%20Plant%20List.pdf (Accessed 28 September 2010).

North Carolina Department of Environment and Natural Resources, Natural Heritage Program (NCDENR NHP). 2010a. Our Mission. Available online at: http://www.ncnhp.org/Pages/mission.html (Accessed 28 September 2010).

North Carolina Department of Environment and Natural Resources, Natural Heritage Program (NCDENR NHP). 2010b. Guide to Federally Listed Endangered and Threatened Species

of North Carolina. Available online at: http://www.ncnhp.org/Pages/guide.htm (Accessed 28 September 2010).

North Carolina Department of Environment and Natural Resources, Natural Heritage Program (NCDENR NHP). 2011. Heritage Data County Record Search. Available online at: http://www.ncnhp.org/Pages/heritagedata.html. (Accessed 9 March 2011).

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 Office of Environmental Education. 2010. Discover North Carolina's River Basins (Interactive Map). Available online at: http://www.eenorthcarolina.org/public/ecoaddress/riverbasins/riverbasinmapinteractive.htm (Accessed 2 November 2010).

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.conservationregistry.org/projects/15863#fulldescr (Accessed 26 April 2012).

Pamlico County. 2004. 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 2010).

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&usg=__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%26tbm%3Disch&ei=3QunTZOZLoKasAPTpe27CA (Accessed 14 April 2011).

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=RptComprehensive.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. 2006. Erosion and Sediment Control Planning and Design Manual. North Carolina Sedimentation Control Commission, North Carolina Department of Environment and Natural Resources, and the North Carolina Agricultural Extension Service, Raleigh, NC. Available online at: http://www.dlr.enr.state.nc.us/pages/publications.html (Accessed 20 January 2011).

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. Forest Service (USFS). Undated. Croatan National Forest: Land of Wonder. Available online at: http://www.cs.unca.edu/nfsnc/recreation/croatan_brochure.pdf (Accessed 9 November 2010).

U.S. Forest Service (USFS). 2010a. Chapter 21. Ecological Subregions of the United States. Outer Coastal Plain Mixed Forest. Subsection 232C: Atlantic Coastal Flatlands. Available online at: http://www.fs.fed.us/land/pubs/ecoregions/ch21.html (Accessed 23 September 2010).

U.S. Forest Service (USFS). 2010b. Ecoregions of the United States: Provinces. Available online at: http://www.fs.fed.us/rm/ecoregions/images/maps/ecoregions-united-states.jpg (Accessed 23 September 2010).

U.S. Forest Service (USFS). 2010c. Geodatabase. Available online at: http://fsgeodata.fs.fed.us/vector/fstopo/USA%20Survey%20and%20Ownership%20File%20Geodatabase.gdb.zip (Accessed December 2010).

U.S. Forest Service (USFS). 2011. National Forests in North Carolina. Fire Information. Available online at: http://prdp2fs.ess.usda.gov/wps/portal/fsinternet/!ut/p/c4/04_SB8K8xLLM9MSSzPy8xBz9CP0os3gjAwhwtDDw9_AI8zPyhQoY6BdkOyoCAGixyPg!/?ss=110811&navtype=BROWSEBYSUBJECT&cid=STELPRDB5186287&navid=091000000000000&position=Feature*&ttype=detail&pname=National%20Forests%20in%20North%20Carolina-%20Home (Accessed 14 April 2011).

U.S. Geological Survey. 2010. Land Cover Trends Project: Middle Atlantic Coastal Plain. Available online at: http://landcovertrends.usgs.gov/east/eco63Report.html (Accessed 8 April 2011).

U.S. Marine Corps (USMC). 2001. Integrated Natural Resources Management Plan for Marine Corps Air Station Cherry Point, North Carolina. September 2001.

U.S. Marine Corps (USMC). 2004. Pest Management Plan for Marine Corps Air Station Cherry Point, NC.

U.S. Marine Corps (USMC). 2005. Stormwater Pollution Prevention Plan for Marine Corps Air Station Cherry Point, NC. Volumes I and II. July 2005.

U.S. Marine Corps (USMC). 2007. Integrated Natural Resources Management Plan Implementation Report, FY07, Marine Corps Air Station Cherry Point, North Carolina.

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). 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. Marine Corps Air Station Cherry Point Annual Water Quality Report.

U.S. Marine Corps (USMC). 2009d. Environmental Assessment MCAS Cherry Point Range Operations. January 2009.

U.S. Marine Corps (USMC). 2009e. Integrated Natural Resources Management Plan Implementation Report, FY09, Marine Corps Air Station Cherry Point, North Carolina.

U.S. Marine Corps (USMC). 2010a. FY09 Economic Impact Summary. Marine Corps Air Station Cherry Point. Available online at: http://www.usmc.mil/unit/mcascherrypoint/pages/MCASCherryPointFY09EconomicImpactbrochure.pdf (Accessed 26 October 2010).

U.S. Marine Corps (USMC). 2010b. Marine Corps Air Station Cherry Point. MCAS Cherry Point Mission. Available online at: http://www.marines.mil/unit/mcascherrypoint/Pages/mcascherrypoint/AboutCP.aspx (Accessed 11 October 2010).

U.S. Marine Corps (USMC). 2010c. 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). 2010d. Assessment of the Commercial and Recreational Usage of Waters Surrounding Piney Island and Brant Island Shoal.

U.S. Marine Corps (USMC). 2010e. Geographic Information System (GIS) database for MCAS Cherry Point.

U.S. Marine Corps (USMC). 2010f. 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). 2010g. Geographic Information System (GIS) data for MCAS Cherry Point Essential Fish Habitat.

U.S. Marine Corps (USMC). 2010h. MCAS Cherry Point Air Show. Available online at: http://militarynewcomers.com/CHERRYPOINT/resources/09_air.html (Accessed 15 November 2010).

U.S. Marine Corps (USMC) Air Station Cherry Point Natural Resources Division (NRD). 2007. Hunting regulations. Cherry Point, NC.

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. 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%3B/portalcontent.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).

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APPENDIX A

2012–2022 INRMP Comments

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UNITED STATES MARINE CORPS
MARINE CORPS AIR STATION
POSTAL SERVICE CENTER BOX 8003
CHERRY POINT, NORTH CAROLINA 28533-0003

IN REPLY REFER TO:
5090/17000
LN
05 December, 2011

Mr. Gordon Myers
Executive Director
North Carolina Wildlife Resources Commission
1701 MSC
Raleigh, North Carolina 27699-1701

Dear Mr. Myers:

Marine Corps Air Station Cherry Point is in the process of revising our Integrated Natural Resources Management (INRMP) for its 10 year review and update cycle as noted in our letter of March 25, 2011. At the Onslow Bight Conservation Forum meeting on October 27, 2011, a hardcopy (with CD) of our revised draft INRMP was provided to a member of your staff attending that meeting. We are soliciting your input for any needed revisions or proposed new projects for our revised INRMP and ask that you, or a representative of your office, attend a meeting on 4 January, 2012 to review any comments you may have on our document. The meeting will be held at MCAS Cherry Point and for security purposes, we will need to know the number of individuals who will attend the event.

We will notify your office if there is any change to the location of the meeting via electronic mail. If you have questions please contact Mr. Carmen A. Lombardo, of the Environmental Affairs Department at (252) 466-5870 or carmen.lombardo@usmc.mil.

Sincerely,

G. W. RADFORD
Environmental Affairs Officer
By direction of the
Commanding Officer

Enclosures: Pre-Final Draft INRMP CD

UNITED STATES MARINE CORPS
MARINE CORPS AIR STATION
POSTAL SERVICE CENTER BOX 8003
CHERRY POINT, NORTH CAROLINA 28533-0003

IN REPLY REFER TO:
5090/17000
LN
December 05, 2011

Mr. Pete Benjamin
Ecological Services Supervisor
Raleigh Field Office
Post Office Box 33726
Raleigh, North Carolina 27636-3726

Dear Mr. Benjamin:

Marine Corps Air Station Cherry Point is in the process of revising our Integrated Natural Resources Management (INRMP) for its 10 year review and update cycle as noted in our letter of March 25, 2011. At the Onslow Bight Conservation Forum meeting on October 27, 2011, a hardcopy (with CD) of our revised draft INRMP was provided to a member of your staff attending that meeting. We are soliciting your input for any needed revisions or proposed new projects for our revised INRMP and ask that you, or a representative of your office, attend a meeting on 4 January, 2012 to review any comments you may have on our document. The meeting will be held at MCAS Cherry Point and for security purposes, we will need to know the number of individuals who will attend the event.

We will notify your office if there is any change to the location of the meeting via electronic mail. If you have questions please contact Mr. Carmen A. Lombardo, of the Environmental Affairs Department at (252) 466-5870 or carmen.lombardo@usmc.mil.

Sincerely,

G. W. RADFORD
Environmental Affairs officer
By direction of the
Commanding Officer

Enclosures: Pre-Final Draft INRMP CD

INRMP REVIEW MEETING

From: Lombardo CIV Carmen A <carmen.lombardo@usmc.mil>
Sent: Tuesday, December 06, 2011 9:15 AM
To: john_hammond@fws.gov
Cc: pete_benjamin@fws.gov; Guilianelli CIV Jessica E
Subject: INRMP REVIEW MEETING
Attachments: USFWS_INRMP_REVIEW.pdf

Pete/John:

The attached is a formal request letter for your participation in a meeting during the first week of
January 2012 to review Cherry Point's revised Integrated Natural Resources Management Plan. The
target date is 4 January at 1000, here at Cherry Point. Please let me know if this date can be
accommodated. Thank you...

r/s
Carmen A. Lombardo
Natural Resources Manager
EAD
MCAS Cherry Point, NC
(252) 466-5870
DSN 582-5870

NCWRC_INRMP REVIEW MEETING_LETTER

From: Lombardo CIV Carmen A
Sent: Wednesday, December 21, 2011 4:17 PM
To: Tommy Hughes (tommy.hughes@ncwildlife.org); 'david.h.allen@ncwildlife.org'
Subject: INRMP REVIEW MEETING
Attachments: NCWRC_INRMP_REVIEW.pdf; ChryPt_INRMP_Pre-final_October 2011_reduced.pdf
Signed By: carmen.lombardo@usmc.mil

Tommy/Dave:

The attached is a formal request letter for your participation in a meeting during the first week of January 2012 to review Cherry Point's revised Integrated Natural Resources Management Plan. The target date is 5 January at 1000, here at Cherry Point (or possibly at Croatan NF Office). I know I have Tommy on the hook, but Dave, could you and others in your section see if there is an opportunity to attend this review meeting.

Please let me know if you can make it. Thank you...

r/s
Mr. Carmen A. Lombardo
Natural Resources Manager
EAD
MCAS Cherry Point, NC
(252) 466-5870
DSN 582-5870

FW INRMP REVIEW MEETING
From: Lombardo CIV Carmen A <carmen.lombardo@usmc.mil>
Sent: Friday, January 06, 2012 2:17 PM
To: Guilianelli CIV Jessica E
Subject: FW: INRMP REVIEW MEETING

Jessica:

From Dave Allen, NCWRC.

r/s Carmen

-----Original Message-----
From: Allen, David H [mailto:david.h.allen@ncwildlife.org]
Sent: Friday, January 06, 2012 2:15 PM
To: Lombardo CIV Carmen A
Cc: Hughes, Tommy K; Schweitzer, Sara H; Godfrey, Matthew H; Carpenter, John P; Hall, Jeffrey G; Dunn, Maria T.; Ellwood, Molly M.
Subject: RE: INRMP REVIEW MEETING

Hey Carmen,
I enjoyed the meeting yesterday. Sorry I had to duck-out a bit early. I finished reading the INRMP today and don't really have any other concerns/comments other than the ones we discussed yesterday. For matter of record I'll reiterate the things we discussed below:

1. Consider managing for a population of RCWs through habitat management, RCW cavity excavation and possibly RCW translocation. This could be done after an agreement with FWS regarding future obligations to manage for the birds. It would support our WAP and also supports your DoD Directive 4715.3 "maintain or reestablish viable populations of all native species in an installation's area of natural habitat, when practical;" P9-1. It could also be accomplished at the same time as your longleaf pine initiative. Some old loblolly will need to be retained for nest trees until young longleaf pines get old enough for RCW cavities.

2. If possible, we would like to see the data that your radar station is accumulating on birds. Specifically, we would like to know how many birds cross though a given area during different times of the year. More specifics would be nice such as size classes of the birds or anything that would help us determine the species or species group. The altitude of the birds would also be helpful. This would not only help us better understand the threats you face from a bird strike perspective, but might also help us when reviewing wind farm applications that seem to be prolific now.

3. Table 4.1 probably needs its title changed so it only reflects federally listed species since there are some other state listed species that are not included.

4. Consider adding the Carolina Gopher frog to table 4.2 "Species at Risk..."

5. Consider starting some monitoring for frogs and toads. Perhaps use the CASP survey protocol or contact Jeff Hall to help look for egg masses of priority species such as the Carolina gopher frog.

6. Most of the Natural Resources Priorities on page 3.1 really didn't seem appropriate. Please either rewrite the list, or retitle the list.

7. Access into restricted fly zones for the purpose of conducting wildlife surveys has been difficult in the
past. We understand the need to maintain these fly zone for training. Any ideas you can furnish to help
alleviate this problem would be appreciated. I believe one method we discussed was to state in the
INRMP (maybe page 5-4) that you support our efforts to conduct such surveys (waterfowl, shorebirds,
eagles, etc.).

8. Cat island has been considerably reduced in size over the years due to storms and boat wakes. It is a
very important nesting site for ibis, herons and egrets. If possible, this site would benefit from either
stabilization or added sand to create some additional upland area for shrubs to establish themselves for
nesting sites. Burying marsh or significant areas of SAV should be avoided.

I hope these comments help while you try to finalize your document. I imagine Sara, Matt, John and
perhaps Jeff may also have a couple comments. Feel free to ask for more details, as I'm sure all of us
coastal biologists will be more than willing to work with you on the document and the related projects.

David H. Allen
Wildlife Diversity Supervisor
NCWRC

-----Original Message-----
From: Lombardo CIV Carmen A [mailto:carmen.lombardo@usmc.mil]
Sent: Thursday, January 05, 2012 8:35 AM
To: Allen, David H
Cc: Hughes, Tommy K
Subject: RE: INRMP REVIEW MEETING

Apologize:

Croatan NF Office meeting room. It is the trailer behind the main building. See you at 1000.

r/s Carmen

-----Original Message-----
From: Allen, David H [mailto:david.h.allen@ncwildlife.org]
Sent: Wednesday, January 04, 2012 4:45 PM
To: Lombardo CIV Carmen A
Cc: Hughes, Tommy K
Subject: RE: INRMP REVIEW MEETING

Hey Carmen, did you decide on a place to meet tomorrow?

-----Original Message-----
From: Lombardo CIV Carmen A [mailto:carmen.lombardo@usmc.mil]
Sent: Wednesday, December 21, 2011 4:17 PM
To: Hughes, Tommy K; Allen, David H
Subject: INRMP REVIEW MEETING

Tommy/Dave:

The attached is a formal request letter for your participation in a meeting during the first week of
January 2012 to review Cherry Point's revised Integrated Natural Resources Management Plan. The
target date is 5 January at 1000, here at Cherry Point (or possibly at Croatan NF Office). I know I have
Tommy on the hook, but Dave, could you and others in your section see if there is an opportunity to

attend this review meeting.

Please let me know if you can make it. Thank you...

r/s
Mr. Carmen A. Lombardo
Natural Resources Manager
EAD
MCAS Cherry Point, NC
(252) 466-5870
DSN 582-5870

NCWRC_COASTAL-PUBLICLANDS-WILDLIFE_INRMP-COMMENTS_20120120

From: Hughes, Tommy K [Tommy.Hughes@ncwildlife.org]
Sent: Friday, January 20, 2012 8:56 AM
To: Lombardo CIV Carmen A
Subject: RE: Inrmp
Attachments: ChryPt_INRMP_Pre-final_October 2011-Comments.docx

I have include comments within the draft document. Comments are on the following pages- 1-10, 2-3,2-32,4-5,6-3,6-5,9-3,9-5,10-1 and 13-1.

Thanks for the opportunity to be part of this process.

Tommy

Tommy K. Hughes
Supervising Wildlife Biologist
Eastern Region-Public Lands
1004 Park Drive
Trent Woods, NC 28562
252-514-4738 Office
252-670-9929 Cell

"We do the difficult immediately because the impossible takes a little longer"

-----Original Message-----
From: Lombardo CIV Carmen A [mailto:carmen.lombardo@usmc.mil]
Sent: Wednesday, January 11, 2012 9:45 AM
To: Hughes, Tommy K; Schweitzer, Sara H
Subject: RE: Inrmp

Sara/Tommy:

Please find attached the word version of our INRMP. This is the same version you have seen in hard copy. Please let me know when you will return a marked copy. I may need to make space in my inbox. Thanks.

Thank You again for your participation in our review meeting. I enjoyed the exchange.

r/s Carmen

-----Original Message-----
From: Hughes, Tommy K [mailto:Tommy.Hughes@ncwildlife.org]
Sent: Tuesday, January 10, 2012 8:40 PM
To: Lombardo CIV Carmen A
Subject: Inrmp

Carmen

Are they going to send us a Word version so I can add my edits? I thought that's what they were going to do.

Tommy K. Hughes

Supervising Wildlife Biologist

Eastern Region-Public Lands

1004 Park Drive

Trent Woods, NC 28562

252-514-4738 Office

252-670-9929 Cell

"We do the difficult immediately because the impossible takes a little longer"

_____

From: Schweitzer, Sara H [sara.schweitzer@ncwildlife.org]
Sent: Friday, January 27, 2012 11:45 AM
To: Lombardo CIV Carmen A
Subject: RE: Inrmp
Attachments: ChryPt_INRMP_Pre-final_October 2011 Schweitzer NCWRC.docx

Hello, Carmen:

Attached is the draft INRMP with my comments (using Track Changes). Thanks for the opportunity to review this document. Please let me know if you have questions about my comments or want to discuss them further. I look forward to working with you on shore- and colonially-nesting waterbirds issues. Also, if you want any data from the Waterbird Program on these species from specific sites, let me know.

Best wishes,
Sara

Sara H. Schweitzer, Ph.D.
Coastal Waterbird Biologist
106 Ferret Run Lane
Wildlife Diversity Program
NC Wildlife Resources Commission
New Bern, NC 28562
252-639-8435 (cell)
sara.schweitzer@ncwildlife.org

_____
From: Lombardo CIV Carmen A [carmen.lombardo@usmc.mil]
Sent: Wednesday, January 11, 2012 9:44 AM
To: Hughes, Tommy K; Schweitzer, Sara H
Subject: RE: Inrmp

Sara/Tommy:

Please find attached the word version of our INRMP. This is the same version you have seen in hard copy. Please let me know when you will return a marked copy. I may need to make space in my inbox. Thanks.

Thank You again for your participation in our review meeting. I enjoyed the exchange.

r/s Carmen

-----Original Message-----
From: Hughes, Tommy K [mailto:Tommy.Hughes@ncwildlife.org]
Sent: Tuesday, January 10, 2012 8:40 PM
To: Lombardo CIV Carmen A
Subject: Inrmp

Carmen

Are they going to send us a Word version so I can add my edits? I thought that's what they were going to do.

Tommy K. Hughes

Supervising Wildlife Biologist

Eastern Region-Public Lands

1004 Park Drive

Trent Woods, NC 28562

252-514-4738 Office

252-670-9929 Cell

"We do the difficult immediately because the impossible takes a little longer"

_____

UNITED STATES MARINE CORPS
MARINE CORPS AIR STATION
POSTAL SERVICE CENTER BOX 8003
CHERRY POINT, NORTH CAROLINA 28533-0003

IN REPLY REFER TO:
5090/17000
LN
February 22, 2012

Ms. Angela Somma
Chief, Endangered Species Division
National Marine Fisheries Service
1315 East West Highway
Silver Spring, MD 20910

Dear Ms Somma:

Marine Corps Air Station Cherry Point is in the process of revising our Integrated Natural Resources Management (INRMP) for its 10 year review and update cycle. Per the Sikes Act Improvement Act of 1997 (SAIA), we are requesting your review and comments on the draft. Additionally, we are requesting your agreement that our INRMP and associated management practices will meet the requirements established by the legal authorities for the conservation, protection, and management of species under your purview.

Our revised INRMP has been re-structured as a planning document and no additional environmental documentation (BA/environmental assessment) will be prepared as part of its revision. The content of the INRMP remains essentially unchanged from our 2001 document with minor deviation related to forest management, terrestrial ecosystem restoration, and the addition of specific protected species management programs resulting from coordination with National Marine Fisheries Service, United States Fish and Wildlife Service (USFWS), and North Carolina Department of Environment and Natural Resources (NCDENR). We are in possession of a current Biological Opinion from National Oceanic and Atmospheric Administration (NOAA Fisheries) and we have recently renewed an Incidental Harassment Authorization related to marine mammals (bottlenose dolphins) from NOAA Fisheries.

We respectfully request your response be provided by April 24, 2012 via correspondence or e-mail to the below point of contact.

If you have questions please contact Mr. Carmen A. Lombardo, of the Environmental Affairs Department at (252) 466-5870 or carmen.lombardo@usmc.mil.

Sincerely,

G. W. RADFORD
Environmental Affairs officer
By direction of the
Commanding Officer

Enclosures: Pre-Final Draft INRMP CD

APPENDIX B

INRMP Actions and Monitoring Table and Funding

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Table B-1. INRMP Course of Action and Monitoring Table and Funding Classes, MCAS Cherry Point Complex.

Action ID	Action Description	Objective ID	Funding Class Level[1]	Lead POC	Legal Drivers[2]	Unit of Measure	Measure of Success
Section 4.0: Protected Species Management							
4-01	Fully incorporate all "actions to reduce adverse effects" to sea turtles as proposed in 2002 Section 7 Biological Assessment.	TES1	I	Carmen Lombardo	A, C, D	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 and TES3	I	Carmen Lombardo	A, C, D	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 and TES3	I	Carmen Lombardo	A, C, D	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

Action ID	Action Description	Objective ID	Funding Class Level[1]	Lead POC	Legal Drivers[2]	Unit of Measure	Measure of Success
4-04	Survey and monitor species at-risk and their habitats.	SAR1 and MIG1	III	Carmen Lombardo	A, B, C	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 and MIG1	III	Carmen Lombardo	A, B	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 and MIG1	III	Carmen Lombardo	A, B, C	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
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 and MIG1	III	Carmen Lombardo	A, B, C	1) N/A	1) Monitoring and reporting actions beyond what is required for threatened an endangered species will be incorporated into INRMP updates
Section 5.0: Migratory Bird Management							
5-01	Annual participation in International Migratory Bird Day summer bird count.	MIG1	III	Carmen Lombardo	A, B	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

Action ID	Action Description	Objective ID	Funding Class Level[1]	Lead POC	Legal Drivers[2]	Unit of Measure	Measure of Success
5-02	Conduct coordinated waterfowl and shorebird surveys in support of South Atlantic Migratory Bird Initiative (SAMBI).	MIG1	III	Carmen Lombardo	A, B	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
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	III	Carmen Lombardo	A, B, C	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	III	Carmen Lombardo	A, B, C	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	0	Carmen Lombardo	A, B, C	1) # of point counts conducted	1) Completion of routine point count surveys
Section 6.0: Forest Management and Protection							
6-01	Align forest management with the military mission, such as providing accessibility and recreation.	FMP1 and WFM2	III	Steven Shephard	A, C	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	Funding Class Level[1]	Lead POC	Legal Drivers[2]	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 and WFM1	0	Steven Shephard	A, C	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 and WFM1	III	Steven Shephard	A	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

Action ID	Action Description	Objective ID	Funding Class Level[1]	Lead POC	Legal Drivers[2]	Unit of Measure	Measure of Success
6-04	Control southern pine beetle infestations.	FMP1 and WFM1	2	Steven Shephard	A	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	2	Steven Shephard	A, C	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	2	Steven Shephard	A, C	1) # of forest stand inventories, prescriptions, and sales entered into database	1) Forestry database updated annually with forest stand inventory, prescriptions, and sales data
6-07	Cruise standing timber for volume estimations.	FMP2	2	Steven Shephard	A, C	1) # of forest stands assessed for standing volume	1) Continued cruises of timber for assessment of standing volume
6-08	Mark timber for sales.	FMP2	2	Steven Shephard	A, C	1) # of stands marked for timber sales	1) Continued marking of timber intended for removal and sales
6-09	Execute timber sales.	FMP2	2	Steven Shephard	A, C	1) # and value of timber sales executed	1) Continued execution of timber sales

Action ID	Action Description	Objective ID	Funding Class Level[1]	Lead POC	Legal Drivers[2]	Unit of Measure	Measure of Success
6-10	Ensure timber sale and restoration contract requirements are met (e.g., implementation of best management practices [BMPs], hardwood protections).	FMP2	2	Steven Shephard	A, C, E, F	1) # of environmental inspections conducted in association with timber sales or restoration contracts 2) # of post-sale and post-restoration inspections conducted	1) Continued inclusion of environmental inspection requirements in all contracts executed for timber sales or restoration activities 2) Post-sale forest stands are free of erosion and restored to conditions set forth in the contract and only marked timber has been extracted
6-11	Implement fire suppression, preparation, documentation, and cooperative activities in accordance with the Wildland Fire Management Plan (WFMP).	FMP3	2	Steven Shephard	A	1) N/A	1) Continued implementation of the WFMP
Section 7.0: Aquatic Resources and Water Quality							
7-01	Support new wetland delineations and renewal of existing jurisdictional determinations to identify aquatic resource limits and jurisdiction.	WET1	1	Carmen Lombardo	A, C, E, G	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 regards to water resource protection.	WET1	0	Carmen Lombardo	A, C, E, G, I	1) N/A	1) Continued MCAS Cherry Point compliance with all State and federal water resources protection regulations

Action ID	Action Description	Objective ID	Funding Class Level[1]	Lead POC	Legal Drivers[2]	Unit of Measure	Measure of Success
7-03	Identify suitable wetland restoration areas and monitor sensitive wetland areas.	WET1	III	Carmen Lombardo	A, C, G, I	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	0	Carmen	A, C, E, F,	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	III	Carmen Lombardo	A, C, E, G, H, I	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

Action ID	Action Description	Objective ID	Funding Class Level[1]	Lead POC	Legal Drivers[2]	Unit of Measure	Measure of Success
Section 8.0: Land Management							
8-01	Monitor training effects on inland soils and in coastal areas and use results to provide recommendations for soil protection during training.	SOI1	0	Carmen Lombardo	A, C, E, F, H, I	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
8-02	Close, restore, and reopen selected eroded sites to training.	SOI1	II	Carmen Lombardo	A, C, E, F	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 for all land-disturbing projects that will impact 1 acre or more of land.	SOI1	0	Carmen Lombardo	A, C, E, F, G	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	0	Carmen Lombardo	A, C, E, F, G	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 landscape and vegetation management projects.	LVM1	0	Carmen Lombardo	A, C, F	1) N/A	1) Continued implementation of requirements outlined in Executive Order 12856 for all MCAS Cherry Point landscaping and vegetation management projects
8-06	Support ecosystem services focused initiatives.	LVM1	III	Carmen Lombardo	A, C	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.

Action ID	Action Description	Objective ID	Funding Class Level[1]	Lead POC	Legal Drivers[2]	Unit of Measure	Measure of Success
Section 9.0: Wildlife and Fisheries Management							
9-01	Implement wildlife habitat improvement projects (e.g., wildlife openings, nest boxes).	WFM1	III	Carmen Lombardo	A, B, C	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	2	Carmen Lombardo	A	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	III	Carmen Lombardo	A, C	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
9-04	Maintain NCWRC Wildlife Cooperator Agent status for reporting harvest data.	WFM2	0	Carmen Lombardo	A	1) N/A	1) NCWRC Cooperator Agent status maintained
9-05	Support general, sensitive, and indicator species surveys.	WFM3	III	Carmen Lombardo	A, B, C	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	III	Carmen Lombardo	A, B, C	1) # of native fauna reintroductions 2) N/A	1) Successful reintroduction of native fauna projects 2) Details of reintroduction projects included in INRMP updates

Action ID	Action Description	Objective ID	Funding Class Level[1]	Lead POC	Legal Drivers[2]	Unit of Measure	Measure of Success
9-07	Implement Bird/Wildlife Aircraft Strike Hazard (BASH) Program.	WFM4	0	Carmen Lombardo	A, B, C	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	0	Carmen Lombardo	A, B, C	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	0	Carmen Lombardo	A, B, C	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	0	Carmen Lombardo	A, B, C	1) N/A	1) Integration of wildlife damage control measures with the hunting program to reduce the potential for aircraft strikes with wildlife
9-11	Continue to support WebDARS development and long-term data management of bird-radar information.	WFM4	0	Carmen Lombardo	A, B, C	1) N/A	1) Include summary of continued WebDARS development and long-term data management of bird-radar information into INRMP updates
9-12	Prioritize and treat existing invasive species populations.	WFM5	0	Carmen Lombardo	A, C	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	0	Carmen Lombardo	A, C	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	Funding Class Level[1]	Lead POC	Legal Drivers[2]	Unit of Measure	Measure of Success
9-14	Monitor treated populations.	WFM5	0	Carmen Lombardo	A, C	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	II	Carmen Lombardo	A, C	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	III	Carmen Lombardo	A, C	1) # and type of DoD initiatives related to invasive species management and control that MCAS Cherry Point participated in	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	III	Carmen Lombardo	A, C	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	III	Carmen Lombardo	A	1) # of sport fish (by species) stocked in managed freshwater ponds of the Main Station 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 the Main Station 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	Funding Class Level[1]	Lead POC	Legal Drivers[2]	Unit of Measure	Measure of Success
9-19	Develop plans to implement recommendations of the MCAS Cherry Point Essential Fish Habitat (EFH) Study.	WFM7	0	Carmen Lombardo	A, C, D	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	I	Carmen Lombardo	A, C, D	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	I	Carmen Lombardo	A, C, D	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
Section 10.0: Public Access and Outdoor Recreation							
10-01	Promote general public awareness of conservation-based recreational opportunities at MCAS Cherry Point.	REC1	III	Carmen Lombardo	A, C	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

Action ID	Action Description	Objective ID	Funding Class Level[1]	Lead POC	Legal Drivers[2]	Unit of Measure	Measure of Success
Section 11.0: Conservation Law Enforcement							
11-01	Continue to fund the Conservation Law Enforcement (CLE) program positions.	ENF1	0	Carmen Lombardo	A, B, C, E	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	0	Carmen Lombardo	A, B, C, E	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	0	Carmen Lombardo	A, B, C, E	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
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	0	Carmen Lombardo	A, B, C, E	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
Section 12.0: Regional Conservation							
12-01	Continue participation in North Carolina Onslow Bight Conservation Forum (OBCF) meetings.	CON1	III	Carmen Lombardo	A	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

Action ID	Action Description	Objective ID	Funding Class Level[1]	Lead POC	Legal Drivers[2]	Unit of Measure	Measure of Success
12-02	Refine and update 2004 Onslow Bight Conservation Design Plan as conservation priorities and actions evolve.	CON1	III	Carmen Lombardo	A	1) N/A	1) MCAS Cherry Point participation in update of 2004 Onslow Bight Conservation Design Plan
12-03	Participate, as appropriate, in sub-committees of the OBCF to ensure military training requirements are factored into regional conservation planning.	CON1	III	Carmen Lombardo	A	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	II	Carmen Lombardo	A, C	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.	CON1	II	Carmen Lombardo	A, C	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
Section 13.0: Conservation Outreach and Education							
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	III	Carmen Lombardo	A, C	1) N/A	1) Implementation of environmental training and educational program for MCAS Cherry Point Marines

Action ID	Action Description	Objective ID	Funding Class Level[1]	Lead POC	Legal Drivers[2]	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	III	Carmen Lombardo	A, C	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	III	Carmen Lombardo	A, C	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	III	Carmen Lombardo	A, C	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	III	Carmen Lombardo	A	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	III	Carmen Lombardo	A, C	1) # of hunting, fishing, and NPLD activities hosted	1) Continued promotion of hunting, fishing, and NPLD activities.

[1]Funding Class Level
Class 0: recurring natural and cultural resources conservation management requirement
Class I: current compliance
Class II: maintenance requirements
Class III: enhancement actions beyond compliance

Action ID	Action Description	Objective ID	Funding Class Level[1]	Lead POC	Legal Drivers[2]	Unit of Measure	Measure of Success

[2]Legal Drivers and Initiatives	
A Chief of Naval Operations Instruction 5090.1C Ch. 24	F Soil and Water Conservation Act of 1977, as amended
B Migratory Bird Treaty Act of 1918	G Executive Order 11990 (Protection of Wetlands)
C Sikes Act of 1960, as amended	H Executive Order 11988 (Floodplain Management)
D Endangered Species Act of 1973, as amended	I Coastal Zone Management Act
E Clean Water Act of 1972, as amended	

Source: HQ USMC 2007

APPENDIX C

INRMP Benefit to Listed Species and Species At-Risk

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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 (*Lysimachia asperulifolia*)	May–Jun	Low pocosins, high pocosins, stream-head pocosins, savanna-pocosin ecotones, and sandhill-pocosin ecotones
Seabeach amaranth (*Amaranthus pumilus*)	Jun–Jul	Sea beaches, fore-dunes, island end flats, rarely on sound-side beaches
Sensitive joint-vetch (*Aeschynomene virginica*)	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 search and rescue helicopters 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 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; normally associated with weekends.
- In addition to monitoring sweeps performed by Search and Rescue helicopters, 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.

Birds

Three 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. 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 regards to the piping plover and roseate tern, 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
Piping plover (*Charadrius melodus*)	Nests situated above the high tide line of coastal beaches, dunes, sandflats, and ends of sandspits and barrier islands
Red-cockaded woodpecker (*Picoides borealis*)	Longleaf pine habitats
Roseate tern (*Sterna dougallii*)	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

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; NMFS 2010 for marine mammals.

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.

Species at-Risk

Plants

Management actions in place for at-risk plant species known 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
Beach false foxglove (*Aeschynomene virginica*)	Jul–Oct	Prairie, sandy open ground, thickets, woodland edges, and fallow field habitats
Beaked spikerush (*Eleocharis rostellata*)	Jul–Sep	Brackish and freshwater tidal marshes, often with other salt marsh species such as those in the genera *Scirpus* and *Spartina*
Carolina goldenrod (*Solidago pulchra*)	Jul–Sep	Wet pine savannas and seepage bogs
Chapman's sedge (*Carex chapmanii*)	Apr–May	Occurs in habitat located along the upper edge of floodplains of small streams located inland from the reach of tidal influence
Globe beaksedge (*Rhynchospora globularis var. pinetorium*)	Jun–Sep	Sand or peat depressions, wet ditches, transmission line corridors, and savannas
Gulf Coast spikerush (*Eleocharis cellulosa*)	Jul–Sep	Interdunal swale ponds with a variety of salinity levels
Lanceleaf primrose-willow (*Ludwigia lanceolata*)	Aug–Sep	Coastal, occurring in interdunal ponds and open wet areas
Moundlily yucca (*Yucca gloriosa*)	Apr–Oct	Dunes and shell middens
Shortbristle beaksedge (*Rhynchospora breviseta*)	Jul–Sep	Disturbed areas such as roadsides and utility line corridors

Species	Survey Window	Comments on Habitat
Smooth sawgrass (*Cladium mariscoides*)	Jul–Sep	Strongly acidic to circumneutral soils such as seeps on the edges of brackish marshes, pond pine and pond cypress flats, mucky seepage bogs, and montane fens and bogs
Shortleaf yelloweyed grass (*Xyris brevifolia*)	Jun–Aug	Primarily in wet sandy soils of pinelands and in margins of Carolina bay sand rims
Springflowering goldenrod (*Solidago verna*)	May–Jun	Pine savannahs, pocosins, and pine barrens
West Indian meadowbeauty (*Rhexia cubensis*)	Jun–Sep	Limesink ponds
Winged primrose-willow (*Ludwigia alata*)	Jun–Sep	Interdunal ponds and fresh to slightly brackish marshes

Source: UNC Herbarium 2010

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

Bridle shiner (*Notropis bifrenatus*)

Bridle shiner was last documented at MCAS Cherry Point in 1960 during a Natural Heritage Inventory of Tucker Creek on the Main Station (USMC 2001). Subsequent surveys of Tucker Creek have not identified this species and it is currently thought to be extirpated from North Carolina. Bridle shiners are found in a 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. Monitoring requirements for bridle shiner include:

- Conducting surveys in high-probability habitat for new locations of bridle shiner that may occur at MCAS Cherry Point;
- Collection of GIS location and habitat data for bridle shiner observed during surveys, and entering this data into the MCAS Cherry Point GIS database; and,
- Implementation of ecosystem management practices that support the conservation and management of known bridle shiner populations.

If successive surveys for bridle shiner fail to document its presence, surveys will be discontinued, based on the probability that this species has been extirpated from North Carolina. If identified as occurring at MCAS Cherry Point, additional protection for this species would be provided through NEPA-initiated individual project review and agency consultation, if necessary.

Herpetofauna

Carolina pigmy rattlesnake (*Sistrurus miliarius miliarius*), **Carolina watersnake** (*Nerodia sipedon williamengelsi*), **Neuse River waterdog** (*Necturus lewisi*), **Northern diamondback terrapin** (*Malaclemys terrapin terrapin*), and **timber rattlesnake** (*Crotalus horridus*)

Habitats associated with at-risk herpetofauna 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 herpetofauna 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 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-4. Species-Specific Habitats for At-Risk Herpetofauna Species of MCAS Cherry Point Complex.

Species	Comments on Habitat
Carolina pigmy rattlesnake (*Sistrurus miliarius miliarius*)	Pine flatwoods and sandy, open woodlands with pines, wiregrass, and scrub oaks, and frequently observed near cypress ponds and other waterbodies
Carolina watersnake (*Nerodia sipedon williamengelsi*)	Brackish marsh/salt marsh habitats; occurs on nearby terrestrial habitat when basking, non-aquatic foraging, resting, and probably over-wintering
Neuse River waterdog (*Necturus lewisi*)	Eddies, or backwaters of streams with high oxygen levels and good water quality; commonly observed in large accumulations of submerged leaves
Northern diamondback terrapin (*Malaclemys terrapin terrapin*)	Brackish marsh/salt marsh habitats and tidal channels of sounds and estuaries that are bordered primarily by *Spartina* spp.
Timber rattlesnake (*Crotalus horridus*)	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-5) 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-5);
- 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-5. Species-Specific Habitats for At-Risk Bird Species of MCAS Cherry Point Complex.

Species	Comments on Habitat
Bachman's sparrow (*Aimophila aestivalis*)	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 (*Haliaeetus leucocephalus*)	Forage primarily on fish; nest in large pine trees
Black-necked stilt (*Himantopus mexicanus*)	Shallow fresh and saltwater wetlands; ground-nesters
Black rail (*Laterallus jamaicensis*)	High salt marsh and shallow freshwater marshes, as well as wet meadows and other flooded grassy communities; ground-nesters
Black skimmer (*Rhynchops niger*)	Forage on shore for fish; ground-nesters in large colonies
Common tern (*Sterna hirundo*)	Build ground-nests of dead vegetation on islands, marshes, or beaches adjacent to lakes or ocean
Eastern painted bunting (*Gelochelidon nilotica aranea*)	Scrub–shrub and open woodlands along the Atlantic Coast, but are also found in hedges and yards where they forage on invertebrates and seeds; nests are a woven hollow nodule of plant material lined with hair or fine grass, usually placed in low vegetation
Gull-billed tern (*Gelochelidon nilotica aranea*)	Nearshore in upper beach community; nests on gravelly or sandy beaches
Henslow's sparrow (*Ammodramus henslowii*)	Large fields with tall, dense grass layer absent of woody vegetation; and drier areas of salt marshes
Little blue heron (*Egretta caerulea*)	Aquatic systems including swamps, estuaries, rivers, ponds and lakes; nest in colonies with other herons in trees or shrubs
Northern harrier (*Circus cyaneus*)	Open habitat including wetlands, meadows, pastures, prairies, grasslands, croplands, and riparian woodlands
Short-billed dowitcher (*Limnodromus griseus*)	Tidal flats, beaches, and salt marshes, but also occurs in freshwater mud flats and flooded agricultural fields
Snowy egret (*Egretta thula*)	Freshwater and saline marsh communities
Tricolored heron (*Egretta tricolor*)	Marsh communities; nest in trees in mixed-species colonies

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 Slocum Creek at the Main Station. 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. 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 involves field testing and validation of a permanent proto-type unit installed at BT-9 for continuous receipt of dolphin activity within the area. Once the PAM monitoring system is completed, MCAS Cherry Point will implement the PAM Protocol described in Section 4.2.7.

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APPENDIX D

Marine Mammal and Protected Species Monitoring Plan

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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

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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	*Amelanchier arborea*	Deciduous	Full/part-sun	Mesic/sub-xeric
Devil's walkingstick	*Aralia spinosa*[2]	Deciduous	Full / part-sun	Hydric/xeric
Paw paw	*Asimina triloba*	Deciduous	Part-sun/shade	Mesic/sub-xeric
American hornbeam	*Carpinus carolina*	Deciduous	Part-sun/shade	Mesic/sub-xeric
Chinquapin	*Castanea pumila*	Deciduous	Full-sun/shade	Sub-xeric/xeric
Eastern redbud	*Cercis canadensis*	Deciduous	Full-sun/shade	Mesic/xeric
Fringe tree	*Chionanthus virginicus*	Deciduous	Full-sun/part-sun	Mesic/xeric
Pagoda dogwood	*Cornus alternifolia*	Deciduous	Part-sun/shade	Mesic/sub-xeric
Flowering dogwood	*Cornus florida*	Deciduous	Sun/shade	Mesic/xeric
Washington hawthorn	*Crataegus phaenopyrum*	Deciduous	Full-sun/part-sun	Mesic/xeric
Persimmon	*Diospyros virginiana*	Deciduous	Full-sun/part-sun	Mesic/sub-xeric
Carolina silverbell	*Halesia carolina*	Deciduous	Full-sun/shade	Mesic/sub-xeric
Common witch-hazel	*Hamamelis virginiana*	Deciduous	Full-sun/shade	Mesic/sub-xeric
American holly	*Ilex opaca*	Evergreen	Full-sun/shade	Mesic/sub-xeric
Red cedar	*Juniperus virginiana*	Evergreen	Full-sun/part-sun	Sub-xeric/xeric
Umbrella tree	*Magnolia tripetela*	Deciduous	Full-sun/part-sun	Mesic/sub-xeric
Hop-hornbeam	*Ostrya virginiana*	Deciduous	Part-sun/shade	Mesic/sub-xeric
Sourwood	*Oxydendrum arboreum*	Deciduous	Full-sun/shade	Sub-xeric/xeric
Hoptree	*Ptelea trifoliata*	Deciduous	Full-sun/shade	Mesic/sub-xeric

Common Name	Scientific Name	Type	Light	Soil Moisture[1]
American plum	*Prunus americana*	Deciduous	Full-sun/part-sun	Sub-xeric/xeric
Pin cherry	*Prunus pensylvanica*	Deciduous	Full-sun/part-sun	Mesic/sub-xeric
Common sassafras	*Sassafras albidum*[2]	Deciduous	Full-sun/part-sun	Mesic/sub-xeric
Blackhaw viburnum	*Viburnum rufidulum*	Deciduous	Full-sun/shade	Mesic/xeric
Large Trees (> 25 ft)				
Red maple	*Acer rubrum*	Deciduous	Full-sun/shade	Hydric/xeric
Sugar maple	*Acer saccharum*	Deciduous	Full-sun/shade	Mesic/sub-xeric
Yellow buckeye	*Aesculus flava*	Deciduous	Part-sun/shade	Mesic/sub-xeric
Yellow birch	*Betula alleghaniensis*	Deciduous	Full-sun/part-sun	Mesic/sub-xeric
Sweet birch	*Betula lenta*	Deciduous	Full-sun/shade	Mesic/sub-xeric
River birch	*Betula nigra*	Deciduous	Full-sun/part-sun	Hydric/sub-xeric
Bitternut hickory	*Carya cordiformis*	Deciduous	Full-sun/shade	Mesic/sub-xeric
Pignut hickory	*Carya glabra*	Deciduous	Full-sun/shade	Sub-xeric/xeric
Yellowwood	*Cladrastis kentuckea*	Deciduous	Full-sun/part-sun	Mesic/sub-xeric
Beech	*Fagus grandifolia*	Deciduous	Full-sun/shade	Mesic/sub-xeric
Tulip tree	*Liriodendron tulipifera*	Deciduous	Full-sun/part-sun	Mesic/sub-xeric
Cucumber tree	*Magnolia acuminata*	Deciduous	Part-sun/shade	Mesic/sub-xeric
Black tupelo	*Nyssa sylvatica*	Deciduous	Full-sun/shade	Mesic/xeric
Sycamore	*Platanus occidentalis*	Deciduous	Full-sun/part-sun	Hydric/mesic
Red spruce	*Picea rubens*	Evergreen	Full-sun/shade	Mesic/sub-xeric
Black cherry	*Prunus serotina*[2]	Deciduous	Full-sun/part-sun	Mesic/xeric

Common Name	Scientific Name	Type	Light	Soil Moisture[1]
White oak	*Quercus alba*	Deciduous	Full-sun/part-sun	Mesic/xeric
Chestnut oak	*Quercus montana*	Deciduous	Full-sun/part-sun	Mesic/xeric
Red oak	*Quercus rubra*	Deciduous	Full-sun/part-sun	Mesic/sub-xeric
Post oak	*Quercus stellata*	Deciduous	Full-sun/part-sun	Sub-xeric/xeric
American linden	*Tilia americana*	Deciduous	Full-sun/shade	Mesic/sub-xeric
Canadian hemlock	*Tsuga canadensis*	Evergreen	Full-sun/shade	Mesic/sub-xeric
Carolina hemlock	*Tsuga caroliniana*	Evergreen	Full-sun/shade	Mesic/sub-xeric
Low Shrubs (< 4 ft)				
New Jersey tea	*Ceanothus americanus*	Deciduous	Full-sun/part-sun	Mesic/xeric
Sweetfern	*Comptonia peregrina*	Deciduous	Full-sun/part-sun	Sub-xeric/xeric
Snowhill hydrangea	*Hydrangea aborescens*	Deciduous	Part-sun/shade	Mesic/sub-xeric
Shrubby St. John's wort	*Hypericum prolificum*	Deciduous	Full-sun/part-sun	Hydric/xeric
Drooping leucothoe	*Leucothoe fontanesiana*	Evergreen	Part-sun/shade	Mesic/sub-xeric
Carolina rose	*Rosa carolina*	Deciduous	Full-sun/part-sun	Mesic/sub-xeric
Swamp rose	*Rosa palustris*	Deciduous	Full-sun/part-sun	Hydric/mesic
Cranberry	*Vaccinium macrocarpon*	Evergreen	Full-sun/part-sun	Hydric/mesic
Lowbush blueberry	*Vaccinium pallidum*	Deciduous	Full-sun/part-sun	Mesic/xeric
Maple-leaf viburnum	*Viburnum acerifolium*	Deciduous	Full-sun/part-sun	Mesic/xeric
Mid-size Shrubs (4–10 ft)				
Red chokeberry	*Aronia arbutifolia*	Deciduous	Full-sun/part-sun	Hydric/sub-xeric
Black chokeberry	*Aronia melanocarpa*	Deciduous	Full-sun/part-sun	Hydric/sub-xeric

Common Name	Scientific Name	Type	Light	Soil Moisture[1]
Sweetshrub	*Calycanthus floridus*	Deciduous	Part-sun/shade	Hydric/sub-xeric
Cinnamonbark	*Clethra acuminata*	Deciduous	Full-sun/part-sun	Sub-xeric/xeric
Silky dogwood	*Cornus amomum*	Deciduous	Full-sun/part-sun	Hydric/sub-xeric
Hazelnut	*Corylus americana*	Deciduous	Full-sun/shade	Mesic/sub-xeric
Bush-honeysuckle	*Diervilla sessilifolia*	Deciduous	Full-sun/shade	Mesic/xeric
Hearts-a-bustin	*Euonymus americanus*	Deciduous	Part-sun/shade	Mesic/sub-xeric
Large fothergilla	*Fothergilla major*	Deciduous	Full-sun/part-sun	Mesic/sub-xeric
Dense hypericum	*Hypericum densiflorum*	Deciduous	Full-sun/part-sun	Mesic/xeric
Common winterberry	*Ilex verticillata*	Deciduous	Full-sun/shade	Hydric/mesic
Virginia sweetspire	*Itea virginica*	Deciduous	Full-sun/shade	Hydric/sub-xeric
Mountain laurel	*Kalmia latifolia*	Evergreen	Full-sun/part-sun	Sub-xeric/xeric
Spicebush	*Lindera benzoin*	Deciduous	Part-sun/shade	Mesic
Sweet azalea	*Rhododendron aborescens*	Deciduous	Full-sun/shade	Hydric/mesic
Flame azalea	*Rhododendron calendulaceum*	Deciduous	Part-sun/shade	Mesic/sub-xeric
Carolina rhododendron	*Rhododendron carolinianum*	Evergreen	Part-sun/shade	Mesic/sub-xeric
Mountain rosebay	*Rhododendron catawbiense*	Evergreen	Full-sun/shade	Mesic/sub-xeric
Pink azalea	*Rhododendron periclymenoides*	Deciduous	Part-sun/shade	Hydric/sub-xeric
Pinkshell azalea	*Rhododendron vaseyi*	Evergreen	Full-sun/part-sun	Mesic/sub-xeric
Elderberry	*Sambucus canadensis*[2]	Deciduous	Full-sun/shade	Mesic
Coral berry	*Symphoricarpus orbiculatus*[2]	Deciduous	Full-sun/shade	Mesic/xeric
Hobblebush	*Viburnum alnifolium*	Deciduous	Part-sun/shade	Mesic

Common Name	Scientific Name	Type	Light	Soil Moisture[1]
Highbush blueberry	*Vaccinium corymbosum*[2]	Deciduous	Full-sun/part-sun	Sub-xeric/xeric
Deerberry	*Vaccinium stamineum*	Deciduous	Full-sun/part-sun	Mesic/xeric
Witherod viburnum	*Viburnum cassinoides*	Deciduous	Full-sun/shade	Mesic/sub-xeric
Large Shrubs (> 10 ft)				
Tag alder	*Alnum serrulata*[2]	Deciduous	Full-sun/part-sun	Hydric/mesic
Mountain winterberry	*Ilex montana*	Deciduous	Full-sun/part-sun	Mesic/sub-xeric
Mock orange	*Philadelphus inodorus*	Deciduous	Full-sun/part-sun	Mesic/sub-xeric
Rosebay rhododendron	*Rhododendron maximum*	Evergreen	Part-sun/shade	Mesic/sub-xeric
Smooth sumac	*Rhus glabra*[2]	Deciduous	Full-sun/part-sun	Mesic/sub-xeric
Silky willow	*Salix sericea*	Deciduous	Full-sun/shade	Hydric/sub-xeric
Arrowwood	*Viburnum dentatum*[2]	Deciduous	Full-sun/part-sun	Mesic/sub-xeric
Vines				
Dutchman's pipe	*Aristolochia macrophylla*	Deciduous	Part-sun/shade	Mesic/xeric
Crossvine	*Bignonia capreolata*	Evergreen	Full-sun/shade	Hydric/sub-xeric
Virgin's bower	*Clematis virginiana*[2]	Deciduous	Full-sun/shade	Mesic/xeric
Climbing hydrangea	*Decumaria barbara*	Deciduous	Full-sun/part-sun	Mesic/sub-xeric
Coral honeysuckle	*Lonicera sempervirens*	Deciduous	Full-sun/part-sun	Mesic/sub-xeric
Passion flower	*Passivlora incarnata*	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.

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Table E-2. Native and Locally Adapted Herbaceous Plant Species.

Common Name	Scientific Name
Ferns	
Maidenhair fern	*Adiantum pedatum*
Ebony spleenwort	*Asplenium platyneuron*
Lady fern	*Athyrium felix-feimina* ssp. *Asplenoides*
Hay-scented fern	*Dennstaedtia punctiloba*
Wood fern	*Dryopteris marginalis*
Sensitive fern	*Onoclea sensibilis*
Cinnamon fern	*Osmunda cinnamomea*
Interrupted fern	*Osmunda claytoniana*
Royal fern	*Osmunda regalis*
Christmas fern	*Polystichum acrostichoides*
New York fern	*Thelypteris noveboracensis*
Chain fern	*Woodwardia areolata*
Common woodsia	*Woodsia obtusa*
Grasses and Sedges	
Big bluestem	*Andropogon gerardii*
Broomsedge	*Andropogon virginicus*
River cane	*Arundinaria gigantea* ssp. *Gigantea*
Pennsylvania sedge	*Carex pensylvanica*
Plantain-leaved sedge	*Carex plantaginea*
River oats	*Chasmanthium latifolium*
Oat grass	*Danthonia compressa*
Bottle brush	*Elymus bystrix*
Switch-grass	*Panicum virgatum*
Little bluestem	*Schizachyrium scoparium*
Indian grass	*Sorghastrum nutans*
Eastern gamma grass	*Tripsacum dactyloides*
Mesic for Full Sun	

Common Name	Scientific Name
Butterfly weed	*Asclepias tuberosa*
New England aster	*Aster novae-angliae*
Curtis aster	*Aster curtisii*
Hairy coreopsis	*Coreopsis pubescens*
Joe-pye weed	*Eupatorium fistulosum*
Blazing star	*Liatris spicata*
Cardinal flower	*Lobelia cardinalis*
Bee balm	*Monarda didyma*
Wild blue phlox	*Phlox carolina*
Blackeyed susan	*Rudbeckia hirta*
Mesic for Shade	
Jack-in-the-pulpit	*Arisaema triphyllum*
Wild ginger	*Asarum canadense*
Trout lily	*Erythronium americanum*
Sharp-lobed hepatica	*Hepatica acutiloba*
Alumroot	*Heuchera americana*
Partridge berry	*Mitchella repens*
Cinnamon fern	*Osmunda cinnamomea*
Solomon’s seal	*Polygonatum biflorum*
Christmas fern	*Polystichum acrostichoides*
Oconee bells	*Shortia galactifolia*
Foamflower	*Tiarella cordifolia*
Ground Covers	
Pussy’s toes	*Antennaria plantaginifolia*
Wild ginger	*Asarum canadense*
Wintergreen	*Baultheria procumbens*
Green-and-gold	*Chrysogonum virginianum*
Mouse-eared coreopsis	*Coreopsis auriculata*
Wild strawberry	*Fragaria virginiana*
Little brown jugs	*Hexastylis arifolia*

Common Name	Scientific Name
Dwarf crested iris	*Iris cristata*
Partridge berry	*Mitchella repens*
Allegheny spurge	*Pachysandra procumbens*
Phacelia	*Phacelia bipinnatifida*
Chalice phlox	*Phlox amoena*
Wild blue phlox	*Phlox divaricata*
Creeping phlox	*Phlox stolonifera*
Golden aster	*Pityopis graminifolia*
Christmas fern	*Polystichum acrostichoides*
Oconee bells	*Shortia galacifolia*
Blue-eyed grass	*Sisyrinchium mucronatum*
Foamflower	*Tiarella cordifolia*
Yellow-root	*Xanthorhiza simplicissima*
Wildflowers	
Doll's eyes	*Actaea pachypoda*
Blue star	*Amsonia tabernaemontana*
Thimbleweed	*Anemone virginiana*
Wild columbine	*Aquilegia canadensis*
Green dragon	*Arisaema dracontium*
Jack-in-the-pulpit	*Arisaema triphyllum*
Goat's-beard	*Aruncus dioicus*
Swamp milkweed	*Asclepias incarnata*
Butterfly-weed	*Asclepias tuberosa*
White wood aster	*Aster divaricatus*
Late purple aster	*Aster patens*
False goatsbeard	*Astilbe biternata*
Wild indigo	*Baptisia tinctoria*
Blue cohosh	*Caulophyllum thalictroides*
Pink turtlehead	*Chelone lyonii*
Black cohosh	*Cimicifuga racemosa*

Common Name	Scientific Name
Coreopsis	*Coreopsis pubescens*
Bleeding heart	*Dicentra eximia*
Shooting star	*Dodecatheon meadia*
Joe-pye weed	*Eupatorium fistulosum*
Wild geranium	*Geranium maculatum*
Sunflower	*Helianthus resinosus*
Sharp-lobed hepatica	*Hepatica acutiloba*
Alumroot	*Heuchera americana*
Jewelweed	*Impatiens capensis*
Blazing star	*Liatris spicata*
Turks-cap lily	*Lilium superbum*
Cardinal flower	*Lobelia cardinalis*
Lobelia	*Lobelia puberula*
Great lobelia	*Lobelia siphilitica*
Fringed loosestrife	*Lysimachia ciliata*
Bishop’s cap	*Mitella diphylla*
Bee balm	*Monarda didyma*
Carolina phlox	*Phlox carolina*
Carolina phlox	*Phlox carolina*
Garden phlox	*Phlox paniculata*
Solomon's seal	*Polygonatum biflorum*
Blackeyed susan	*Rudbeckia hirta*
Bloodroot	*Sanguinaria canadensis*
Fire pink	*Silene virginica*
Winkle-leaf goldenrod	*Solidago rugosa*
Bush pea	*Thermopsis villosa*
New York ironweed	*Vernonia noveboracensis*

Source: North Carolina Native Plant Society (NCNPS) 2008.