

2015 - 2020 INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN

MARINE CORPS BASE CAMP LEJEUNE NORTH CAROLINA

FINAL
JULY 2015

CONTRACT: N62470-13-D-8017
TASK ORDER: WE02

Prepared for:
NAVFAC MIDLANT
6506 Hampton Blvd.
Norfolk, VA 23508

JOINT VENTURE
GMI **AECOM**



2015-2020 Integrated Natural Resources Management Plan

Marine Corps Base Camp Lejeune, North Carolina

Final
July 2015



Prepared for:
Mid-Atlantic Division,
Naval Facilities Engineering Command
Norfolk, VA.



Prepared by:
JOINT VENTURE
GMI AECOM
Hampton, Virginia

Contract #: N62470-13-D-8017, Delivery Order WE02

Activity Point of Contact: Martin Korenek, Natural Resources Manager,
Environmental Conservation Branch, MCB Camp Lejeune, NC

POC and Contact Info: Emmett Carawan, Natural Resources Specialist,
NAVFAC Mid-Atlantic, NTR

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Marine Corps Base Camp Lejeune

APPROVAL

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This document fulfills INRMP requirements in accordance with the Sikes Act (16 USC §670a et seq.), as amended; Department of Defense Instruction 4715.03 (DoD Environmental Conservation Program); and Marine Corps Order (MCO) P5090.2A (Environmental Compliance and Protection Manual). This document was prepared and reviewed in coordination with the Department of Interior, acting through the Director of the U.S. Fish and Wildlife Service, Director, Protected Resources Division National Oceanic Atmospheric Administration National Marine Fisheries, Southeast Region, the Executive Director of the North Carolina Wildlife Resources Commission, and the Director of the Division of Marine Fisheries, North Carolina Department of Environment and Natural Resources in accordance with the 2013 Memorandum of Understanding for a Cooperative Integrated Natural Resources Management Program on Military Installations.

By your signature below, you grant MCIEAST-Marine Corps Base Camp Lejeune concurrence with and acceptance of the following document.

Approving Official – Marine Corps Base Camp Lejeune



R. F. CASTELLVI
Brigadier General, U.S. Marine Corps
Commanding General
MCI EAST, MCB Camp Lejeune

22 Jul 2015
Date

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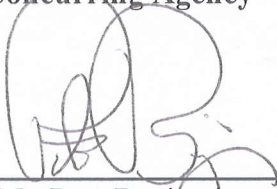
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By your signature below, you grant agency concurrence with and acceptance of the following document.

Concurring Agency – U.S. Fish and Wildlife Service



Mr. Pete Benjamin

Supervisor, Ecological Services, Raleigh Field Office, USFWS
Post Office Box 33726
Raleigh, NC 27636-3726

4/30/13
Date

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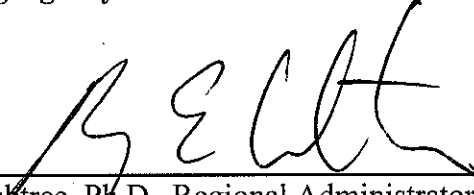
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By your signature below, you grant agency concurrence with and acceptance of the following document.

Concurring Agency – National Marine Fisheries Service



Roy E. Crabtree, Ph.D., Regional Administrator
Protected Resources Division
National Marine Fisheries, Southeast Region
263 13th Avenue South
St. Petersburg, FL 33701-5505

17/23/15

Date

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Concurring Agency – National Marine Fisheries Service

A copy of this final product and an opportunity to comment was provided to NMFS. NMFS has provided no comment or objection to the 2015 INRMP.

Roy E. Crabtree, Ph.D., Regional Administrator
National Marine Fisheries, Southeast Region
263 13th Avenue South
St. Petersburg, FL 33701-5505

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By your signature below, you grant agency concurrence with and acceptance of the following document.

Concurring Agency – North Carolina Wildlife Resources Commission



Mr. Gordon S. Myers, Executive Director
NC Wildlife Resources Commission
1751 Varsity Drive
Raleigh, NC 27606

08 MAY 2015

Date

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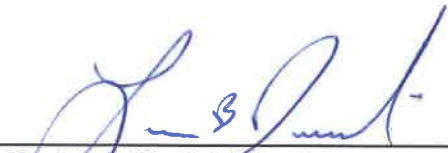
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By your signature below, you grant agency concurrence with and acceptance of the following document.

Concurring Agency – North Carolina Division of Marine Fisheries



Dr. Louis Daniel, Director
NC Division of Marine Fisheries, NCDENR
PO Box 769
Morehead City, NC 28557

3/30/15

Date

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Executive Summary

The Department of Defense (DoD) manages approximately 30 million acres of land in the United States. Each military base that has suitable habitat for conserving and managing natural ecosystems is required to prepare, maintain, and implement an Integrated Natural Resources Management Plan (INRMP). This INRMP was prepared for Marine Corps Installations East (MCIEAST)-Marine Corps Base (MCB) Camp Lejeune in accordance with 16 US Code (USC) §670a *et seq* – Sikes Act, DoD Instruction (DoDI) 4715.03 – Environmental Conservation Program; Chief of Naval Operations Operating Instruction (OPNAVINST) 5090.1 – Environmental and Natural Resources Program Manual, and 32 Code of Federal Regulations (CFR) Part 190 – DoD Natural Resources Management Program.

This INRMP is a long-term planning document that guides implementation of the natural resources program to ensure consistency with MCIEAST-MCB Camp Lejeune’s military mission and to support “no net loss” in military mission capability for the base lands, while providing for the conservation and rehabilitation and the sustainable multipurpose use of natural resources on MCB Camp Lejeune. For the purposes of this document, “MCB Camp Lejeune” includes the property and mission of MCAS New River.

In accordance with the Sikes Act, this INRMP was prepared in cooperation with and with mutual agreement from the Department of Interior, acting through the Director of the US Fish and Wildlife Service (USFWS). Additionally, Director, Protected Resources Division, National Oceanic Atmospheric Administration, National Marine Fisheries, Southeast Region; the Executive Director of the North Carolina Wildlife Resources Commission; and the Director of the Division of Marine Fisheries, North Carolina Department of Environment and Natural Resources cooperated and fully supported the creation of this INRMP. Future involvement of the State of North Carolina and federal wildlife agencies will ensure continued mutual agreement with US FWS and cooperation with these agencies in managing the natural resources at MCB Camp Lejeune. In accordance with DoD policy, the installation will evaluate the effectiveness of this INRMP annually in cooperation with the appropriate field-level offices of the USFWS and state fish and wildlife agencies. The web-based Natural and Cultural Resource Management Tool on the Marine Corps Conservation Metrics Portal will facilitate evaluation of the successes and issues resulting from INRMP implementation.

Resource-specific program elements have been developed and described to address relevant natural resources issues at MCB Camp Lejeune. Existing conditions, baseline survey data, current management practices, and recommended management actions have been described for each program element.

Management program elements described in this INRMP include:

- Rare, Threatened, and Endangered Species Management
- Forest Management
- Wildland Fire Management
- Fish and Wildlife Management
- Migratory Bird Management
- Bird/Animal Aircraft Strike Hazard (BASH) Management
- Wetlands Management
- Coastal Area Management
- Soil Conservation
- Invasive Species Management
- Outdoor Recreation and Conservation Outreach

The management actions and projects identified for MCB Camp Lejeune are intended to help the Base Commander support the military mission, while managing natural resources effectively, ensuring base lands remain available and in good condition, and ensuring compliance with relevant environmental regulations. These actions incorporate the principles of ecosystem management and are consistent with Marine Corps policy on sustainable, multiple use of natural resources on Marine Corps property.

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Appendix 2: Natural Resources Management Drivers

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Appendix 4: Memorandum of Understanding for the North Carolina Onslow Bight Conservation Forum

Appendix 5: Ecological Classification System

Appendix 6: MCB Camp Lejeune 2014 RCW Management Plan

Appendix 7: Wildland Fire Management Plan

Appendix 8: MCB Camp Lejeune Silvicultural System

Appendix 9: Sea Turtle Monitoring, Management, and Protective Measures

Appendix 10: Mitigation and Monitoring for Marine Mammals and Sea Turtles

Appendix 11: Hirst's Panicgrass Monitoring

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Appendix 13: Species at Risk Known or with Potential to Occur at MCB Camp Lejeune

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Appendix 16: Funding Class

Appendix 17: Agency Coordination and Comment Response Matrix

Appendix 18: Biological Assessment Marine Corps Base Camp Lejeune 2015-2020

Appendix 19: USFWS Biological Opinion MCB Camp Lejeune 2015-2020 INRMP

Appendix 20: Environmental Assessment MCB Camp Lejeune 2015-2020 INRMP

Appendix 21: Finding of No Significant Impact MCB Camp Lejeune 2015-2020 INRMP

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1.0 OVERVIEW

This revised Integrated Natural Resources Management Plan (INRMP) was developed to guide implementation of the natural resources management program on Marine Corps Installations East – Marine Corps Base (MCB) Camp Lejeune (MCIEAST-MCB CAMLEJ [MCB Camp Lejeune]) over the next 5 years (2015 - 2019). This INRMP provides for the management of natural resources on MCB Camp Lejeune in accordance with the requirements of the Sikes Act of 1973 (16 USC 670a et seq.), as amended, and the INRMP implementing policies established in Department of Defense Instruction (DoDI) 4715.03 - Natural Resources Conservation Program and Marine Corps Order (MCO) P5090.2A – Environmental Compliance and Protection Manual. The principal purpose of this INRMP is to ensure that installation natural resources are managed and conserved for long-term mission sustainability. This INRMP also ensures that natural resources management and other mission activities are conducted in accordance with the Endangered Species Act (ESA) (16 USC 1531 et seq.), Migratory Bird Treaty Act (MBTA) (16 USC 703–712), Clean Water Act (CWA) (33 USC 1251 et seq.), and a suite of additional federal laws and regulations governing natural resource protection and management on military installations. In accordance with the Sikes Act, this INRMP was prepared in cooperation with and with mutual agreement from the Department of Interior, acting through the Director of the US Fish and Wildlife Service (USFWS). Additionally, Director, Protected Resources Division, National Oceanic Atmospheric Administration, National Marine Fisheries, Southeast Region; the Executive Director of the North Carolina Wildlife Resources Commission; and the Director of the Division of Marine Fisheries, North Carolina Department of Environment and Natural Resources cooperated and fully supported the creation of this INRMP.

1.1 INRMP VISION

The goal of the revised INRMP is to insure a **balanced** land use and land management approach for military operational and training requirements and natural resources regulatory requirements on MCB Camp Lejeune. Within MCB Camp Lejeune, *Land Use and Land Management* are similar to municipal land planning (i.e., it is the command's identification for use of specific parcels based on types of activities planned or being conducted). As an example, the land use of the Greater Sandy Run Area (GSRA) was designated during its acquisition process in 1991 as being primarily for range development, operations, live-fire, and maneuver space for tactical vehicles and combat troops. Smaller parcels and airspace of GSRA were dedicated to air operations and wetland banking (Department of the Navy, 1991). To achieve that primary use, *Land Management* efforts were implemented to incorporate the activities necessary to manage specific parcels to achieve a variety of regulatory and policy requirements. These activities include management actions to satisfy conservation requirements and contain proposed actions such as silviculture plans, recreational activities, and/or species management plans. *Land*

Management plans should be applied after land use is determined and designed to provide support for the identified land uses.

This INRMP outlines military training requirements, and conservation efforts geared toward meeting land use requirements and satisfying regulatory requirements, by establishing procedures to ensure compliance with related laws and regulations. This INRMP considers resources on both the Installation and larger regional levels.

Development and implementation of this INRMP will fulfill the statutory requirements as defined under the Sikes Act. Congress intended for natural resources management on military installations to support the installation mission, to provide an opportunity to the public to have access to installation natural resources, and to participate, when appropriate, in regional ecosystem initiatives. In particular, Congress intended for each INRMP to support and be consistent with the mission of the installation. The Sikes Act states:

- (1) (A) The Secretary of Defense shall carry out a program to provide for the conservation and rehabilitation of natural resources on military installations.
- (1) (B) (i) To facilitate the program, the Secretary of each military department shall prepare and implement an integrated natural resources management plan for each military installation in the United States under the jurisdiction of the Secretary.
- (3) (A) Consistent with the use of military installations to ensure the preparedness of the Armed Forces, the Secretaries of the military departments shall carry out the program to provide for- (i) the conservation and rehabilitation of natural resources on such military installations; (ii) the sustainable multipurpose use of the resources, which shall include hunting, fishing, trapping, and non-consumptive uses; and (iii) subject to safety requirements and military security, public access to military installations to facilitate the use.

Consistent with the mission of MCB Camp Lejeune to ensure the preparedness of the Armed Forces, paragraph (b) of the Sikes Act states that the INRMP shall, to the extent appropriate and applicable, provide for:

- 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 for support of fish, wildlife;
- Integration of, and consistency among the various activities conducted under the plan;
- Establishment of specific natural resources management goals and objectives and time frames for proposed action;

- Sustainable use by the public of natural resources to the extent such use is not inconsistent with the needs of fish and wildlife resources;
- Public access to the installation that is necessary or appropriate for the use described in subparagraph (F) subject to requirements necessary to ensure safety and military security;
- Enforcement of applicable natural resource laws (including regulations);
- ***No net loss in the capability of installation lands to support the military mission of the installation;*** and
- Such other activities as the Secretary of the military department determines appropriate.

The Sikes Act is viewed as an “umbrella” law with regard to management of natural resources on military lands. As a result, military instruction and guidance exist to guide installation compliance with the Sikes Act and other environmental policies. Examples include:

- DoDI 4715.03 requires protection and enhancement of natural resources for multiple use, sustainability, and biological integrity. INRMP requirements include the 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.
- DoD INRMP Implementation Manual (DoDM) 4715.03 provides procedures to prepare, review, update, and implement INRMPs in compliance with the Sikes Act.
- 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, and military mandates for environmental compliance.
- The Handbook for Preparing, Revising and Implementing Integrated Natural Resources Management Plans on Marine Corps Installations (US Marine Corps, 2007) was also utilized as guidance for this INRMP revision. The 2007 Handbook provides information on Sikes Act requirements, the purpose of natural resources management on Marine Corps lands, and general guidance on the preparation and revision of INRMPs for Marine Corps installations.
- Marine Corps Doctrinal Publication 1 (Warfighting) describes the Marine Corps warfighting philosophy and is the “authoritative basis for how the USMC fights wars and prepares for war” through training.

This INRMP reflects MCB Camp Lejeune's commitment to provide ongoing sustainable military training for its Marines while conserving, protecting, and enhancing natural resources. MCB

Camp Lejeune published its first INRMP in October 2001 to direct its resource management activities from 2002 to 2006. Since this initial publication, adjustments to certain environmental objectives are required to support the training mission of MCB Camp Lejeune.

1.2 MARINE CORPS MISSION

The Marine Corps serves as an expeditionary force-in-readiness. As outlined in 10 USC§ 5063 and as originally introduced under the National Security Act of 1947, the Marine Corps has three primary areas of responsibility:

- Seizure or defense of advanced naval bases and other land operations to support naval campaigns;
- Development of tactics, techniques, and equipment used by amphibious landing forces in coordination with the Army and Air Force; and
- Other duties as the President may direct.

MCB Camp Lejeune supports the Commandant's Vision 2025, Expeditionary Force 21 and the II MEF Campaign Plan with sea, land, and air training ranges that support small to large scale exercises. In the Marine Corps Vision & Strategy 2025, the Commandant identified enduring Marine Corps' core competencies:

- The Corps conducts persistent (continuous) forward naval engagement and is always prepared to respond as the Nation's force in readiness;
- The Corps employs integrated combined arms across the range of military operations (ROMO) and can operate as part of a joint or multinational force. ROMO ranges from humanitarian and peacekeeping operations to declared war;
- The Corps provides forces and specialized detachments for service aboard naval ships, Embassy security, and for operations ashore;
- The Corps conducts joint forcible entry operations from the sea and develops amphibious landing force capabilities and doctrine;
- The Corps conducts complex expeditionary operations in the urban littorals and other challenging environments; and
- The Corps leads joint and multinational operations and enables interagency activities.

1.3 INSTALLATION MISSION

MCB Camp Lejeune provides training support in the form of training ranges, training facilities and maneuver space for the warfighting forces assigned to II Marine Expeditionary Forces (II

MEF) and other tenant organization. Additionally, MCB Camp Lejeune provides training range scheduling; oversees training range operations; and range safety, management and development. MCB Camp Lejeune supports a full range of operational training that includes individual and unit level maneuver, live-fire, and amphibious operations both at-sea and ashore. MCB Camp Lejeune is home to the II Marine Expeditionary Force and therefore supports all aspects of combined arms training to include ground combat elements, aviation elements, logistics combat elements (LCE) and command and control elements. Additionally, numerous other tenant commands reside at MCB Camp Lejeune that require training ranges and unencumbered maneuver space to accomplish their training requirements. They include, but are not limited to, commands such as the Marine Corps Engineer School, Field Medical School, Coast Guard's Special Mission Training Center, Marine Corps Air Station (MCAS) New River, and Marine Special Operations Command.

II MEF training involves combined arms characterized by firepower, speed, surprise, initiative, and competent leadership focused on countering a potential enemy's mission and tactics. Combined arms is a term that incorporates all or certain parts of warfighting; individuals, tactical vehicles, units, and weapons systems assigned to the II MEF.

The warfighting forces of II MEF can be uniquely task organized to support specific mission requirements and are referred to in size or capability as a Marine Air-Ground Task Force (MAGTF). The MAGTF is made up of a Command Element; a Ground Combat Element (mainly infantry); an Aviation Combat Element (helicopters, tilt-rotor aircraft, tactical jets, and KC-130 airlift); and a Logistic Support Element (movement of fuel, food, ammunition, and personnel).

MCB Camp Lejeune's training support mission must also provide for the training of Marine Expeditionary Units and large scale exercises at the Marine Expeditionary Brigade (MEB) level.

1.4 COMMANDING GENERAL MESSAGES AND THEMES

1.4.1 Operational Imperatives and Goals for this INRMP

MCB Camp Lejeune's primary training support mission is to provide modern and state-of-the-art training ranges, training facilities, and maneuver areas that promote realistic and relevant training for combat units destined for deployment throughout the world. The short and long term focus for training range managers is to strive to provide the best available training opportunities and training capabilities (ranges) that support amphibious training, live-fire, tactical vehicle maneuver, and ultimately combined arms tactical maneuver with live-fire.

The operational goal for this INRMP revision is to redefine military drivers into operational training themes and objectives and adjust land use management to address deficiencies in training capabilities. From an operational view-point, the command recognizes that land use management is a collective responsibility to comply with the laws and regulations to conserve

and enhance our natural resources. This INRMP shall be accomplished in a manner that maintains sustainable training ranges and maneuver areas and sustainable natural resources. The operational training themes and objectives will be addressed in terms of actionable, enduring requirements presented as short-term objectives (5 years or less) and long-term objectives (longer than 5 years).

We will remain committed to:

- Meeting our on-base red-cockaded woodpecker (*Picoides borealis* [RCW]) recovery goal and reducing restrictions on military training by increasing the RCW population on non-military lands through RCW Recovery and Sustainment Plan (RASP) agreements,
- Rangeland efforts to restore longleaf pine (*Pinus palustris*) focusing on suitable areas on Mainside (east of New River) and in Verona Loop, wherever practicable and where there is no conflict with the mission, and
- Continued maintenance of the GSRA Wetlands Mitigation Bank.

What we will seek to do based on interim discussions with the USFWS and in order to meet the operational imperatives of the Commanding General include implementing the following actions as foundational to the development of this INRMP:

- **GSRA Incidental Take Authorization**

In order to maximize the availability of unconstrained training lands on MCB Camp Lejeune, off-road tactical vehicle maneuver capabilities on GSRA and Mainside will be developed and maintained to the maximum extent practical. The application of prescribed burning for ecosystem management, wildfire prevention, and range vegetation management may encourage new occurrences by creating suitable habitat. Any new threatened and endangered species appearing as a result of beneficial fire management and other natural resource management effects will not result in additional constraints on training or range development. This agreement with USFWS includes species currently listed under the ESA, as well as species such as the Eastern Diamondback Rattlesnake and Carolina Gopher Frog that may become federally listed in the future. In the specific case of the RCW, this agreement will cover all RCW clusters that may become established on GSRA and will not be limited to a specific number of clusters based on habitat availability. This agreement will apply to all training activities and range development projects, as well as any supporting infrastructure and facility development projects. All consultation requirements associated with this agreement will be completed during the USFWS INRMP review and approval process. Subsequent to the INRMP consultation, any listed species that appear as a result of fire and other natural resource management activities can be taken without further USFWS approval or consultation.

MCB Camp Lejeune will notify USFWS of any incidental take, potentially in annual INRMP update reports.

- **GSRA Longleaf Pine**

The ongoing process of planning and designing tactical vehicle maneuver ranges on GSRA precludes the identification of suitable longleaf pine restoration sites at this time. In order to avoid inefficient and ineffective resource allocation, longleaf pine restoration on GSRA will be put on hold pending completion of the range planning and design process. Potential longleaf restoration sites on GSRA will be reevaluated upon completion of the planning/design process or at the end of the 5-year INRMP period, whichever comes first.

- **GSRA Pocosin as RCW Benefit**

The concept that the pocosin habitat in the GSRA provides a conservation benefit to the red-cockaded woodpecker has not previously been recognized. The pocosins and pocosin fringes may serve as dispersal habitat as well as marginal nesting and foraging habitat. In the past, only the uplands that support or could potentially support longleaf pine were seen as providing a benefit to the species. However, observations of birds using non-typical habitat have shown that pocosin habitat can still provide a benefit. This recognition will be helpful when looking at potential impacts to uplands in GSRA from mechanized maneuver and future range projects.

- **Combined Arms Amphibious Assault Capability (CAAAC) Phase 1/Beach to Combat Town Maneuver Capability (BCTMC)**

Within the Mainside area of MCB Camp Lejeune, the operational requirement exists to provide tactical vehicle maneuver corridors/areas for transit of tracked and wheeled vehicles from the beach to tactical objectives located inland (Figure 1-1). These corridors/areas are intended to be developed to incorporate existing tank trails to the maximum extent possible, but they will also be expanded in some areas to include lanes of travel that permit tactical maneuver. Corridors will be classified as speed and mobility corridors (SM) or cover and concealment (CC) corridors. Corridors may appear as open maneuver areas with little vegetation or three lanes separated by significant vegetation. MCB Camp Lejeune does not believe that mechanized maneuver is compatible with RCW management. The period of this INRMP will be used to validate or invalidate that assumption and provide the basis for future determinations as to whether these maneuver corridors can continue to be included as manageable RCW habitat. There will be “take” associated with these corridors, but all feasible precautions will be used to minimize the

“take” and ensure that the overall RCW recovery plan is not adversely impacted. The full details of this proposed action will be addressed in separate consultation.

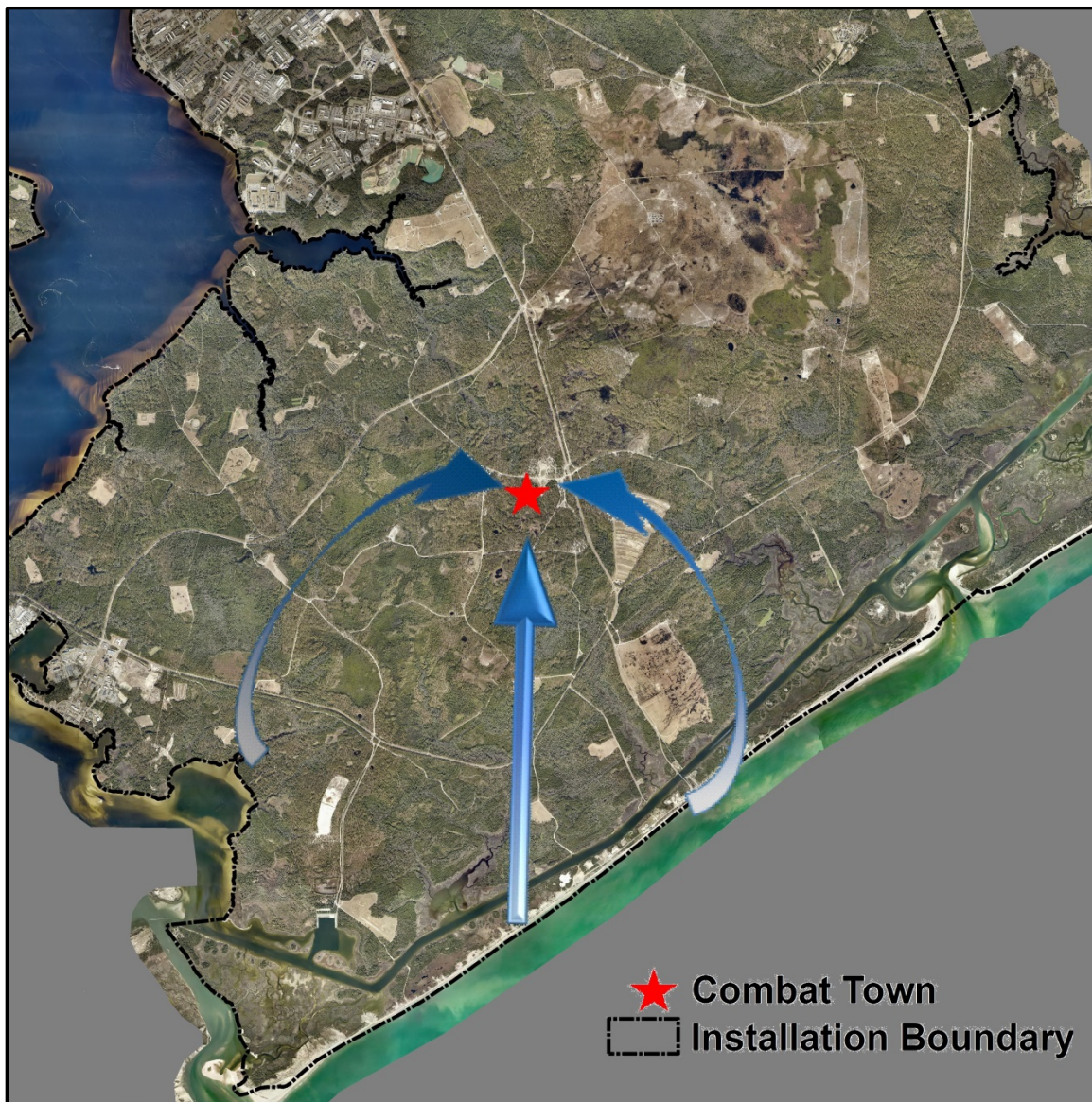


Figure 1-1. General concept of maneuver corridors to Combat Town from Onslow Beach

- **Vegetation Management within Impact Areas**

The impact areas of MCB Camp Lejeune are critical to the accomplishment of live-fire training for air, ground, and naval forces. Visibility of targets is essential for target acquisition by forward observers, pilots, and personnel using direct fire weapons in order to evaluate live fire with regard to target hits and proximity of munitions delivery. Maintenance of the impact areas to provide that necessary visibility requires vegetation management in order to maintain ground cover at desirable heights. Fires resulting from

munitions generally maintain ground cover within the desired threshold in portions of the impact areas. However, many portions of the impact area require additional vegetation management. Due to the danger of unexploded ordnance (UXO), the high cost of UXO removal, and weather conditions, mechanical vegetation management and prescribed fire are not always practical. Consequently, aerial application of herbicides within the impact areas will be a method of control. It is MCB Camp Lejeune's intent to maximize vegetation control in this manner, with anticipation that the rough-leaved loosestrife population within the impact area may be affected. The full details of this proposed action will be made available in the EA for Vegetation Maintenance in the G-10 and K-2 impact Areas and Various Ranges and consultation. The cleared areas of the G-10/K-2 impact areas will not be managed for federally listed threatened and endangered species or species of concern (SOC). Other areas of the G-10/K-2 impact areas that have RCW or other protected species requiring monitoring and management will require escort by certified UXO technicians and Range Control Officer's approval.

- **Memorialize decisions for this INRMP period**

Our long-term and short-term themes and messages will address actionable objectives.

1.4.2 Operational Messages and Themes

Operational Messages and Themes (OM&T) are actions that “identify needs to be satisfied in order for the mission to continue without disruption” (USMC, 2004). The MCB Camp Lejeune mission OM&T serve as the basis for installation land use decisions on the installation. These OM&T in turn direct the development of land management decisions and, to a large extent, the management of natural resources. OM&T may be narrow in focus or broad in scope; however, land management activities may act as flash points for disrupting mission activities including recognition of the Base's mission through “*No net loss in training capabilities.*”

Long-term training objectives center on Marine Expeditionary Unit (MEU) and Marine Expeditionary Brigade (MEB) requirements:

- CAAAC to provide a training capability on Mainside that allows units to conduct seamless combined arms training with live-fire and maneuver from amphibious shipping through or over the training beaches/barrier islands to include subsequent land based training and operations ashore. The CAAAC can also be used for individual and unit level training requirements.
- Ensure the viability of MCAS New River as an aviation facility capable of accepting new aviation platforms through runway extensions and improvements and through the elimination of bird and wildlife strike hazards to aircraft while complying with the Endangered Species Act and other wildlife regulatory requirements.

- Evaluate land use management impacts for future weapon systems well in advance of fielding plans.

Short-Term operational objectives center on individual and unit level Mission Essential Task and USMC Training and Readiness Manual requirements:

- CAAAC Phase 1 BCTMC
- Develop Tactical Vehicle Maneuver Capability (TVMC) in the GSRA to support tactical vehicle maneuver Mission Essential tasks integrated with live-fire opportunities. This project is of immediate priority as TVMA's represents a significant training (capability) gap that was identified in 1979 and has yet to be overcome.
- Develop training capabilities of the barrier islands. The training beach and barrier islands support one of the USMC's critical (core) training requirements; that is, amphibious operations and subsequent operations ashore. This capability will be enhanced through the re-activation of a designated (duded) impact area on Brown's Island for Precision Guided Munitions (PGM) and Landing Craft Air Cushioned (LCAC) artillery raids conducted on the north end of Onslow Beach. Regulatory compliance and management of threatened and endangered species has not significantly impacted the use of the barrier islands for training.
- Increase off road maneuver training opportunities in RCW habitat around Combat Town, designated tank trails, and the Military Operations in Urban Terrain (MOUT) Complex.
- Determine if there is an operational training requirement to clear the G-10 impact area out to the secondary impact area.
- Explore requirements to conduct periodic maintenance dredging of transit lanes for tactical vehicle movement from Mainside (Weil's Point) to Verona Loop (Roads Point).

Both the long-term and short-term goals will assist the managers of MCB Camp Lejeune to provide the operational forces with a comprehensive training range complex that prepares them for the full range of military missions.

1.4.3 Environmental Actions Directly Supporting Operational Messages and Themes

Accomplishing operational messages and themes requires close cooperation with the Environment Management Division to ensure that certain resource management actions are in support of those stated messages and themes. These include:

- Use of the RASP as a primary program to free up large acreages of encumbered training lands from Threatened and/or Endangered species; however, independent formal consultations outside the RASP may be required.

- Explore hardening the Atlantic Intracoastal Waterway (AIWW) tactical vehicle splash points to preserve the integrity of the shoreline and the transit of tactical vehicles from the barrier islands to Mainside land space and develop a long-term management plan for these splash points.
- Ensure MCB Camp Lejeune maintains compliance with the CWA during military training use and when performing Operational Range Clearance in the New River, the AIWW, and Onslow Bay.
- Tidal Area stabilization in the AIWW presents an excellent opportunity to develop a project referred to as thin layer sediment application in select areas of the AIWW to help protect the marshlands in order to preserve terrain suitable for the conduct of amphibious operations.
- Explore potential mutual cooperation with North Carolina (NC) State Marine Fisheries on New River oyster beds/reefs and shrimp trawling areas in advance of establishing specific areas in order to ensure safety of personnel in and around impact areas that border navigable waterways.
- Explore and define our regulatory obligations to manage SOC and Natural Heritage Areas due to their impact on training.

1.5 TENANT UNITS UTILIZING MCB CAMP LEJEUNE AND THEIR DIVERSE TRAINING REQUIREMENTS

1.5.1 Military Units

Many different types of military units conduct a variety of training events and exercises on MCB Camp Lejeune. Representative units and their subsequent activities are listed below.

- **II Marine Expeditionary Force:** II MEF is the principle warfighting force stationed at MCB Camp Lejeune. II MEF conducts operational planning and oversees training for assigned units. When directed, II Marine Expeditionary Force deploys and is employed as a Marine Air Ground Task Force (MAGTF) in support of Combatant Commander requirements for contingency response or Major Theater War. With appropriate augmentation, II MEF serves as the core element of a Joint Task Force (other DoD services such as Army or Air Force). As discussed in the II MEF Campaign Plan, over the last decade, II MEF Marines and Sailors have fought bravely in Iraq and Afghanistan and deployed to countless other locales, performing vital missions and making unsurpassed sacrifices in the service of this Nation. Over this period, the tempo of deployments has dictated an almost singular focus on preparing units for their next operational rotation, to the detriment of our broader core competencies. This focus eroded

the skills needed for combined arms maneuver, mountain and jungle warfare, and amphibious and maritime prepositioning operations.

- **2nd Marine Expeditionary Brigade (MEB):** The MEB is a task organized element of II MEF that is able to rapidly deploy to any area within a matter of hours. Unlike a MEU that continually deploys around the world, the MEB units will spend their time training at home, maintaining their ability to rapidly deploy. The 2nd MEB Command Element does not have permanently assigned subordinate units. When task-organized for crisis and contingency operations and exercises, 2nd MEB will draw its aviation, ground, and logistics elements from II MEF to form a Marine Air-Ground Task Force.
- **22nd, 24th, & 26th Marine Expeditionary Unit (MEU):** As a powerful, mobile force deployable from self-contained floating sea bases (Naval ships), the MEU is uniquely equipped and forward-deployed to respond to any threat, protect any American or ally, or help thwart external aggression any place in the world, often within hours. With its complement of fully-integrated air, ground, and logistic forces, working closely with its Navy counterparts, the MEU is a powerful, expertly-trained, and superbly-equipped force that has proven itself time and again in recent years.
- **2nd Marine Division:** 2nd Marine Division is a multi-role, expeditionary ground combat force. The Division is employed as the ground combat element (GCE) of II MEF or may provide task-organized forces for assault operations and other such operations as may be directed. The 2nd Marine Division must be able to provide the ground amphibious forcible entry capability to the Naval Expeditionary Force (NEF) and to conduct subsequent land operations in any operational environment. Elements of the 2nd Marine Division are tasked organized to support the GCE requirements of MEBs and MEUs.
- **2nd Marine Logistics Group:** Conduct combat logistics operations in support of II Marine Expeditionary Force (MEF) and attached/assigned forces in order to support and conduct combat operations and sustain warfighting effectiveness. Provide general support (GS) combat logistics to all forces operating in the MEF battle space. Elements of the 2nd Marine Logistics Group are task organized to support the LCE requirements of MEBs and MEUs.
- **2nd Marine Air Wing (MAW):** The mission of the MAW is to conduct air operations in support of the Marine Forces to include offensive air support, anti-air warfare, assault support, aerial reconnaissance, electronic warfare, and control of aircraft and missiles. As a collateral function, the MAW may participate as an integral component of naval aviation in the execution of such other Navy functions

as the Fleet Commander may direct. Elements of the 2nd Marine Air Wing are task organized to support the Armored Combat Earthmover (ACE) requirements of MEBs and MEUs.

1.5.2 Other Units on MCB Camp Lejeune

- **Marine Special Operations Command (MARSOC):** A service component of the US Special Operations Command (USSOCOM). MARSOC is tasked by the commander of USSOCOM to train, organize, equip, and, when directed by commander of USSOCOM, deploy task organized, scalable, and responsive US Marine Corps Special Operations Forces worldwide in support of combatant commanders and other agencies. MARSOC has been directed to conduct foreign internal defense, special reconnaissance, and direct action.
- **Special Missions Training Center (SMTTC):** The Coast Guard's SMTTC develops and delivers training and training material to improve performance, ensure safety, promote proficiency, and enforce standardization for the tactical communities' they serve. SMTTC is the Center of Excellence (COE) for tactical operations. Each year SMTTC trains more than 800 coast guard men and women.
- **School of Infantry-East (SOI-E):**
 - **Advanced Infantry Training Battalion:** Develop infantry small unit leaders and provide advanced skills training through professional instructors in order to empower Marines for service throughout the Operating Forces.
 - **Infantry Training Battalion:** Train, Mentor, and evaluate Marines in field craft and Military Occupational Skills specific entry-level tasks under the leadership of Combat Instructors in order to provide the Marine Corps with basically qualified infantry Marines prepared for service in the operating forces.
 - **Marine Combat Training Battalion:** The Marine Combat Training Battalion-East conducts standards-based common combat skills training of entry-level Marines in order to create riflemen for service throughout the Marine Corps.
 - **Marine Combat Instructor School:** Combat Instructor School develops a Marines' leadership, character, knowledge, and fitness in order to produce Combat Instructors who will lead, teach, and mentor entry and advanced level Marines capable of conducting expeditionary combat operations within the Operating Forces.
- **Marine Corps Engineer School (MCES):** The MCES provides instruction in 21 different programs of instruction in both the basic combat engineer and utilities engineer

skill sets training approximately 2000 Marines each year. Additionally, as the USMC proponent for Counter-Improvised Explosive Device (C-IED) and Defeat the Device training, MCEC provides training to approximately 50,000 personnel annually in pre-deployment C-IED training utilizing 10 different Master Lesson Files.

- **Marine Corps Combat Service Support Schools (MCCSSS):** The MCCSSS develops, conducts, and evaluates formal training for entry, intermediate, and advanced level officer, enlisted, and civilian students in Personnel Administration, Ground Supply Support and Distribution, Financial Management, and Logistics Operations, as well as Marine Corps Water Survival training and sustains the professional transformation of Marines in order to prepare graduates for service in the operating forces and supporting establishment.

1.6 MILITARY LAND USE AT MCB CAMP LEJEUNE

1.6.1 Historic Land Use

Onslow County was settled for agricultural purposes in the 1700s. Crops included corn, cotton, and peanuts. Eventually, farmland and woodland were converted to more urban uses.

MCB Camp Lejeune Marine Barracks, New River was originally established on May 1, 1941 on approximately 115,000 acres of land. It was designed to provide training and facilities for all amphibious and ground activities of the 1st Marine Division, Marine Barracks New River. Development of MCB Camp Lejeune occurred in three stages.

Stage 1:

Early in 1941, temporary troop quarters and administrative facilities were erected at Camp Geiger and Montford Point (now Camp Johnson). A Civilian Conservation Corps camp was also established at this time at Camp Knox. In April 1941, units were established along the New River and at Hadnot Point, with support and industrial facilities farther inland. Finally, additional barracks and support facilities were created at Montford Point, Camp Geiger, and Courthouse Bay. The first US Naval Hospital on Base was established in 1943.

Stage 2:

After World War II, development at MCB Camp Lejeune focused on the permanent population of the Base through the expansion of landscaping and recreational opportunities. MCAS New River (formerly Peters Point Field Glider Base) was established in 1951, and training centers were reactivated in the 1950s to support the Korean War. In the 1970s, Montford Point became an educational complex for Marine Corps Service Support and included Field Medical Service School and MCB Camp Lejeune Regional Staff Non-Commissioned Officer Academy.

Stage 3:

In 1992, the Federal government acquired approximately 41,000 acres adjacent to MCB Camp Lejeune to provide additional acreage for troop maneuver and gunnery (live-fire) training due to the training restriction on Mainside. International Paper Company owned approximately 36,500 of these acres. This area is now referred to as GSRA or the Greater Sandy Run Training Area (GSRTA). Prior to acquisition, this virtually undeveloped area had been managed for timber for more than 50 years.

1.6.2 Current Land Use

MCB Camp Lejeune currently encompasses approximately 143,835 acres (Figure 1-2); including an administrative cantonment area, air station, impact areas, training and maneuver areas, drop zones, tactical landing zones (TLZs), gun positions, and outlying landing fields (OLFs). MCB Camp Lejeune has 98 active ranges and three munitions impact areas, as defined in the Range Control Standard Operating Procedure (SOP) (Base Order [BO] P3570.1C).¹ Most of the ranges and impact areas aboard MCB Camp Lejeune are scheduled for daily training exercises. For a summary of weapons accommodated and ammunition authorized at each active range and impact area on MCB Camp Lejeune, refer to the appropriate appendix in MCIEAST-MCB CAMLEJO 3570.1.

There are 96 training areas (TAs) on MCB Camp Lejeune. Table 1-1 provides an overview of current land use totals. Training Areas are divided into five major blocks with 96 sub-training areas, 47 Tactical Landing Zones, and 10 major drop zones. Tactical Landing Zones and Drop Zones are multiple use areas often containing artillery gun positions. Additionally, MCB Camp Lejeune has eleven water training areas, and two ocean training areas adjacent to the training beaches. Training areas currently support:

- Amphibious Assault Vehicles, Landing Craft Air Cushion, and Landing Craft Utility;
- Amphibious raids;
- Platoon-level and below mechanized training and movement;
- Aviation fires, with delivery parameter (altitude/standoff) limitations; and
- Most supporting arms, except live fixed-wing ordnance and un-segmented combined arms training.

¹ The Range Control SOP (Chap 6) outlines environmental requirements for ranges, impact areas, and maneuver and training areas on MCB Camp Lejeune.

Table 1-1. MCB Camp Lejeune Land Use Totals

Primary Land Uses	Acreage	Percent
Impact Areas	12,394	8.7%
K-2 Impact Area	3,263	2.3%
K-2 Water Impact	726	0.5%
G-10 Impact Area	5,002	3.5%
BT-3 Impact Area (on base)	3,413	2.4%
Training Areas	95,940	67.0%
Live Fire Ranges	39,442	27.4%
Areas designated as RCW partitions	39,688	27.5%
Other	16,810	11.6%
Cantonment	17,158	12.0%
Wetlands	10,502	7.3%
Undeveloped Land	6,324	4.3%
Total Acreage	143,835	100%

*Note, areas listed above (in bold) do not add to exactly 100% due to rounding

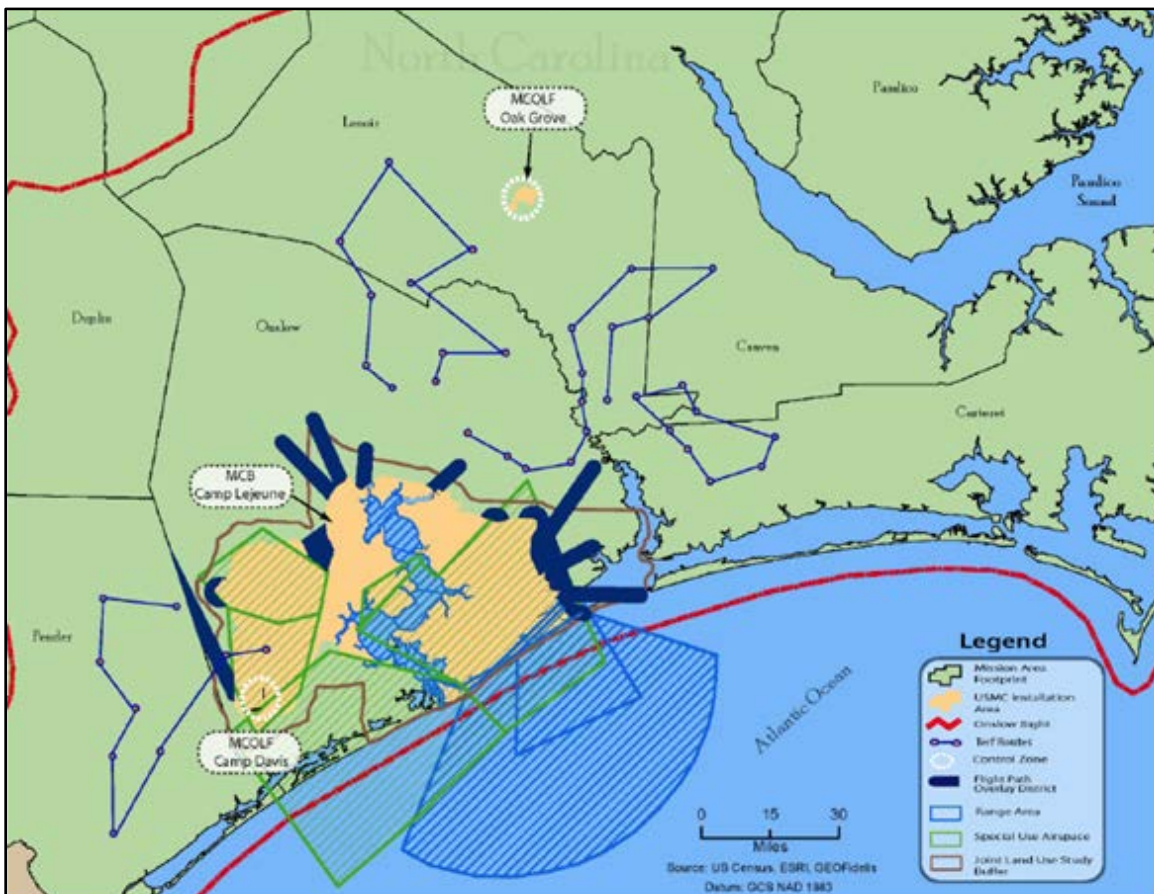


Figure 1-2. MCB Camp Lejeune/MCAS New River combined mission area footprint

Onslow Beach: MCB Camp Lejeune also maintains approximately 10.3 nautical miles of Onslow Beach to support amphibious operations. At the beach range, the 2nd Amphibious Assault Vehicle (AAV) Battalion and Joint Armed Services training conduct regular exercises or periodic, large-scale training. MCIEAST-MCB CAMLEJO 3570.1 includes a comprehensive list of military training on Onslow Beach activities.

New River: New River fulfills the USMC's mission requirement to conduct combat and combat support operations in shallow-water and riverine environments. Training on the New River includes activities by two USMC commands and one US Coast Guard unit.

- The **2nd MARDIV** supports II MEF with 17 Riverine Assault Craft (RAC), 65 Rigid Raider Craft (RRC), and 100 Combat Rubber Raider Craft (CRRC). Many of these boats are deployed in various locations around the world and are not simultaneously training on the New River. These boats include jet and propeller-driven boats designed for high speed military operations in shallow water and riverine environments. Day and night training exercises include personnel insertion and extraction, re-supply and refuel between vessels, waterborne refueling, formation traveling, and medium and heavy machine guns live-fire. Current exercises occur at a rate of approximately 635 per year and are expected to increase to 830 per year.
- The **8th Engineer Support Battalion (ESB)** has 21 Bridge Erection Boats (BEB) in their inventory and uses boats to transport and build floating bridges. The boats have traditionally been used to transport and build expeditionary-type bridging and to ferry equipment across areas too wide to bridge. GSRA's recent acquisition has also required an increase in military training traffic on New River. Sixty-seven ton M1A21 tanks belonging to the **2nd Tank Battalion (TKBN)** are now ferried across the river to reach training areas and firing ranges in GSRA. The **2nd TKBN** conducts approximately 8 training operations per year in GSRA requiring 15 tanks for each operation. The **8th ESB** supports this operation by using BEBs to raft the tanks across the river (one at a time) on six Bay Ribbon Bridges (several sections of pontoon-type bridging are joined together to form a raft large enough to support a tank). In addition to the **8th ESB**, the **2nd AAVBN** conducts maneuvers with tracked, amphibious vehicles on the New River. These vehicles are track and water propulsion system driven and enter and exit the river at designated earth and concrete splash points. Various Navy and Army landing craft utility (LCU) units also support training on the river.
- The US Coast Guard Port Security Unit located at Courthouse Bay currently uses 11 vessels (eight 25-foot outboard-driven Boston Whalers and three 22-foot outboard-driven Boston Whalers) and conducts 8-10 training exercises a year on the New River and surrounding waterways.

1.6.3 Future Land Use Needs

The Marine Corps is in the process of reducing the total force from 202,000 to a smaller force structure in the order of 185,000 by Fiscal Year 2017 as part of a budget-driven force redesign. The Marine Corps strategically designed the force based on four guiding principles: (1) be modernized, ready, and based for action, (2) be integrated into the joint force structure, (3) be genuinely expeditionary, and (4) be right-sized while retaining our core combined arms and amphibious structures and competencies (Amos, 2013). These guiding principles will assure that the Marine Corps can maintain its future mission requirements to be a forward presence; be ready to respond rapidly to crisis; and be scalable to larger force interventions as situations required.

The challenge of restoring combined arms proficiency is particularly acute at the individual, unit, Marine Expeditionary Unit (MEU), and Marine Expeditionary Brigade (MEB) levels. As such, II MEF has supported the development of a Combined Arms and Amphibious Assault Capability on main side and a Tactical Vehicle Maneuver Capability in the Greater Sandy Run Training Area. These capabilities will allow II MEF (tactical) maneuver forces to train in individual and (subsequent) unit level collective skills with live-fire in the GSRA; thus providing the foundational training to perform operations as a coherent MAGTF within the construct of amphibious operations or a land based force (CAAAC) on main side.

In addition, future range improvements include:

- Tactical Vehicle Maneuver Capability (TVMC) driving course in the GSRA and
- Unmanned aircraft system (UAS) operations.

With range improvements and new course developments, like the Combined Arms and Amphibious Assault Course, future land use will need to accommodate missions such as:

- Amphibious assault and subsequent operations ashore,
- Live-fire engagement of targets by maneuver forces,
- Modern fixed-wing precision guided munitions delivery,
- Artillery live-fire options in the G-10 and K-2 areas,
- Armor and tactical vehicle maneuver and employment, and
- Mechanized Infantry maneuver and employment.

Given that MCB Camp Lejeune also depends on off-base lands for training (tactical flight paths, special use airspace, and tactical training areas), external future land use will be of concern to the installation's ability to conduct future training and mission activities.

1.7 RESPONSIBILITIES AND INTERESTED PARTIES

The INRMP includes input from diverse stakeholders including federal, state, and local agency representatives, conservation organizations, and interested individuals.

1.7.1 MCB Camp Lejeune

1.7.1.1 Commanding General

The **Commanding General** has the overall responsibility for implementation of the INRMP, including sustaining readiness training and complying with all laws and regulations associated with the protection of the installation's natural resources.

The MCB Camp Lejeune's Operations and Training Standing Committee on Training Management (SCTM) convenes as required with operational forces and provides an opportunity for frank discussion of training deficiencies, emerging natural resources issues, and potential resolutions.

1.7.1.2 Environmental Conservation Branch

The Environmental Conservation Branch (ECON), Environmental Management Division (EMD) is responsible for the conservation, restoration, protection, and enhancement of the environment at MCB Camp Lejeune. This includes the management and oversight of the natural resources (land, fish, and wildlife), water pollution abatement, pest management, cultural resources, recycling, hazardous waste management, National Environmental Policy Act (NEPA), and energy programs.

1.7.1.3 Environmental Impact Working Group

The Environmental Impact Working Group (EIWG) provides a regular opportunity to evaluate the compatibility of proposed projects between both training needs and natural resources management objectives. In addition to these group meetings, opportunities for coordinating training and natural resources activities are provided through the annual forest prescription process. Prescriptions are prepared by the timber management forester of the Forest Management Program and presented to the Director of Range Development and Management Division, AC/S Training and Operations, and program managers from the Environmental Management Division.

1.7.1.4 Installation Development Division

The Installation Development Division plans and programs, via the MILCON and Minor Construction programs, new facilities and supporting infrastructure required to meet organizational missions of II MEF units, tenant commands, formal schools, and base

departments that reside at MCB Camp Lejeune and ensures that projects comply with the terms of the INRMP.

1.7.1.5 MCAS New River

MCB Camp Lejeune and MCAS New River share a Base Operating Support Agreement that outlines several functions for shared operational support and facilities management and maintenance. This understanding also includes management of natural resources at MCAS New River. For this reason, the INRMP addresses MCAS New River as part of the overall MCB Camp Lejeune landscape and not as a stand-alone section of the INRMP.

1.7.1.6 Other Federal and State Agencies

A number of federal agencies, in addition to DoD and MCB Camp Lejeune, have an interest or a role in the management of natural resources at MCB Camp Lejeune. The involvement of these agencies is based on signatory responsibilities, cooperative agreements, regulatory authority, and technical assistance as required by federal laws and regulations. The participating federal agencies include **US Department of the Interior (DOI), US Fish and Wildlife Service, US Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS), and the USDA Forest Service (USFS)**. State agencies include the **North Carolina Wildlife Resources Commission (NCWRC) and the North Carolina Division of Marine Fisheries (NCDMF)**.

1.7.2 Contractors and Universities

Contractors provide MCB Camp Lejeune with technical support for natural resources and environmental management projects. This technical support includes preparation of the INRMP, NEPA analyses and documentation, cultural and biological resource surveys, and general natural resources support.

Several universities are active participants in projects at MCB Camp Lejeune. For example, the Defense Coastal/Estuarine Research Program (DCERP), combining researchers from College of William and Mary, Virginia Institute of Marine Science; Duke University, Nicholas School of the Environment; University of South Carolina, Bell W. Baruch Institute; University of North Carolina at Chapel Hill, Institute of Marine Sciences; North Carolina State University, Department of Soil Science; and Virginia Polytechnic Institute and State University, Department of Biological Sciences are combining research efforts with government agencies and nonprofit institutes to maintain MCB Camp Lejeune's ecological health in order to enable the installation's land and waters to be sustainably used indefinitely, to meet the installation's stewardship responsibilities, and to continue the training and testing necessary to keep Marines mission-ready.

1.7.3 Other Cooperating Agencies and Interested Parties

1.7.3.1 National Fish and Wildlife Foundation

The National Fish and Wildlife Foundation (NFWF) is managing the Recovery and Sustainment Program (RASP) to protect RCW habitat on properties off MCB Camp Lejeune to contribute to the recovery goal of the Coastal North Carolina Primary Core (CNCPC) population in an attempt to decrease the on-base recovery goal and provide a broader landscape in which to balance training and species needs.

Onslow Bight Conservation Forum

In 2003, MCB Camp Lejeune entered into a Memorandum of Understanding (Appendix 4) establishing the North Carolina Onslow Bight Conservation Forum (NCOBCF). NCOBCF is composed of several federal and state agencies and non-governmental organizations dedicated to sustainable natural resource management. The NCOBCF is co-chaired by the Nature Conservancy and MCB Camp Lejeune. Forum participants represent a broad spectrum of land managers, conservation organizations, and other agencies. Some are custodians of large areas of public land held primarily for natural resource conservation and utilization or national security. Some modify the resource base by their own construction activities, and some are natural resource conservation advocates with little or no land base of their own. All, however, are dedicated to sustainable natural resource management, 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 in the area known as the Onslow Bight landscape.

Some significant features in the NCOBCF region include federally threatened and endangered species, such as the RCW and green and loggerhead sea turtles; Carolina bays and Carolina sandhills; and rare plant and animal communities supported by North Carolina's pocosins, dunes, and estuaries. MCB Camp Lejeune is collaborating with local, state, and federal agencies and organizations represented on the Forum to conserve the biological diversity native to this area.

MCB Camp Lejeune's participation in Onslow County planning efforts, combined with involvement and support of the regional NCOBCF natural resources management initiatives, are contributing to MCB Camp Lejeune's presence beyond the base fence line. For example, NCOBCF was instrumental in protecting 2,400 acres adjacent to MCB Camp Lejeune training ranges that had been slated for development with more than 3,000 housing units. This partnership will help ensure compatible land use in the region and minimize current and future environmental restrictions on the military mission.

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2.0 INSTALLATION CONDITIONS

2.1 LOCATION

MCB Camp Lejeune is primarily located in Onslow County, North Carolina, approximately 45 miles southwest of New Bern, 43 miles west of Morehead City, and 47 miles northeast of Wilmington (Figure 2-1). The installation is comprised of the Main Base and Verona Loop area, which encompasses 101,620 acres (of which approximately 16,340 acres are the New River); and GSRA which encompasses 41,230 acres. The Main Base area includes all MCB Camp Lejeune property from the eastern shore of the New River to NC Highway 172, and south of NC Highway 24. Mainside is the portion of base that lies east of the New River. The Verona Loop Area is the portion of the base that lies west of the New River to US Highway 17, and north of NC Highway 210. The Verona Loop Area includes MCAS New River, Camp Geiger, Devil Dog, and Stone Bay.

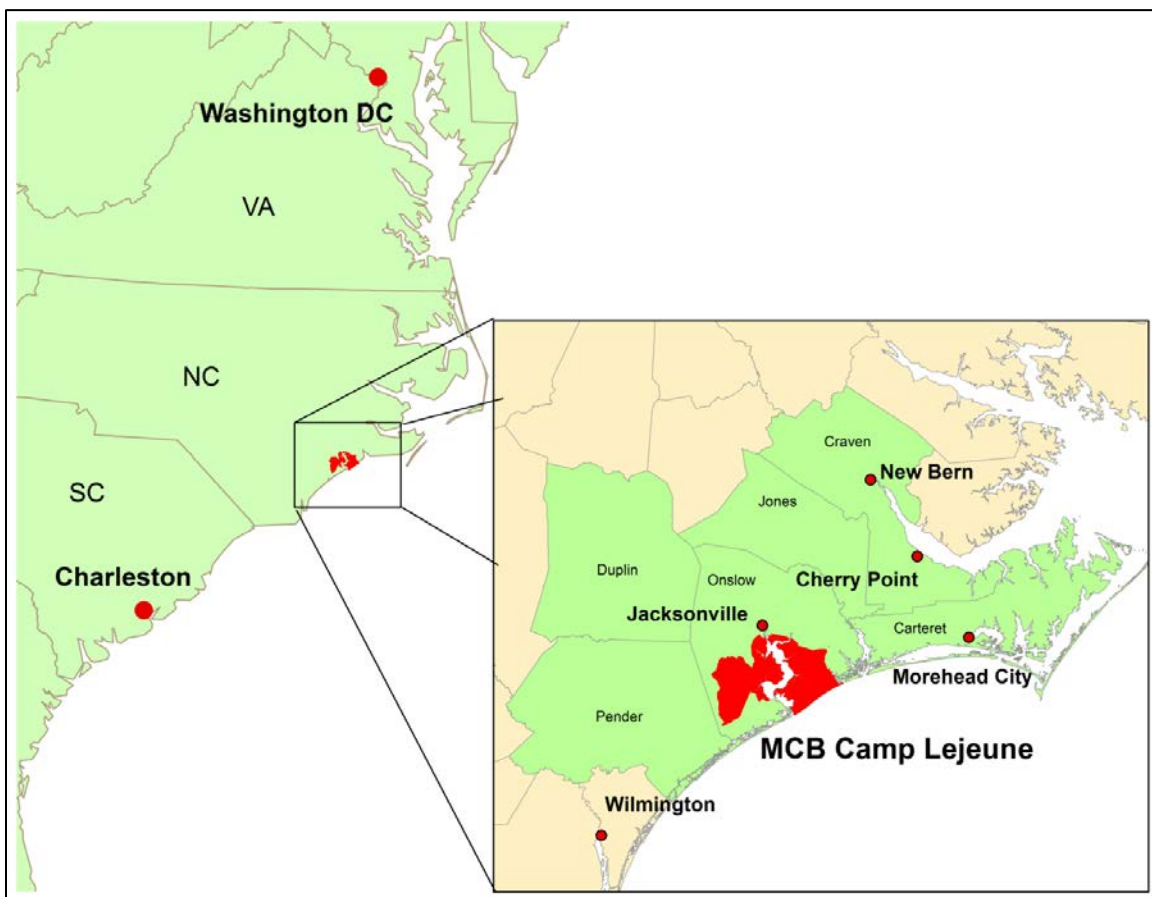


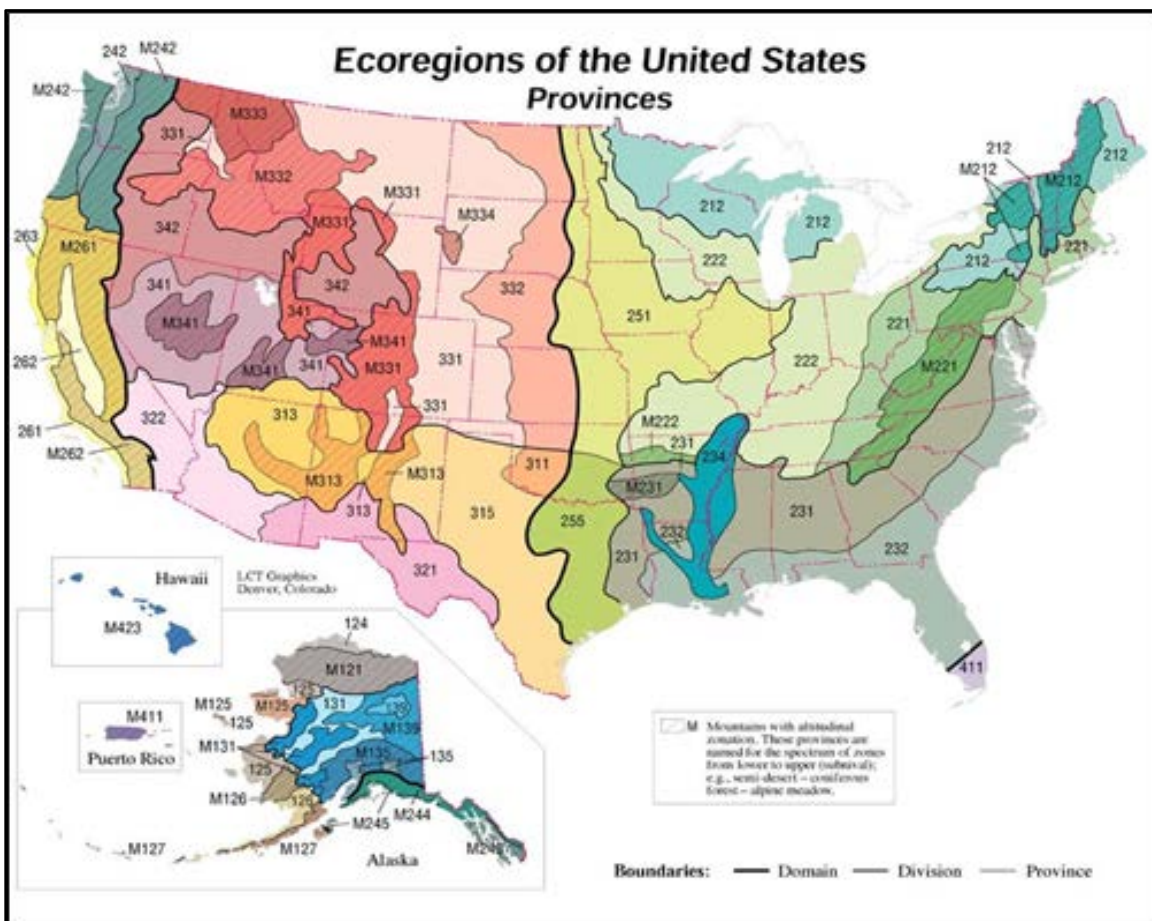
Figure 2-1. General location of MCB Camp Lejeune

2.2 NEIGHBORS AND ADJACENT LANDS

MCB Camp Lejeune is surrounded by the Hubert community and Swansboro to the east, Jacksonville to the north, and Holly Ridge and Sneads Ferry to the south. The City of Jacksonville is the county seat and the primary commercial center for the Base. The main port-of-embarkation for deployment is located 45 miles to the northeast in Morehead City. MCAS Cherry Point, approximately 50 miles northeast of MCB Camp Lejeune is another regional military installation that is under the umbrella organization of MCIEAST. Nearby state and federal natural areas include the Croatan National Forest, Angola Bay Game Lands, Hofmann Forest and Holly Shelter Game Land. Shaken Creek Savanna Preserve is a private natural area owned by The Nature Conservancy, in Pender County.

2.3 NATURAL ENVIRONMENT

2.3.1 Ecoregions



Source: U.S. Forest Service, 1994

Figure 2-2. Ecoregions of the United States

Based on the USFS National Hierarchical Framework of Ecological Units, MCB Camp Lejeune is in the Atlantic Coastal Flatlands Section (Section 232C) of the Outer Coastal Plain Mixed Forest Province (Province 232, Figure 2-2). This province comprises the Atlantic and Gulf Coastal Plains. Most of the area is flat to gently sloping with relief less than 300 feet (ft) above mean sea level (msl). The region has numerous fluvial and coastal terraces and is characterized by slow-moving streams, marshes, and swamps. Along the Atlantic coast, the extensive coastal marshes and interior swamps are dominated by gum (*Nyssa* spp.) and cypress (*Taxodium* spp.). Most upland areas are covered by subclimax pine forest that has an understory of grasses and sedge savannas. Undrained shallow depressions in savannas form upland bogs or pocosins that are dominated by evergreen shrubs (Bailey, 1995).

2.3.2 Climate

In the National Hierarchy of Ecological Units, MCB Camp Lejeune is in the Subtropical Division of the Humid Temperate Domain (Bailey, 1995). Summers in this region are hot and humid, but temperatures along the coast can be moderated by sea breezes. July is the hottest month of the year with an average high of 89.2 degrees Fahrenheit (°F). The greatest number of days with rainfall (14) and greatest number of days with thunderstorms (22) also occur in July (Table 2-1). The average annual precipitation is 50.6 inches and thunderstorms occur approximately 88 days a year. Winters are mild with the average low temperature of 33.6 °F occurring in January. Snowfall is generally insignificant about 3 inches per year, however in February 2013, over 11 inches fell (National Oceanographic and Atmospheric Administration [NOAA], 2014). The growing season, with daily minimum temperatures higher than 28 °F for 5 years out of 10 is 235 days (from 19 March to 11 November).

Table 2-1. 20-Year Climate Data from New Bern, NC (1994 – 2014)

	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sept	Oct	Nov	Dec	Annual
Ave. High Temp.	55.2	58.0	64.8	73.9	80.3	87.3	89.2	88.2	82.6	74.2	65.8	58.1	72.9
Ave. Low Temp.	33.6	35.4	41.7	50.5	58.8	67.7	71.1	70.4	65.1	53.1	42.9	36.3	52.1
Ave. Precip.	3.1	2.9	3.7	3.3	4.1	4.2	6.3	6.5	6.1	3.2	3.1	3.4	50.6
Days with Precip. (>0.01in)	10	9	10	9	10	12	14	13	11	9	8	10	124
Days with t-storms	2	2	3	7	10	13	22	17	7	2	2	1	88

Source: NOAA, 2014 and CustomWeather, 2014

2.3.2.1 Climate Change Vulnerability

Climate change is any significant change in climatic measures such as temperature, precipitation, or wind that lasts for an extended period of time, potentially decades or longer. The magnitude and rate of future climate change depends on factors such as the rate of increase of greenhouse gases in the atmosphere, the strength of climate response (e.g., sea level rise) to those atmospheric greenhouse gas concentrations, the natural influences on climate from sources such as volcanic activity and changes in the sun's intensity, and impacts to the climate system from changes in ocean circulation patterns (EPA, 2013).

A number of DoD installations and other assets including Naval Base Norfolk (Virginia), Eglin Air Force Base (Florida), and MCB Camp Lejeune are located on the southeastern coast of the US. DoD installations in the southeast support all of the major DoD land, air, and sea training; operations; and testing missions and are major support facilities for United States contingency operations. These operations are inherently subject to the effects of the prevailing climate and weather conditions. Air operations conducted by all the DoD services (i.e., combat support training, flight training, personnel transport, and logistical support) are also subject to prevailing weather and climate conditions (DoD, 2012). Naval ship operations include near-shore combat training operations, sea-based training operations, and logistical support functions, which all depend upon access to port facilities and coastal environments. Amphibious training operations require access to beach and near-shore environments for landing operations, which can be impacted by sea level, storm surge, overwash, and other conditions of extreme weather events (RTI, 2013). The built infrastructure required to support military operations at DoD installations is subject to the same climate conditions and vulnerabilities identified for comparable civilian infrastructure and is interdependent with many civilian regional services (public utilities, transportation systems, and communications networks).

The DoD recognizes climate change will affect both the built environment and natural resources and will play a significant role in its ability to fulfill its mission in the future. As part of its 2012 annual Strategic Sustainability Performance Plan (SSPP), DoD released its Climate Change Adaptation Roadmap (CCAR) detailing its plan for managing the effects of climate change on its operations and infrastructure in the short and long term (DoD, 2012). The CCAR identified several potential high-level climate change impacts to the DoD mission and operations including rising temperatures, changes in precipitation patterns, increases in storm frequency and intensity, rising sea levels and associated storm surge, and changes in ocean temperature, circulation, salinity, and acidity.

In order to address climate change risks and opportunities, DoD has begun to incorporate climate change considerations into installation-level planning as well as training plans (DoD, 2013). Also, as required by DoDI 4715.03, DoD must, to the extent practicable, using the best science available, utilize existing tools to assess the potential impacts of climate change to natural resources on DoD installations, identify significant natural resources that are likely to remain on

DoD lands or that may in the future occur on DoD lands and, when not in conflict with mission objectives, take steps to implement adaptive management to ensure the long-term sustainability of those resources. However, more comprehensive and region/installation-specific vulnerability assessments are needed to determine what adaptive responses are the most appropriate at individual installations.

Climate Change Tools

A number of climate change modeling, vulnerability assessment, and sustainability tools are available to natural resource managers at MCB Camp Lejeune. Research conducted by the Strategic Environmental Research and Development Program (SERDP) and the Environmental Security Technology Certification Program (ESTCP), DoD's environmental research programs, is focused on developing methodologies and tools needed to assess the physical effects climate change and the impacts to mission-essential infrastructure. Since 2006, SERDP has operated a Defense Coastal/Estuarine Research Program (DCERP) at MCB Camp Lejeune. DCERP has examined the potential impacts of four climatic drivers (rising temperatures, change in precipitation patterns, increasing storm intensity, and rising sea level) on ecosystem processes and the training mission (RTI, 2013). Specific research on sea level rise conducted at MCB Camp Lejeune is being conducted to project the geomorphic response to sea level rise scenarios and examine how these changes alter the susceptibility of the installation to storm-induced impacts (SERDP/ESTCP 2014).

In addition to the above tools, there are more regionally specific resources available that are accessible to MCB Camp Lejeune managers. Those resources include, but are not limited to, the Southeastern Climate Science Center (SE CSC), the Southeast Regional Climate Center (SERCC) at Chapel Hill, and the State Climate Office of NC at NC State University. The SE CSC goal is to provide scientific information, tools, and techniques to anticipate, monitor, and adapt to climate change. The SE CSC is one of eight Climate Science Centers managed by the National Climate Change and Wildlife Science Center, under the US Geological Survey.

The SERCC program was created in response to an assessment that identified various user needs for regional climate services in the southeast. Overall direction of the Regional Climate Center Program is provided by the National Climatic Data Center and the National Environmental Satellite, Data, and Information Service of NOAA. The SERCC serves Alabama, Florida, Georgia, North Carolina, South Carolina, Virginia, Puerto Rico, and the US Virgin Islands. The mission of the SERCC is to provide timely, high-quality, and pertinent climate data and information to public and private users in the region.

The NC State Climate Office maintains information regarding temperature, precipitation, and severe weather events for the state of North Carolina. The office provides local climate data, including storm reports and severe weather maps, storm and heat index records, and an environmental modeling tool that assists in identifying changes in climate patterns and trends.

2.3.3 Physiography, Geology, and Soils

The NC Coastal Plain is underlain by broad wedge of unconsolidated marine and fluvial sediments that is hundreds of feet thick in the southern coastal region near MCB Camp Lejeune. Overlaying these materials is a 5 to 30-foot thick layer of mostly clean sand and clayey sand, interlayered with deposits of clay and marine shells. The Yorktown Formation, a unit of bedrock consisting of clay, sand, and shell marl beds occur on the banks of large streams (USDA, 1984). The coastal sand ridge is another geologic feature of MCB Camp Lejeune. This feature represents either an earlier shoreline or barrier island that lies along the Intracoastal Waterway.

Three geomorphic surfaces of varying geologic age occur at MCB Camp Lejeune. The majority of the land area of MCB Camp Lejeune is found on the Talbot Surface, with elevations ranging from about 25 to 45 ft above msl. The Pamlico Surface ranges from 0 to 25 ft above msl and occurs in narrow strips along the New River and other streams. The Wicomico Surface is located primarily on the western side of the New River, south of Jacksonville, with only a small portion occurring at MCB Camp Lejeune. Elevations on this surface range from 45 to 70 ft above msl (USDA, 1984). The soils formed in surficial sediments on the Wicomico and Talbot marine terraces are partially filled with sandy or clayey material, whereas the soils formed on the Pamlico Surface contain higher levels of organic materials and are more poorly drained.

Mainside MCB Camp Lejeune is characterized by a combination of poorly drained broad, level flatlands and gently rolling better-drained terrain. East of the New River, the flatlands range in elevation from 25 ft to 45 ft above msl. Between the New River and US 17, the changes in elevation are more pronounced, with three areas reaching 72 ft in elevation. At GSRA, the land is almost uniformly flat and poorly drained. Elevation ranges from 39 ft to 69 ft above msl, with the greatest variation in elevation in the eastern-most portion of GSRA.

Soil surveys were prepared by USDA Soil Conservation Service, now the Natural Resources Conservation Service (NRCS), with cooperation from MCB Camp Lejeune in 1984 (USDA, 1984). Updated soil survey were later prepared for Onslow and Jones counties and made available digitally (USDA, 2013a and b; Figure 2-3, Table 2-2). Soil surveys provide valuable information for planning and resource management including soil fertility, drainage class, flooding potential, stability, and suitability for development.

Most of MCB Camp Lejeune is nearly level with minimal relief. Consequently, many of the soils are poorly drained and are included on the List of Hydric Soils of the United States (USDA, 2014). Hydric soils are soils that form under conditions of saturation, flooding, or ponding that last long enough during the growing season to develop anaerobic conditions in the upper part and may indicate the presence of a wetland (USDA, 2014). On county soil surveys, hydric soils are classified as type A (map units that are all hydric soils or have hydric soils as a major component) or type B (map units with inclusions of hydric soils or meet hydric soil indicators a

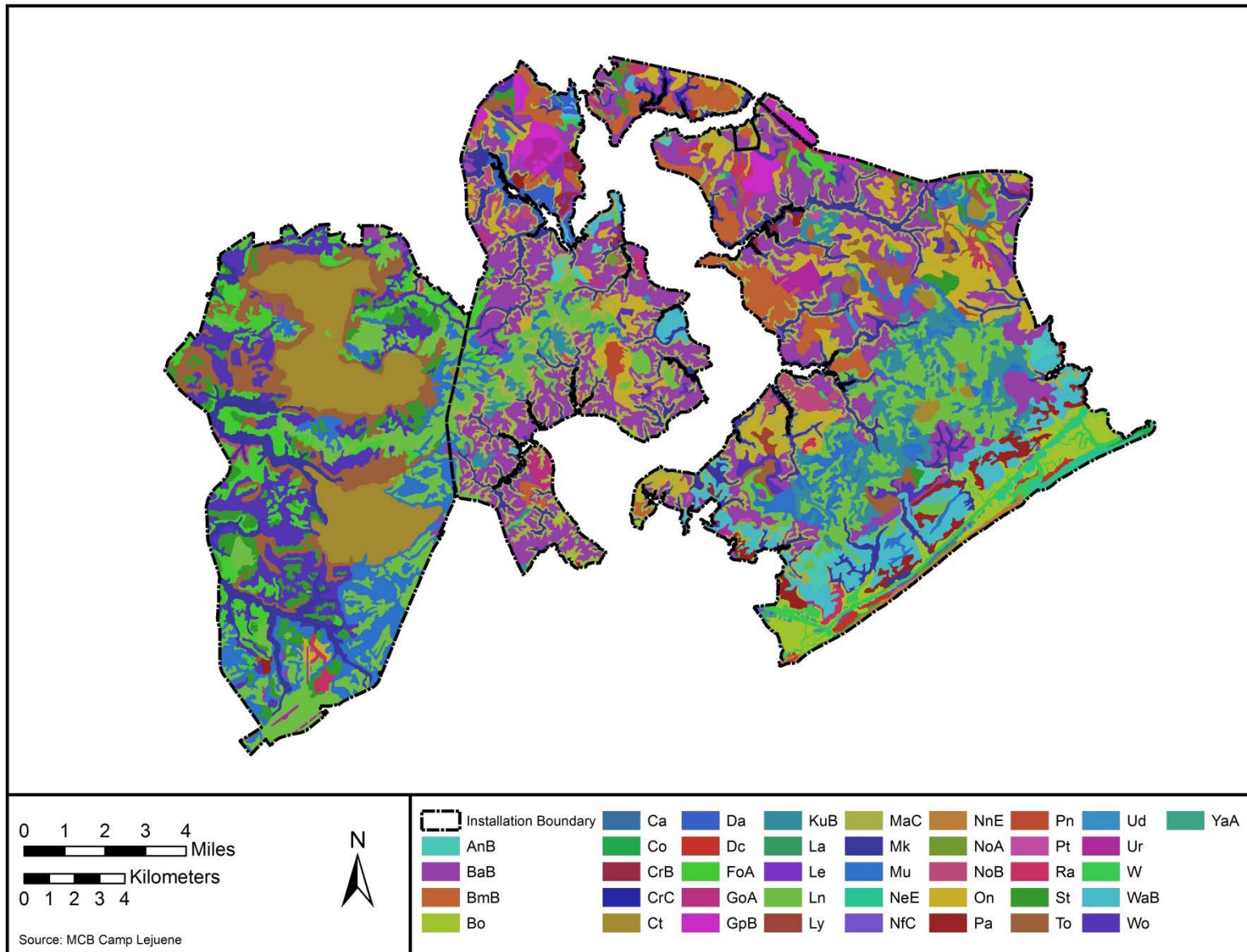


Figure 2-3. Soils at MCB Camp Lejeune

Table 2-2. Soils at MCB Camp Lejeune

Map Symbol	Soil Name	Acres	Percent
Type A Hydric			
Bo	Bohicket silty clay loam	2,915	2.34
Ca	Carteret fine sand	9	0.01
CrB	Craven fine sandy loam-1 to 4 percent slopes	267	0.21
Ct	Croatan muck	8,479	6.80
Da	Dorovan muck	1,023	0.82
Dc	Duckston fine sand	248	0.20
GoA	Goldsboro fine sandy loam-0 to 2 percent slopes	468	0.38
La	Lafitte muck	5	0.00
Ln	Leon fine sand	14,266	11.43
Mk	Muckalee loam	8,677	6.95
Mu	Murville fine sand	7,817	6.26
Pn	Pantego mucky loam	289	0.23
Ra	Rains fine sandy loam	818	0.66
To	Torhunta fine sandy loam	7,175	5.75
Wo	Woodington loamy fine sand	7,466	5.98
Type B Hydric		Total Type A	59,921
			48
AnB	Alpin fine sand-1 to 6 percent slopes	892	0.71
BaB	Baymeade fine sand-0 to 6 percent slopes	18,155	14.55
BmB	Baymeade-Urban land complex-0 to 6 percent slopes	3,864	3.10
Co	Corolla fine sand	181	0.15
CrC	Craven fine sandy loam-4 to 8 percent slopes	251	0.20
FoA	Foreston loamy fine sand-0 to 2 percent slopes	5,111	4.10
KuB	Kureb fine sand-1 to 6 percent slopes	5,133	4.11
Le	Lenoir muck	112	0.09
Ly	Lynchburg fine sandy loam	152	0.12
MaC	Marvyn loamy fine sand-6 to 15 percent slopes	9,372	7.51
NeE	Newhan fine sand-0 to 30 percent slopes	582	0.47
NfC	Newhan fine sand-dredged-2 to 10 percent slopes	183	0.15
NnE	Newhan-Corolla-Urban land complex-0 to 30 percent slopes	540	0.43
NoB	Norfolk loamy fine sand-2 to 6 percent slopes	1,152	0.92
On	Onslow loamy fine sand	6,377	5.11
Pa	Pactolus fine sand	1,663	1.33
St	Stallings loamy fine sand	3,775	3.03
WaB	Wando fine sand-1 to 6 percent slopes	4,531	3.63
Non-Hydric		Total Type B	62,025
			50
GpB	Goldsboro-Urban land complex-0 to 5 percent slopes	1,519	1.22
NoA	Norfolk loamy fine sand-0 to 2 percent slopes	81	0.07
YaA	Yaupon fine sandy loam-0 to 3 percent slopes	123	0.10
Pt	Pits	168	0.13
Ud	Udorthents-loamy	50	0.04
Ur	Urban land	898	0.72
		Total Non-Hydric	2,840
			2

Source: USDA, 2013a

portion of the time) (USDA, 2013a). Hydric soils comprise approximately 98 percent of the land area at MCB Camp Lejeune. The major hydric soils are Leon, Croatan, Muckalee, Bohicket, Torhunta, Murville, and Woodington. Major soils with hydric inclusions include Baymeade, Onslow, and Marvyn. The soils at MCB Camp Lejeune are typical of Onslow County and are generally acidic, strongly leached, and low in natural fertility; however, soils that developed in marl have a high calcium carbonate content and are less acidic (USDA, 1992).

2.3.4 Water Resources and Wetlands

2.3.4.1 Surface Waters

MCB Camp Lejeune has extensive water resources and aquatic habitat including onshore, near shore, and surf areas in and adjacent to the New River and the Atlantic Ocean (Figure 2-4). The New River is the largest water feature at Camp Lejeune as it bisects the Mainside along a 17 mile, 16,650 acre reach extending from the Base's northern boundary south of Jacksonville to the southern boundary at the Atlantic Ocean. Just within the Base boundary, the New River is joined by Northeast Creek and Southwest Creek to form a wide, slow-moving tidal estuary that empties into the Atlantic Ocean at Onslow Bay. Numerous large second order streams, including Wallace Creek, French Creek, Lewis Creek, Stone Creek, Millstone Creek, and Muddy Creek, and many smaller second order streams such as Cogdel Creek, Duck Creek, and Goose Creek, and unnamed tributaries also drain into the New River. A small number of creeks in the eastern portion of Mainside drain to Bear Creek and Queen Creek to the east.

The Intracoastal Waterway and broad expanses of tidal marsh separate the barrier islands from the mainland on the southern side of the Base. Several large second order streams including Holover Creek, Gillets Creek, and Freeman Creek drain into the Intracoastal Waterway.

Although much of the natural hydrology of GSRA has been altered by ditching and draining, several natural water features remain intact. Most of GSRA drains westward into the Northeast Cape Fear River via Shakey Creek, Juniper Swamp, Shelter Swamp Creek, and Sandy Run, which is part of the Cape Fear watershed. A small portion of the eastern side of GSRA drains into the New River.

2.3.4.2 Wetlands

Wetlands are defined as those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions (Environmental Laboratory, 1987). Jurisdictional and planning level wetland delineations have identified over 55,000 acres, of wetland at MCB Camp Lejeune (excluding the New River), which comprises approximately 44 percent of the Base's land area (Figure 2-4, Table 2-3). Approximately 28 percent of the land area of the Main Base and 62 percent of the land area at GSRA are comprised

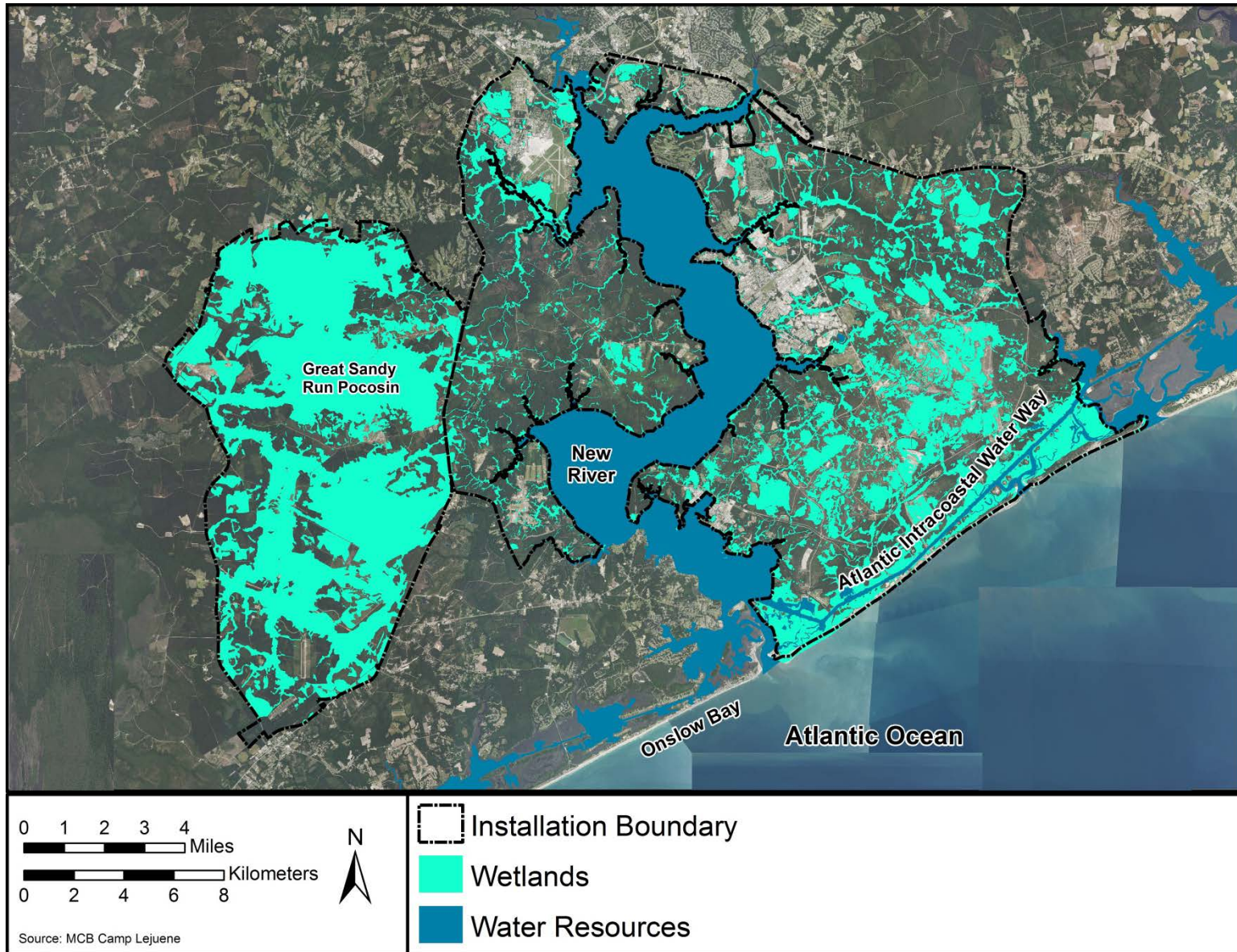


Figure 2-4. Wetlands at MCB Camp Lejeune

Table 2-3. Wetlands at MCB Camp Lejeune

Area	Acres
Main Base (Including Mainside and Verona)	
Jurisdictional	11,287
Planning Level	17,391
Main Base Total	
28,678	
GSRA	
Jurisdictional	8,887
Planning Level	17,366
GSRA Total	
26,253	
Total Wetland Area	
54,931	

of wetlands. Nearly half (48 percent) of the Base’s wetlands occur at GSRA and are part of the Great Sandy Run Pocosin, Shelter Swamp, Sandy Run Swamp, Juniper Swamp, and Big Shakey Swamp. Wetlands on the Main Base are more closely associated with broad creek basins and the coastal marshes.

2.3.5 Ecological Classification System

An extensive ecological classification mapping effort was undertaken at MCB Camp Lejeune by the USFS in the early 2000s (Simon, 2001). The classification was derived from a synthesis of available information including existing vegetation maps, soils surveys, rare species surveys, forest inventory data, climate data, and known fire regimes. The resulting ecological classification system included 5 Land Type Associations (Figure 2-5) and 15 Land Types (Figure 2-6), which were further separated into 31 Land Type Phases (Appendix 5).

Land Type Associations are high-level designations that classify areas based on topography, stream density, soil series associations, and potential vegetation communities. The five associations that occur at MCB Camp Lejeune (Figure 2-5) are as follow:

- The Onslow Maritime Zone lies along the shoreline of the Atlantic Ocean and Onslow Bay to the southeast of the Base. This area is characterized by active beaches, barrier islands, and coastal rivers.
- The Bogue-Topsail Coastal Sandridge lies just inland of the Onslow Maritime Zone and is characterized by broad ridges and swales that reflect the remnant ocean shoreline and a large percentage of deep sandy, very poorly drained soils.

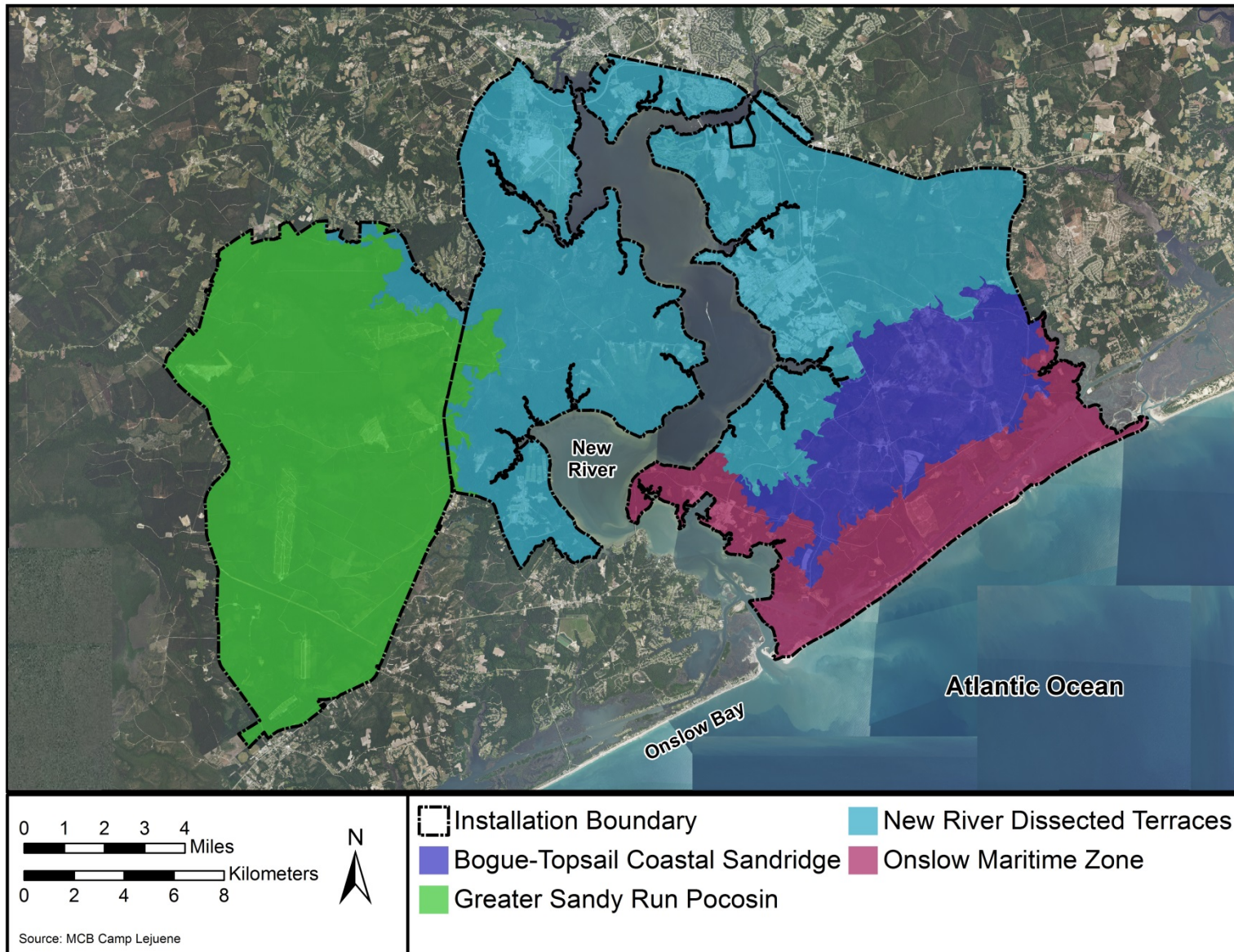


Figure 2-5. Land Type Associations at MCB Camp Lejeune

- The Stella White Oak Dissected Lowlands is characterized by interstream flats with low relief. A small portion of Midway Park lies within this association.
- The New River Dissected uplands lies to the east and west of the New River and is characterized by upland terraces dissected by networks of numerous small streams and the New River.
- The Great Sandy Run Pocosin includes most of GSRA and is characterized by large peatlands bordered by very poorly drained mineral soils.

The fundamental components of the Land Type Associations are the Land Types. Land Types are based on landscape placement, hydrologic regime, past and present vegetation communities. Land Type Phases are finer classifications based on hydrology, soils, and vegetation. Mapped Land Types and Land Type Phases provide valuable information for mission planning and natural resources management. Information regarding the potential occurrence of rare, threatened, and endangered species, soil moisture and texture, and vegetation cover type are particularly important to mission planning. However, any analysis of vegetation and land cover can only represent a point in time and changes in management practices, mission requirements, training intensity, and development have likely altered some elements of the Land Types and Land Type Phases as mapped in 2001.

During the time the ecological classification was conducted, xeric and dry-mesic pine savannas made up the largest single Land Type with over 24,000 acres (Figure 2-6, Table 2-4). This Land Type comprised most of the upland forest lands at Mainside. Open water, including rivers, lakes, and ponds, was the second largest classification, largely because of the New River. Wet-mesic and wet pine savannas was the second largest vegetated Land Type, with 17,826 acres and was fairly evenly distributed between Mainside and GSRA. Broad pocosins, which included much of the Great Sandy Run Pocosin was the third largest vegetative Land Type and occurred at GSRA as well as the K-2 impact area, the G-10 impact area, and various other areas at Mainside. All other Land Types were less than 10,000 acres each.

2.3.6 Plant Communities

MCB Camp Lejeune is in a region that historically experienced frequent fires across much of the landscape. Areas such as upland sand ridges, upland flats, and much of the pocosin areas, where fires generally occurred on a 1 to 3-year interval, developed fire-dependent communities including the extensive pine savannas and pine flatwoods that dominate the forest landscape at MCB Camp Lejeune today. Presettlement vegetation at MCB Camp Lejeune is thought to have consisted of pure longleaf on sandy soils in fire exposed locations, loblolly pine (*Pinus taeda*) in bottomlands and swamps, pond pine (*Pinus serotina*) in peatlands and mineral soils, and mixtures of longleaf and pond pine on moist savanna sites (Frost, 2001). However, because of

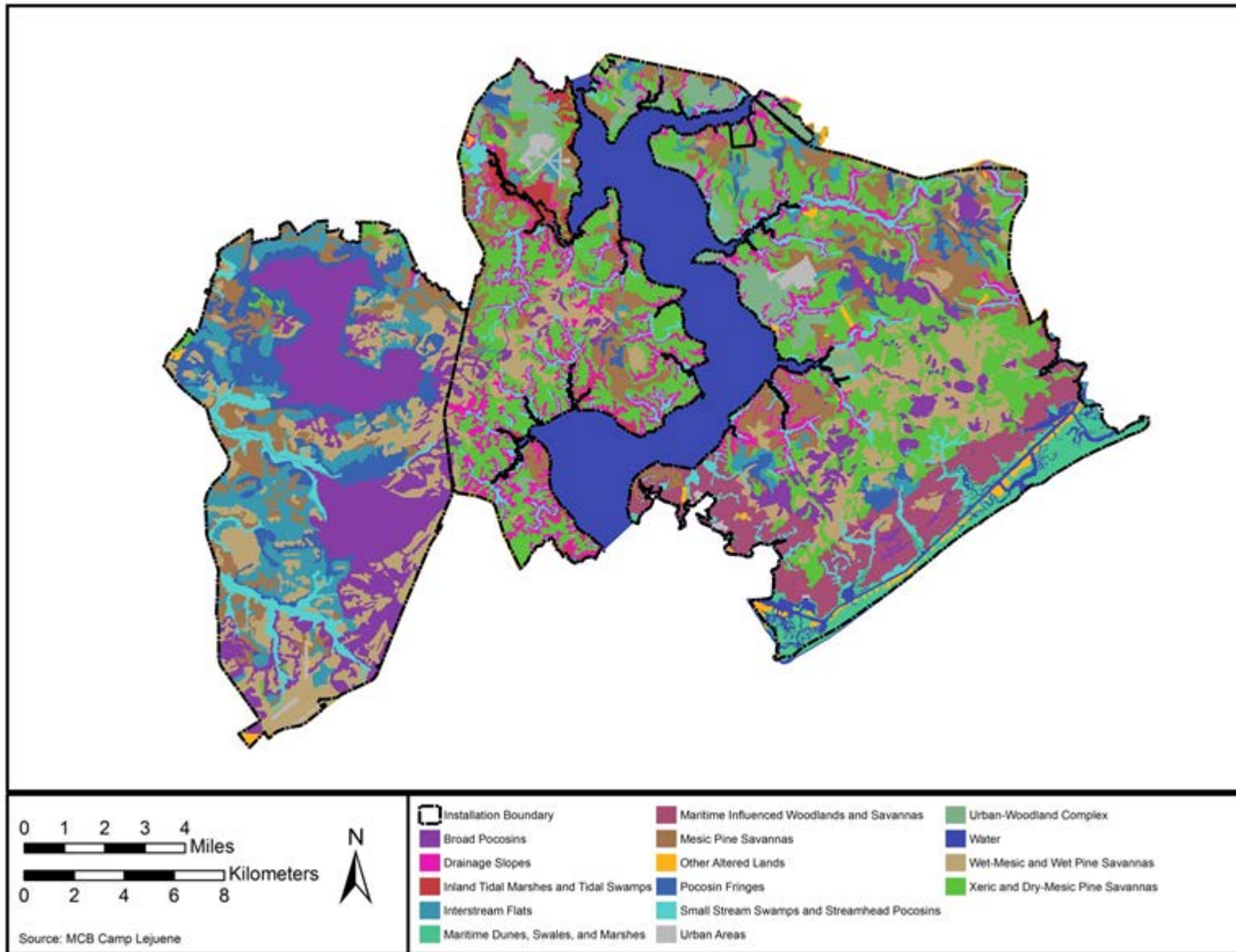


Figure 2-6. Land Types at MCB Camp Lejeune

Table 2-4. Land Types and Land Type Phases of MCB Camp Lejeune

LT	LTP	LAND TYPE Land Type Phase	LT (acres)	LTP (acres)
1		INLAND TIDAL MARSHES and TIDAL SWAMPS	1,399	
	101	Very poorly drained, loamy, sandy, or deep organic, inland tidal marsh		319
	102	Very poorly drained, deep organic, tidal cypress-gum swamp		1,080
2		SMALL STREAM SWAMPS and STREAMHEAD POCOSINS	8,686	
	201	Poorly drained, mucky, small stream swamp		8,196
	202	Poorly drained, sandy muck, stream head pocosin		490
4		DRAINAGE SLOPES	8,771	
	401	Well-drained, sandy, pine-hardwood slope		8,618
	402	Moderately well-drained, clayey, hardwood slope		153
6		INTERSTREAM FLATS	8,462	
	601	Somewhat poorly to poorly drained, sandy, loamy or clayey, mixed pine savanna		1,089
	602	Poorly drained, sandy, pond pine and mixed pine savanna		7,373
7		POCOSIN FRINGES	7,726	
	701	Very poorly drained, mucky and loamy, pond pine woodland		7,726
8		BROAD POCOSINS	16,822	
	801	Very poorly drained, pond pine pocosin, on peat		8,662
	802	Very poorly drained, sandy muck, pond pine pocosin		8,160
9		WET-MESIC and WET PINE SAVANNAS	17,826	
	901	Somewhat poorly drained, sandy and loamy, longleaf-mixed pine savanna		4,022
	902	Poorly drained, sandy, longleaf pine savanna		13,804
10		MESIC PINE SAVANNAS	13,916	
	1001	Well-drained, loamy, longleaf pine and mixed pine savanna		1,280
	1012	Moderately well-drained, loamy, longleaf pine and mixed pine savanna		12,636
11		XERIC and DRY-MESIC PINE SAVANNAS	24,314	
	1101	Excessively drained, sandy, longleaf pine		6,094
	1102	Excessively drained, sandy, dry-mesic, longleaf pine savanna		614
	1103	Well-drained, sandy, longleaf pine savanna		17,606
13		MARITIME INFLUENCED WOODLANDS and SAVANNAS	7,400	
	1301	Excessively drained, sandy, maritime influenced		3,728
	1302	Well drained, sandy, maritime influenced longleaf pine savanna		1,009
	1303	Well drained, sandy, maritime influenced mixed pine-oak slope		1,000
	1304	Moderately well and somewhat poorly drained, sandy, maritime mixed pine flat		1,663
14		MARITIME DUNES, SWALES, and MARSHES	3,595	
	1401	Excessively to poorly drained, maritime dunes and swales		1,369
	1402	Very poorly drained, loamy, maritime salt marsh		2,226
16		URBAN AREAS	976	
	1601	Highly developed urban area		976
17		URBAN-WOODLAND COMPLEX	4,939	
	1701	Urban-woodland complex		4,939
18		OTHER ALTERED LANDS	1,658	
30		WATER (Rivers, lakes, ponds)	18,917	

Source: Simon, 2001

LT = Land Type, LTP = Land Type Phase

the area's complex topography, relatively fire-intolerant hardwood communities also developed on naturally protected sites such as steep slopes, ravines, and excessively wet areas (Frost, 2001). Examples of fire-sheltered communities that occur at MCB Camp Lejeune are Cypress-Gum Swamps, Mixed Mesic Hardwoods, and Coastal Plain Small Stream Swamps. Because of its proximity to the coast and its 11 mile shoreline, several maritime communities also occur at MCB Camp Lejeune. Some of these have moderate (3 to 5-year) fire intervals or greater. Maritime communities found at MCB Camp Lejeune include Coastal Fringe Evergreen Forests, Dune Grass, and Salt Marsh.

Two inventories conducted in the 1990s by the North Carolina Natural Heritage Program (NCNHP) identified the plant communities that occur on Mainside (NCNHP, 1994) and GSRA (NCNHP, 1993). Approximately 25 natural community types were identified and described in these studies. However, as the GSRA study noted, because of intensive longleaf pine harvesting that occurred up to the late 1800s and subsequent conversion to loblolly and slash pine (*Pinus elliottii*) plantations, fire exclusion, and agricultural land use, nearly all of the natural communities have been altered from their natural condition. The Base Forest Management Section has been actively conducting prescribed burns across much of the forested landscape since the early 1970s and restoring longleaf habitat since the late 1980s.

A brief description of the plant communities identified in the 1993 and 1994 surveys is provided below. The names of the communities have been updated from the initial NCNHP surveys to nomenclature used in the 4th Approximation of the Guide to the Natural Communities of North Carolina (Schafale, 2012). More communities are described here because finer divisions of several communities have been described by the NCNHP over the years and several additional community types not described in the 1993 and 1994 surveys have been identified at MCB Camp Lejeune. The relationship between these natural community types and the Land Type or Land Type Phase of the USFS Ecological Classification System (see Table 2-4) is also identified for each community type.

2.3.6.1 Mesic Pine Savanna

The Mesic Pine Savanna type covers longleaf pine communities of environments intermediate between sandhills and wet savannas. The Mesic Pine Savanna type is distinguished from Pine/Scrub Oak Sandhill and other sandhill types by the substantial absence of scrub oaks or by their presence combined with that of wetland species. Mesic Pine Savannas contain a diverse component of legume species, which are largely absent in wetter pine savannas. Forest oaks such as water oak (*Quercus nigra*), southern red oak (*Quercus falcata*), or post oak (*Quercus stellata*) may be present in areas where fire has been excluded for a long period of time. The Ecological Classification System Land Type Mesic Pine Savanna is equivalent to this community type.

2.3.6.2 Wet Pine Flatwoods

Wet Pine Flatwoods are seasonally wet open grassy longleaf pine or pond pine communities on coarse sandy soils. They are distinguished from Mesic Pine Savanna by a low diversity herbaceous flora that largely lacks legumes. This is a naturally occurring fire-tolerant community that is being maintained by range activities that sustain a frequent burning regime. It is characterized by a relatively open canopy of longleaf pine, or loblolly and slash pine in areas, and a near complete absence of mid-canopy or understory trees and shrubs. Plant diversity is typically low in the shrub and herbaceous layers where they occur. The shrub stratum may include inkberry (*Ilex glabra*), maleberry (*Lyonia mariana*), and wax myrtle. The herbaceous layer is dominated by wiregrass, creeping blueberry, bracken fern (*Pteridium aquilinum*), and broom-sedge (*Andropogon virginicus*). The Wet-Mesic and Wet Pine Savanna Land Type includes this community type.

2.3.6.3 Sandy Pine Savanna

This community type covers very wet pine/wiregrass savannas of sandy soils, typically high in species richness, but with flora consisting mostly of the more widespread savanna species. Loblolly pine or pond pine, wire grass, Carolina dropseed (*Sporobolus pinetorum*), toothache grass (*Ctenium aromaticum*), or other grasses, or rush feathering (*Pleea tenuifolia*) typically dominate. Sandy Pine Savannas are distinguished from Wet Pine Flatwoods by a more diverse herb layer that includes species indicative of greater wetness. Species found in Sandy Pine Savanna include Carolina dropseed, toothache grass, bushy bluestem (*Andropogon glomeratus*), purple bluestem (*Andropogon glaucopsis*), cinnamon fern (*Osmunda cinnamomea*), Virginia chainfern (*Woodwardia virginica*), orange milkwort (*Polygala lutea*), yellow pitcher plant (*Sarracenia flava*), Carolina yellow-eyed grass (*Xyris caroliniana*), savannah meadowbeauty (*Rhexia alifanus*), and deathcamas (*Zigadenus glaberrimus*). All of the carnivorous plants including Venus flytrap (*Dionaea muscipula*) and sundews (*Drosera* spp.) are also characteristic. Areas with high densities of rush featherling (dominant or codominant in herb layer), a rare subtype, Sandy Pine Savanna (Rush Featherling Subtype), has been defined. This community type is included in the Wet-Mesic and Wet Pine Savanna Land Type.

2.3.6.4 Wet Loamy Pine Savanna

Wet Loam Pine Savannas cover longleaf pine or pond pine savanna that are wet, but less wet than the Very Wet Loamy Pine Savanna type, on soils other than coarse sands (sandy loam, loam, or soils with a clayey B horizon). These communities are typically very high in species richness, sharing all of the species of Sandy Pine Savanna and having an additional suite of herbaceous species. Longleaf pipe or pond pine, toothache grass, Carolina dropseed, cutover muhly (*Muhlenbergia expansa*), or beaksedges (*Rhynchospora* spp.) typically dominate or

codominate with wire grass. This community type is also included in the Wet-Mesic and Wet Pine Savanna Land Type.

2.3.6.5 Pond Pine Woodland

Pond Pine Woodlands are pocosin communities of shallow peats or mucky mineral soils, with a well-developed, though usually open, canopy of pond pine, with or without loblolly bay (*Gordonia lasianthus*). They occur on the edges of large domed peatlands, peat-filled Carolina bays, and interdunal swales. The Pond Pine Woodland community at GSRA has been greatly impacted by extensive drainage of pocosin basins and the conversion of outlying areas to pine plantations. Pond Pine Woodlands are included in the Interstream Flats, Pocosin Fringe, and Broad Pocosin Land Types.

2.3.6.6 High Pocosin

High Pocosin communities have persistent intermediate-stature shrubs and lack a well-developed tree canopy. Subtype covers the common examples dominated strongly by evergreen shrubs, generally fetterbush lyonia (*Lyonia lucida*), gallberry (*Ilex coriacea*), inkberry, or titi (*Cyrilla racemiflora*). High Pocosins are distinguished from other peatland pocosins by having dense shrub layers persistently greater than 1.5 meters tall (except immediately after fire) but lacking a well-developed tree canopy (cover less than 25 percent). They are distinguished from Streamhead Pocosins by not occurring in seepage-fed drainages in sandhill terrain. This community type is included in the Broad Pocosin Land Type.

2.3.6.7 Low Pocosin (Titi Subtype)

This type covers pocosin shrublands with natural shrub height less than 1.5 meters tall due to the low fertility and wetness produced by deep peat. They commonly are in the centers of domed peatlands, but may also occur in Carolina bays or some smaller peat-filled basins. In general, Low Pocosins can be distinguished from even recently burned High Pocosins by the smaller stature of the pines. Low Pocosins are distinguished from Pocosin Openings by strong dominance of erect shrubs. The Titi Subtype covers more southern examples in which titi is a major component along with honeycup (*Zenobia pulverulenta*), fetterbush lyonia, and inkberry. This community type is included in the Broad Pocosin Land Type.

2.3.6.8 Streamhead Pocosin

This community type is rare on the outer Coastal Plain, and is found on seepage slopes at the headwaters of small streams. Streamhead Pocosins are distinguished from other pocosin communities by their occurrence in drainages in sandhill terrain, with flowing or seepage water, rather than on peat domes or in depressions fed mainly by rain water. Tulip poplar (*Liriodendron tulipifera*) is often, but not always, a component of this type and is never present in other pocosin

types. Sweet pepperbush (*Clethra alnifolia*), poison sumac (*Toxicodendron vernix*), and sourwood (*Oxydendrum arboreum*) are often present in this type and seldom present in other types of pocosins. This community type is also included in the Small Stream Swamps and Streamhead Pocosin Land Type.

2.3.6.9 Pocosin Opening (Pitcher Plant Subtype)

This subtype covers the rare examples which have some combination of pitcher plants (*Sarracenia* spp.) as a dominant or codominant. The Pitcher Plant Subtype is distinguished by having greater than 25 percent cover by pitcher plants. No clear Land Type identified in the Ecological Classification System is associated with this community type.

2.3.6.10 Small Depression Pocosin

This community type is found in limesinks and other isolated small depression wetlands that naturally have dense shrub layers of typical pocosin shrubs or blueberries (*Vaccinium* spp.), and that have either an open canopy of pocosin species or no canopy. Dense shrub layers dominated by combinations of titi, swamp bay (*Persea palustris*), fetterbush lyonia, inkberry, gallberry, or honeycup may occur. A canopy of pond pine, loblolly pine, red maple (*Acer rubrum*), or loblolly bay is usually present. No clear Land Type identified in the Ecological Classification System is associated with Small Depression Pond Pocosins.

2.3.6.11 Small Depression Pond

This community type covers the wettest portions of all mainland Coastal Plain small depressions, with permanent flooding or with hydroperiods lasting most of the growing season. They may occur in limesink depressions, very wet clay-based Carolina bays, and occasionally in deep inland dune swales or other natural basins. They are the most typical community types found in the limesink depression on MCB Camp Lejeune, but are rare across their range. They tend to be dominated either by floating-leaf plants or by large emergent graminoids, though smaller water-tolerant graminoids may dominate. No clear Land Type identified in the Ecological Classification System is associated with Small depression Ponds other than Water.

2.3.6.12 Cypress Savanna

This is a rare community type that has been documented at two sites on the Mainside of MCB Camp Lejeune, on the north side of the G-10 Impact Area. The community occurs on limesink depressions surrounded by Baymeade soils. The open to closed canopy is dominated by pond cypress with an open to moderate understory and diverse herbaceous layer. The understory may contain myrtle dahoon (*Ilex myrtifolia*), titi, red maple, and sweet pepperbush. Plants that are characteristic of Cypress Savanna include flattened pipewort (*Eriocaulon compressum*),

plumegrass (*Saccharum giganteum*), Virginia buttonweed (*Diodia virginiana*), and roundpod St. Johnswort (*Hypericum cistifolium*).

2.3.6.13 Cypress Savanna (Depression Meadow Variant)

The 4th Approximation of the Guide to the Natural Communities of North Carolina (Schafale, 2012) includes Depression Meadows as a variant of Cypress Savannas. The Depression Meadow and Small Depression Pond are the most common community types found in the limesink depressions that occur at MCB Camp Lejeune. Depression Meadows occur in basins that are periodically flooded, most frequently in the winter and spring. The community generally has no overstory, except for an occasional pine, pond cypress (*Taxodium ascendens*), or black gum (*Nyssa sylvatica*). The Depression Meadow is distinguished from the Small depression Pond by the absence of a zone of permanent water and by little or no aquatic vegetation and is distinguished from the Ephemeral Pool type by the absence of less flood-tolerant plants such as Switchgrass (*Panicum virgatum*) and little bluestem (*Schizachyrium scoparium*). No clear Land Type identified in the Ecological Classification System is associated with this community type.

2.3.6.14 Ephemeral Pool

This community type occurs in a few small limesink depressions on Mainside. Ephemeral pools occur in small concave basins that are intermittently flooded for brief periods and serve as important amphibian breeding habitat. The wettest portions of the sites support species typical of pond margins such as maidencane (*Panicum hemitomon*), but not obligate aquatic vegetation. Typical plants include Switchgrass (*Panicum virgatum*), plumegrass (*Saccharum giganteum*), southern waxy sedge (*Carex glaucescens*), arrowfeather threeawn (*Aristida purpurascens* var. *virgata*), Virginia chainfern, little bluestem (*Schizachyrium scoparium*), and any of several *Andropogon* species. Trees may include a mixture of loblolly pine, longleaf pine, swamp tupelo (*Nyssa biflora*), and red maple, though they may be absent altogether. No clear Land Type identified in the Ecological Classification System is associated with this community type.

2.3.6.15 Coastal Plain Small Stream Swamp

This community type has been documented at several locations at MCB Camp Lejeune, primarily in small streams associated with the New River, Queen Creek, and Bear Creek, including at Millstone Creek and Wallace Creek. The community occupies the intermittently inundated floodplain of small streams. The canopy is dominated by a mix of bald cypress (*Taxodium distichum*), swamp tupelo, tulip poplar, red maple, American elm (*Ulmus americana*), and an occasional loblolly pine. The understory frequently has American hornbeam (*Carpinus caroliniana*), southern maple (*Acer floridanum*), American holly (*Ilex opaca*), and swamp bay. Grasses and sedges can include giant cane (*Arundinaria gigantea*), and brome-like sedge (*Carex*

bromoides). This community type is included in the Small Streams and streamhead Pocosin Land Type.

2.3.6.16 Cypress-Gum Swamp

The Cypress Gum Swamp community is a climax forest that develops on the wettest portions of the floodplains. One site was identified at MCB Camp Lejeune in a former mill pond on Wallace Creek. This community covers examples on Coastal Plain floodplains that lack clay sediment and where water tupelo (*Nyssa aquatic*) is not a significant component of the canopy. The canopy is dominated by combinations of bald cypress and swamp tupelo over open understory and herbaceous layers. This community is distinguished from Coastal Plain Small Stream Swamp, where occurring on small stream floodplains, by the strong canopy dominance by swamp tupelo or bald cypress (and red maple in successional condition). No clear Land Type identified in the Ecological Classification System is associated with this community type.

2.3.6.17 Mesic Mixed Hardwood Forest

This community occurs along the side slopes and low upland terraces associated with small streams west of the New River. The type covers mesic hardwood forests of acidic bluffs and other fire-sheltered sites dominated by combinations of American beech (*Fagus grandifolia*), water oak, tulip poplar, red oak (*Quercus rubra*), or species of similar moisture tolerance. Common shrub and herb species include silky camellia (*Stewartia malacodendron*), common sweetleaf (*Symplocos tinctoria*), dangleberry (*Gaylussacia frondosa*), and a variety of shrubs and herbs that more typically occur in wetlands, such as switchcane (*Arundinaria tecta*), inkberry, swamp bay, Virginia chainfern, and cinnamon fern. This community type is included in the Drainage Slope Land Type.

2.3.6.18 Dry Oak-Hickory Forest

This type covers upland hardwood forests of acidic soils in very dry topographic positions, on south slopes and ridge tops; where white oak (*Quercus alba*), post oak, and southern red oak predominate in the canopy. They contain acid-tolerant flora such as sourwood, black gum, blueberries (*Vaccinium* spp.) and huckleberries (*Gaylussacia* spp.), and lack more base-loving plants. A variety of shrubs and herbs more characteristic of wetter communities, including switchcane, inkberry, swamp bay, Virginia chainfern, and cinnamon fern are often present. This community type is included in the Drainage Slope Land Type.

2.3.6.19 Pine/Scrub Oak Sandhill (Mixed Oak Subtype)

The Pine/Scrub Oak Sandhill type covers dry longleaf pine communities that are less xeric and infertile than the Xeric Sandhill Scrub type, and are characterized by a scrub oak layer containing a mixture of oak species. This is a fire-maintained community that occurs on sandy loam mineral

soils or interbedded sand and clay. It is characterized by an open to moderate pine canopy over an open-to-dense scrub oak understory, and often, a diverse low shrub and herbaceous layer. Bluejack oak, turkey oak, and blackjack oak (*Quercus marilandica*), are important understory oaks. Wire grass and blue huckleberry or dangleberry often dominate the shrub layer, though dwarf huckleberry (*Gaylussacia dumosa*), American holly (*Ilex opaca*), and wax myrtle (*Morella cerifera*) are also important. Creeping blueberry (*Vaccinium crassifolium*), wiregrass, Carolina ipecac (*Euphorbia ipecacuanhae*), and tread-softly (*Cnidocolus stimulosus*) are frequent groundcovers. Pine/Scrub Oak Sandhill is included in the Xeric and Dry-Mesic Pine Savanna Land Type.

2.3.6.20 Pine/Scrub Oak Sandhill (Coastal Fringe Subtype)

This community is found on upland soils near the coast, often on relic beach ridge systems. The Coastal Fringe Subtype covers communities near the coast that contain characteristic coastal fringe plants, including evergreen scrub oaks. The Coastal Fringe Subtype is distinguished by the presence of plant species that are confined to the coast. These include sand live oak (*Quercus geminate*), devilwood (*Osmanthus americanus*), and yaupon (*Ilex vomitoria*). Darlington oak (*Quercus hemisphaerica*) is often abundant in the Coastal Fringe Subtype. The Pine/Scrub Oak Sandhill Coastal Fringe Subtype is included in the Maritime Influenced Woodlands and Savannas Land Type.

2.3.6.21 Xeric Sandhill Scrub

The Xeric Sandhill Scrub is a type of dry longleaf pine community. This type occurs on coarse, infertile sands on high, dry sand ridges. They have an open canopy of longleaf pine and low diversity scrub oak layer strongly dominated by turkey oak (*Quercus laevis*), though sand post oak (*Quercus margaretta*) and bluejack oak (*Quercus incana*) are often present. This type has a fairly high cover of wiregrass (*Aristida stricta*) and other herbs. Plants that thrive in shifting sands including pineland scalypink (*Stipulicida setacea*) and pine barren stitchwort (*Minuartia caroliniana*) (= *Arenaria caroliniana*), may also be present. This community type falls under the Xeric and Dry Mesic Pine Savanna Land Type in the Ecological Classification System.

2.3.6.22 Calcareous Coastal Fringe Forest

This is a rare deciduous hardwood forest that occurs on shell-rich sandy soils of the coastal fringe. One site at MCB Camp Lejeune, Corn Landing, is a designated natural area and is considered a significant Natural Heritage Area by the NCNHP (1999). The closed forest canopy is dominated by Carolina basswood (*Tilia americana* var. *caroliniana*) with frequent pignut hickory (*Carya glabra*), American elm, and live oak (*Quercus virginiana*). Yaupon dominates the understory with lesser amounts of swamp bay, southern sugar maple, stiff dogwood (*Cornus*

foemina), red buckeye (*Aesculus pavia*), and dwarf palmetto (*Sabal minor*). This community type is included in the Maritime Influenced Woodlands and Savanna Land Type.

2.3.6.23 Coastal Fringe Evergreen Forest

This community type covers evergreen hardwood-pine forests dominated by the characteristic species of maritime forests but which are not subject to salt spray or other disturbance processes of the immediate coast and therefore have a broader range of flora and more typical forest structure. Coastal Fringe Evergreen Forest is distinguished from Maritime Evergreen Forest by occurring on the mainland and well inland of any communities of the coast line. Examples generally contain deciduous species in all strata, including southern red oak and pignut hickory in the canopy. Darlington oak is generally more dominant, and live oak less abundant than in Maritime Evergreen Forest, and may even be absent. This community type is also included in the Maritime Influenced Woodlands and Savanna Land Type.

2.3.6.24 Maritime Evergreen Forest

This community type covers evergreen hardwood-pine forests of barrier islands and comparable coast lines. This is a rare community in North Carolina as it occurs on infrequent shell hammocks. Salt spray is a major environmental influence on these communities. The vegetation is dominated by some combination of live oak, Darlington's oak, loblolly pine, and southern red cedar (*Juniperus virginiana* var. *silicola*). This community type falls under the Maritime Influenced Woodlands and Savanna Land Type in the Ecological Classification System.

2.3.6.25 Estuarine Fringe Pine Forest

This community type covers strongly pine-dominated forests and woodlands adjacent to sounds or marshes, which have lower strata indicative of estuarine influence rather than consisting of typical pocosin shrubs. Estuarine Fringe Pine Forests are distinguished from Pond Pine Woodland and Nonriverine Swamp Forest by having a shrub layer dominated or codominated by wax myrtle. The Loblolly Pine Subtype is distinguished from the rarer Pond Pine Subtype by the canopy dominant. This community type is included in the Maritime Dunes, Swales, and Marshes Land Type.

2.3.6.26 Dune Grass

This community type covers the grassy communities of coastal foredunes and some dunes in the interior of barrier islands, influenced by salt spray as well as by the absence of soil development. These communities are dominated by a small set of specialized plants that includes sea oats (*Uniola paniculata*) or American beachgrass (*Ammophila breviligulata*), shore little bluestem (*Schizachyrium littorale*), coastal panicgrass (*Panicum amarum*), and coastal goldenrod

(*Solidago sempervirens*). This community type also falls under the Maritime Dunes, Swales, and Marshes Land Type.

2.3.6.27 Salt Marsh

This community type covers marshes regularly flooded by sea water at full salinity, dominated by smooth cordgrass (*Spartina alterniflora*). The Salt Marsh type is distinguished from most other marshes by the dominance of smooth cordgrass. It is distinguished from the Smooth Cordgrass subtype of Brackish Marsh, which contains smooth cordgrass, by having tidal waters at or near full sea water salinity. Associated plants in Salt Marshes are limited to just a few species, such as pickleweed (*Salicornia* spp.) and saltgrass (*Distichlis spicata*). This community type is also included in the Maritime Dunes, Swales, and Marshes Land Type.

2.3.6.28 Brackish Marsh

The Brackish Marsh community includes marshes that are salt influenced, but to a lesser degree than Salt Marshes, because of regular or irregular flooding by brackish water or irregular flooding by salt water mitigated by freshwater input. It includes marshes of estuarine areas at some distance from oceanic inlets, where the water is brackish, and also higher zones of Salt Marshes in areas with salt water. Subtype covers examples dominated or codominated by Brackish Marshes are distinguished from Salt Marshes by having vegetation dominated by saltmeadow cordgrass (*Spartina patens*), black needlegrass rush (*Juncus roemerianus*), or by having smooth cordgrass in combination with less salt-tolerant species such as eastern grasswort (*Lilaeopsis chinensis*). The Salt Meadow Cordgrass Subtype is distinguished from the other subtypes of Brackish Marsh by dominance of cordgrass. This community type also falls under the Maritime Dunes, Swales, and Marshes Land Type.

2.3.6.29 Upper Beach

This community type covers the sparsely vegetated areas between the unvegetated intertidal beach and the foredunes. Harper's searocket (*Cakile edentula* ssp. *harperi*) is a dominant species. This community type also falls under the Maritime Dunes, Swales, and Marshes Land Type.

2.3.7 Wildlife

The diverse plant communities at MCB Camp Lejeune support an abundant and diverse fauna that is typical of the Atlantic Coastal Plains. The fauna varies with the age and stocking level of forest stands, the percentage of deciduous trees, and the proximity to openings, bottom-land forest types, and variations in community structure and composition. Data from various taxon-specific surveys including migratory bird surveys, cover board surveys for reptiles and amphibians, fish surveys, and incidental observations are available to support the Base wildlife biologists in making wildlife management decisions. Although comprehensive surveys have not

been conducted, the following is a summary of common wildlife species known to occur on MCB Camp Lejeune.

The white-tailed deer (*Odocoileus virginianus*), coyote (*Canis latrans*), and black bear (*Ursus americana*) are the large, indigenous mammals known to occur. Medium size mammals that are present at MCB Camp Lejeune include red fox (*Vulpes vulpes*), gray fox (*Urocyon cinereoargenteus*), and bobcat (*Lynx rufus*). Common small mammals include raccoon (*Procyon lotor*), beaver (*Castor canadensis*), Virginia opossum (*Didelphis virginiana*), gray squirrel (*Sciurus carolinensis*), fox squirrel (*Sciurus niger*), Eastern cottontail (*Sylvilagus floridanus*), marsh rabbit (*Sylvilagus palustris*), otter (*Lontra canadensis*), mink (*Mustela vison*), and numerous species of ground-dwelling rodents. Coypu or nutria (*Myocastor coypus*) is an invasive, non-native herbivorous, semiaquatic rodent that has also been documented at the Base. Northern bobwhite (*Colinus virginianus*), mourning dove (*Zenaida macroura*), and wild turkey (*Meleagris gallopavo*) are the principal game birds. Approximately 156 migratory bird species are known to use the base as breeding grounds, wintering grounds, or stop over habitat during migration (Tetra Tech, Inc. 2013). Hawk surveys have identified 13 raptor species that are resident or transient species at the Base. A recent freshwater stream fish survey documented 18 species of freshwater fish (Tetra Tech, Inc., 2012). Numerous species of reptiles and amphibians have been documented during cover board and snake surveys; the threatened American alligator (*Alligator mississippiensis*) being the largest of the reptiles.

2.3.8 Resources of Special Conservation Interest

In addition to MCB Camp Lejeune's diverse natural communities and wildlife, the Base supports a number of rare, threatened, and endangered plant and animal species. Conservation and management of these species is discussed in Section 4.1. Other natural resources of special conservation interest include several significant natural communities; the Base's designated Natural Areas, and its position in the Onslow Bight landscape.

2.3.8.1 Natural Areas

Areas identified as high priority natural communities for protection are considered in Base conservation planning and management. Eight community types that occur in 20 localities on Base, and total approximately 780 acres (Figure 2-7) are considered high quality areas that provide habitat for many species that are currently state-listed or classified as federal SOC. Included are unique lime-sink depression complexes that contain a wide range of floral and faunal diversity and serve as breeding and forage areas for avian, amphibian, and reptile species.

Another unique habitat complex exists within the bottomland hardwood swamps along creeks and small tributaries. These areas support a rich avian community and provide nesting and foraging habitat for resident and neotropical migrant birds. Training, road construction,

silvicultural actions, and development all have the potential to affect these areas. Protecting and restoring these rare elements should help forestall or lessen the possibility of federal listing of the individual species or lessen the potential impact to MCB Camp Lejeune's training mission should listing occur. These unique and important habitats of high conservation priority will continue to be given consideration in MCB Camp Lejeune's conservation management program.

Two highly significant areas on Base are designated as natural areas and are listed on the North Carolina Registry of Natural Heritage Areas (Figure 2-7). A formal Memorandum of Understanding (MOU) between the Commanding General, MCB Camp Lejeune and the NC Department of Environment and Natural Resources (NCDENR) precludes the Base from making or permitting changes that substantially and negatively affect the exceptional natural resources for which the natural areas are registered.

Wallace Creek Cypress Swamp Natural Area

The Wallace Creek Cypress Swamp is located in the northern part of Mainside, in floodplain along Wallace Creek east of Piney Green Road (LeBlond, 1999). The site consists of a 115-acre old growth bald cypress stand that formed in a remnant of an historic millpond on Wallace Creek. The millpond was created by the old Montford Dam, which was destroyed by Hurricane Hazel in 1954. The forest is a quality example of a blackwater swamp system due to its undisturbed hydrologic condition and maturity. Cypress trees tower over a subcanopy of hardwoods and an open understory with scattered red bays and palmetto palms. The swamp forest provides important habitat for wildlife and connects with the marshes along the New River (MOU, 1985).

C.F. Russell Longleaf Pine Ridge Savanna Natural Area

Longleaf Pine Ridge natural area is located in the southeastern part of Mainside, west of Combat Town between Marines Road and TLZ DoDo Road (LeBlond, 1999). It is characterized by large low basins surrounded and intersected by forested sand ridges. This 26-acre longleaf pine stand on a dry sand ridge is one of the few old growth naturally regenerating longleaf pine forests remaining on the Coastal Plan. This stand was heavily turpented, but has apparently remained uncut since before the 1900s. Other than fire breaks around the stand, and a few shallow firebreaks extending into the stand, there are no signs of human manipulation. The stand supports an active colony of RCW and the Federal and State Endangered rough-leaved loosestrife. The preserve stands as a historic and natural interpretation and research area (MOU, 1985).

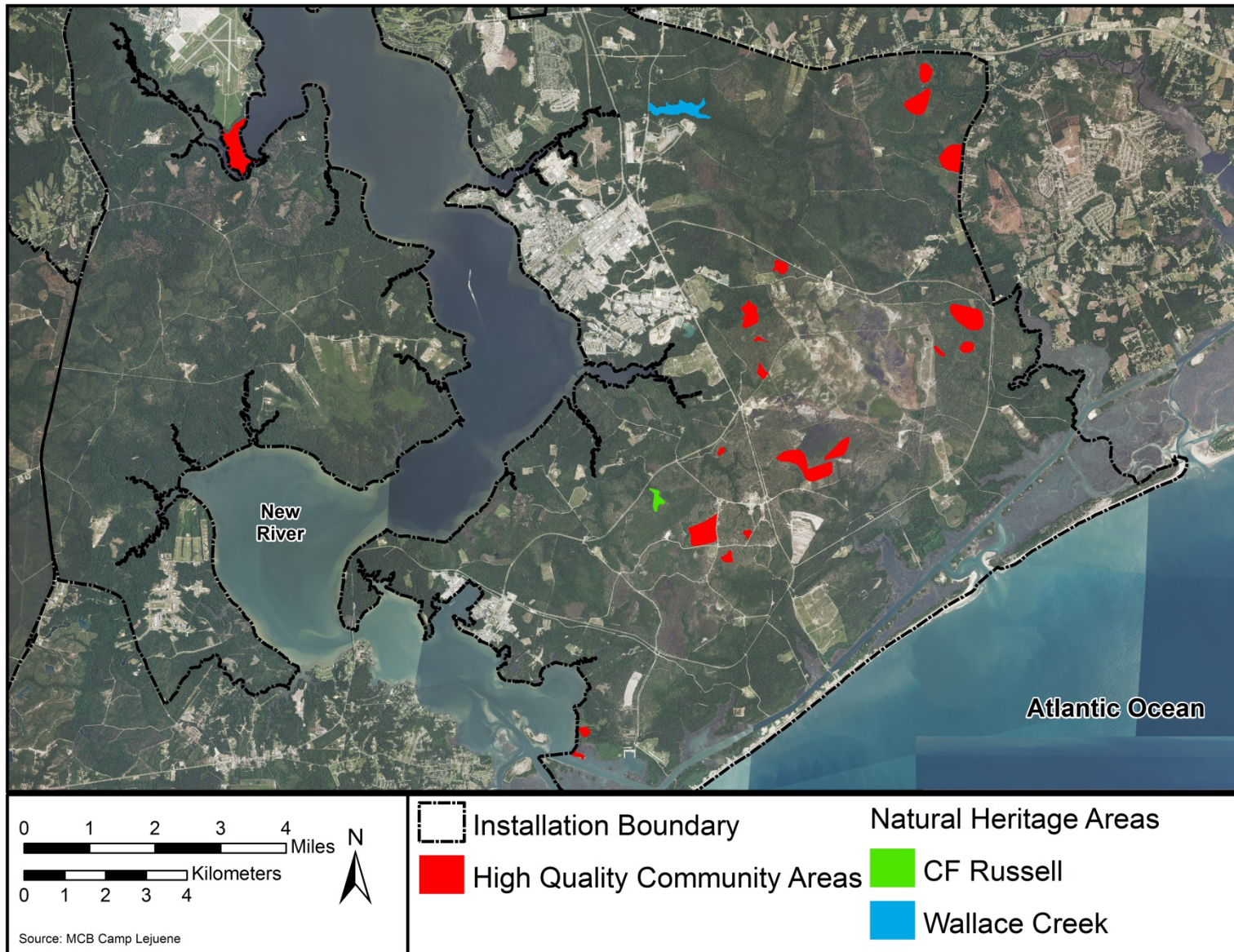


Figure 2-7. High Priority Natural Areas and Natural Heritage Areas

2.3.8.2 Onslow Bight Landscape

MCB Camp Lejeune is located in a significant natural area, the Onslow Bight landscape, one of region's highest conservation priorities. The Onslow Bight extends from the lower Northeast Cape Fear River to the Pamlico River and from offshore waters to approximately 30 miles inland. The area is a unique landform of barrier islands, marshes, riverine wetlands, pocosins, longleaf pine savannas and many other coastal ecosystems. Significant features in the Bight landscape include federally threatened and endangered species such as the RCW and green sea turtles (*Chelonia mydas*) and loggerhead sea turtles (*Caretta caretta*); Carolina bays and Carolina sandhills; and rare plant and animal communities supported by North Carolina's pocosins, dunes and estuaries.

MCB Camp Lejeune is a member of the Onslow Bight Conservation Forum; a collaborative forum composed of several federal and state agencies and non-governmental organizations dedicated to sustainable natural resource management in the region. MCB Camp Lejeune is collaborating with members of the forum to conserve the biological diversity native to this area, which will help avoid future restrictions associated with endangered species on base. In addition, participation in the forum enhances encroachment partnership opportunities and compatible land use in the vicinity of key training areas and ranges.

In 2003 MCB Camp Lejeune partnered with NCWRC and The Nature Conservancy to help preserve approximately 2,500 acres of forested habitat known as the "Beck" property in the Dixon/Folkstone area. The planned development of this property would have been incompatible with the on-going military training in the area. As a result of this partnership, water quality values were preserved in the headwaters of Stone Creek and Stone Bay. Also, this property will provide valuable outdoor recreational benefits to the public as the Stone Creek Game Land. In 2005 MCB Camp Lejeune successfully partnered on several other parcels in the vicinity of GSRA. MCB Camp Lejeune continues to work with Onslow Bight Forum participants to identify other opportunities to ensure compatible development and conserve local natural resources. See Appendix 4 for a copy of the Onslow Bight MOU.

3.0 NATURAL RESOURCE MANAGEMENT AND MISSION SUSTAINABILITY

The DoD vision of mission sustainability is the ability to maintain military operational capabilities and the resources that support those capabilities into the future without decline. MCB Camp Lejeune supports the Marine Corps in achieving mission sustainability by ensuring continued access to the critical land resources that are required for realistic training and mission readiness. It is the goal of the natural resources management program to manage MCB Camp Lejeune's natural resources for long-term mission sustainability while fulfilling the Marine Corps' responsibility to practice good stewardship over the lands to which it has been entrusted. Fundamental to mission sustainability is the requirement to provide a sustainable landscape that can accommodate current and future training with minimal constraints on mission capabilities. This INRMP will guide the implementation of a sustainable, ecosystem-based land management strategy that will ensure the continued availability of installation lands for future training. Furthermore, through compliance with all applicable environmental laws and the formation of regional conservation partnerships, this INRMP will provide the Marine Corps with minimally-constrained access to installation lands. MCB Camp Lejeune's natural resources management program will advance mission sustainability through the application of an integrated management approach that effectively balances training mission requirements with conservation goals and sustainable land management practices.

3.1 ECOSYSTEM MANAGEMENT

DoDI 4715.3 directs all installations to implement an ecosystem-based management approach "to ensure that military lands support present and future training and testing requirements while preserving, improving, and enhancing ecosystem integrity." DoD's adoption of a service-wide ecosystem-based strategy is based on the recognition that fully functioning, healthy ecosystems provide natural, realistic training landscapes that can be sustained over the long-term with minimal management intervention. Ecosystem-based management is a landscape-level approach that emphasizes native biodiversity as a key element of ecosystem health and sustainability. Rather than focusing on individual species, landscape-level management practices are used to restore and maintain the full spectrum of historical native habitat types (i.e., natural communities). The general strategy is to restore historical natural community characteristics and distribution patterns using management practices that mimic the original underlying ecological processes. Ultimately, the goal is to restore ecosystem functionality to the extent that the system will be largely self-sustaining with minimal management effort. DoD's vision of ecosystem management is also that of a multi-use strategy that fully incorporates economic and social ecosystem services; thus the restoration of natural communities to ensure ecosystem sustainability must be effectively balanced with the needs of the military mission (DoDI 4715.3).

The original natural communities and fire regimes that existed on MCB Camp Lejeune prior to European settlement were reconstructed by Frost (2001). The work by Frost indicates that all of the original longleaf pine and pocosin communities on MCB Camp Lejeune experienced frequent fire at intervals ranging from 1 to 3 years. Frequent fires maintained the open structure of longleaf pine communities, provided favorable conditions for natural longleaf pine regeneration, and maintained a diverse groundcover stratum dominated by wiregrass and other fire-dependent herbaceous species. Similar to the trend throughout the southeastern Coastal Plain, intensive logging during the late 1800s and subsequent fire suppression efforts dramatically altered the longleaf pine ecosystem on MCB Camp Lejeune; leading to the establishment of dense off-site loblolly pine stands on many sites that had formerly supported longleaf. Increasing pine densities in combination with hardwood encroachment suppressed the native herbaceous stratum, thereby further limiting the occurrence of natural fires. In the late 1980s, the natural resources management program initiated an ecosystem management strategy centering on the restoration of longleaf pine to its native distribution on MCB Camp Lejeune. The ongoing restoration effort is being implemented through conversions of off-site loblolly pine stands to longleaf pine, a 3 to 5-year prescribed burning schedule, and the use of thinning and hardwood midstory removal to restore the natural structure of longleaf pine communities. Existing and restored longleaf stands will be maintained through uneven-aged forest management practices, relying primarily on natural longleaf regeneration to provide a continuous supply of replacement trees. Ultimately, the goal is to have a restored longleaf pine ecosystem on MCB Camp Lejeune that will provide a highly sustainable training landscape that can be maintained primarily through prescribed burning.

3.2 INTEGRATED PLANNING

MCB Camp Lejeune is committed to cooperative and collaborative planning through integrated planning working groups; including the INRMP Working Group (IWG) whose weekly meetings throughout the revision process provided a forum for open discussion that allowed the group to work through many challenging and complex issues. Ultimately, the IWG collaborative process resulted in a path forward that will advance both long-term mission sustainability and the preservation and enhancement of MCB Camp Lejeune's irreplaceable natural resources. IWG members included representatives from GF, G3/5, and G7. Also invaluable to the revision process was the cooperation and participation of the USFWS, Raleigh Ecological Services Field Office, whose staff attended an all-day conference held at MCB Camp Lejeune to specifically discuss issues directly related to MCB Camp Lejeune's obligations under the ESA and the agencies' cooperative INRMP role under the Sikes Act. Staff of the Raleigh Field Office also contributed substantially to the revision process through their willingness to participate in numerous conference calls and exchanges with the Base via written correspondence. MCB Camp Lejeune is facing ever-increasing demands and pressures on its mission capabilities and natural

resources from many sources both internal and external to the Installation. All indications are that the rapid regional population growth that is driving many of these demands will continue to accelerate moving forward. In the face of such challenges, the achievement of mission sustainability and ecosystem preservation will require a commitment by all parties involved to build on the success of this INRMP by expanding and improving on the cooperative and collaborative planning effort that enabled the successful completion of this INRMP.

EMD and many of the other organizations represented on the IWG also participate in a number of additional integrated planning working groups; including the Conservation Working Group (CWG), EIWG, and Base Training Working Group (BTWG). The CWG develops mission drivers, conservation goals/objectives, and project lists for INRMPs; monitors the effectiveness of INRMP implementation; oversees coordination and cooperative INRMP preparation with USFWS and NCWRC; and coordinates the conservation component of MCB Camp Lejeune's Environmental Management System (EMS). The EIWG provides opportunities to evaluate the compatibility of proposed projects with training and natural resources management objectives through participation in the NEPA environmental impact analysis process. The BTWG convenes quarterly and provides an opportunity for discussion of training deficiencies, emerging natural resources issues, and potential resolutions. The annual forest prescription process provides additional opportunities to integrate training and natural resources management objectives. Prescriptions are prepared by the Forest Management Section and presented to the Directors of Training Support and Training Resource Management, Director of Training and Operations, and Section Chiefs of the Environmental Conservation Branch.

3.3 NATURAL RESOURCES RELATED ENCROACHMENT ISSUES

Encroachment refers to a wide range of factors, both external and internal to the MCB Camp Lejeune, that have the potential to reduce the Installation's capability to support current and future training. The following sections describe the encroachment issues that are most relevant to this INRMP; including incompatible land use (i.e., urban growth), threatened and endangered species, and wetlands.

3.3.1 Incompatible Land Use

Incompatible land use issues are primarily related to urban sprawl in areas surrounding the Installation. Urban sprawl can impact mission capabilities through increased noise complaints, light pollution, and the loss and/or fragmentation of habitat. Intensive live-fire training operations on MCB Camp Lejeune produce noise levels that are potentially highly disturbing to persons residing near the Base. Noise complaints are likely to increase as residential development encroaches on the Base, potentially leading to political pressure on MCB Camp Lejeune to modify training activities in ways that could reduce mission capabilities. Light

pollution from urban development degrades the dark-sky environment that is required for realistic nighttime training; and the loss and fragmentation of natural habitats in surrounding areas can impede a regional approach to biodiversity conservation and listed species recovery, placing more of the conservation/recovery burden on MCB Camp Lejeune and limiting the Installation's flexibility in accommodating new training missions. This INRMP will guide efforts to mitigate the effects of urban sprawl through regional conservation partnering and the establishment of conservation buffers. Existing and potential partnering opportunities and strategies are described in Section 3.4.

3.3.2 Threatened and Endangered Species

3.3.2.1 Red-cockaded Woodpecker

All RCW recovery efforts on MCB Camp Lejeune are designed to enhance mission sustainability by meeting the Installation's legally mandated recovery obligations under the ESA and providing the flexibility to move and/or remove some clusters to accommodate changing missions. However, integration of the RCW recovery program with certain elements of the training mission, specifically combined arms tactical vehicle maneuver training, has presented challenges that have yet to be fully overcome. The challenges to full integration originate from two principal factors: 1) restrictions on the types of training activities that can occur in clusters and 2) adjoining foraging habitat management requirements. MCB Camp Lejeune's adopted training restrictions for the RCW apply only to clusters and their associated 200-ft buffer zones; and many types of training, including tactical vehicle maneuver, are allowed in buffered clusters on a transient basis (<2 hours) (see Appendix 6). However, more intensive activities are prohibited; including weapons firing (other than small arms blank firing), excavation of most fighting position types, and sustained (>2 hours) activity of any type. In addition, wheeled and tracked vehicles are not allowed within 50 ft of individual cavity trees. The average buffered cluster on MCB Camp Lejeune occupies an area of ~19 acres; and the 73 active buffered clusters that currently exist on the Installation occupy a total combined "training-restricted" area of ~1,350 acres (Figure 4-3). There are currently an additional 48 "unmarked" active clusters that are not buffered and are not subject to training restrictions (short of damaging the actual cavity trees themselves).

In accordance with the RCW Recovery Plan (USFWS, 2003), each cluster (including both buffered and non-buffered clusters) must be provided with an additional minimum 120 acres of "good quality foraging habitat" within a 0.5-mile radius of the cluster center (Figure 4-4). Although there are no formally adopted restrictions on training in foraging habitat areas, the minimum 120 acres of good quality habitat must be maintained according to specific compositional and structural criteria as defined in the 2003 RCW Recovery Plan (Table 3-1). Based on the 120-acre minimum, the 121 currently active clusters require a total combined

foraging habitat area of ~14,500 acres. Upon reaching the Base recovery goal of 173 active clusters, the total amount of required good quality foraging habitat would be ~21,000 acres. Ultimately, when MCB Camp Lejeune reaches its recovery goal of 173 active clusters, it will have the option of allowing unrestricted training in all clusters. However, the requirement to maintain at least 120 acres of good quality foraging habitat for a minimum of 173 clusters will continue in perpetuity.

Table 3-1. Definition of Good Quality Foraging Habitat (USFWS 2003)

Density of pines that are ≥ 14 inches DBH is ≥ 18 stems/acre.
BA of 10-14 inch DBH pines is 0-40 square feet/acre.
BA of all pines > 10 inches DBH is ≥ 40 square feet/acre.
BA of pines < 10 inches DBH is < 10 square feet/acre.
Density of pines < 10 inches DBH is < 20 stems/acre.
Percent cover of native bunchgrass and/or other fire-dependent herbs is ≥ 40 percent.
No presence of midstory hardwoods > 7 feet in height.
Hardwoods comprise < 10 percent of the total number of canopy trees.
Minimum 120 acres of good quality foraging habitat within 0.5 mile of the cluster center.
Foraging habitat is not separated by more than 200 feet of non-foraging area.

The total combined training-restricted area imposed by buffered clusters alone constitutes a relatively small percentage of the total installation land area; however, the majority of the clusters are concentrated on Mainside in the vicinity of highly used training areas (e.g., Combat Town and areas surrounding the G-10 impact area). These concentrated clusters limit the ability of tanks and amphibious tracked vehicles to maintain tactical formations during expeditionary maneuvers between Onslow Beach and inland objectives. Work around solutions to some of the constraints imposed by buffered clusters could potentially be achieved through incidental take and/or cluster reconfiguration efforts in key training areas; however, the requirement to maintain the much larger areas of adjoining foraging habitat imposes an additional set of potential constraints that must be carefully considered. Off-road tactical maneuver involving tanks and tracked amphibious assault vehicles has the potential for substantial impacts on vegetation, including damage to native groundcover and impacts on naturally regenerating pines. Consequently, the need to maintain foraging habitat according to recovery standard criteria (e.g., ≥ 40 percent cover of native fire-dependent herbs) has the potential to limit the frequency and/or intensity of potentially damaging mechanized operations. Foraging habitat pine density criteria also limit the ability to manipulate vegetation structure to meet doctrinal standards for tactical vehicle maneuver. While the characteristics of good quality foraging habitat (i.e., open pine stands) are ideal for many types of training, tactical vehicle maneuver requirements are diverse,

and in some cases require open areas with tree densities that are lower than those specified by the recovery standard criteria. Foraging habitat work around opportunities are severely limited by the amphibious from-the-sea and live-fire combined arms elements of the expeditionary mission, which effectively limit viable maneuver routes to a relatively narrow corridor between Onslow Beach and the G-10 impact area. Landing points for amphibious vehicles are confined to a 1.6-mile segment of Onslow Beach; and the only inland objectives that can support combined arms live-fire are those located in highly used training areas surrounding the G-10 impact area. In the case of larger foraging partitions that contain manageable foraging habitat well in excess of 120 acres, the distribution of foraging habitat within the partition can be manipulated to accommodate specific training activities; however, the majority of the concentrated clusters in highly used training areas have small partitions with limited excess manageable foraging habitat.

This INRMP incorporates a number of RCW population and habitat management changes that are designed to alleviate constraints on military training capabilities. Unlike the previous INRMP, high-use training areas will not be targeted for the establishment of new clusters until other areas have been filled. RCW management will play a critical role in the expansion of off-road mechanized maneuver training capabilities. Where possible, RCW management will focus on areas not designated for future projects. In areas planned for future RCW clusters, RCW managers will place recruitment clusters in ways that minimize future conflicts. Areas without active clusters have ample flexibility in terms of placement of the cavity trees and acreage of foraging partitions, which allows for avoidance of conflicts with known training priorities. As much as possible, MCB Camp Lejeune RCW managers will seek to manage habitat in a way that avoids conflicts with known future projects. In an effort to assess the impacts of mechanized training in RCW habitat, a habitat monitoring plan will accompany future training corridor projects such as the BCTMC. MCB Camp Lejeune will proceed in its development of the BCTMC with the assumption that off-road tactical vehicle and tracked vehicle maneuver is not compatible with RCW management practices. The period of this INRMP will be used to monitor and evaluate RCW responses to off-road maneuver to validate or invalidate this assumption. In GSRA, MCB Camp Lejeune will suspend planting longleaf pine, and management aimed specifically at RCW habitat improvement will be put on hold pending completion of the planning/design process for the GSRA Tactical Vehicle Maneuver Capability (TVMC).

3.3.2.2 Rough-leaved Loosestrife

Rough-leaved loosestrife typically occurs in the narrow transition zones (a.k.a. ecotones) between longleaf pine and pocosin communities. The majority of the known occurrences on MCB Camp Lejeune are associated with frequently burned, high quality longleaf pine/pocosin natural communities on Mainside (Figure 4-9). Rough-leaved loosestrife sites are restricted to training along with a surrounding 100-ft protective buffer zone. However, rough-leaved loosestrife occurrences and their associated buffer zones collectively occupy a relatively small

land area of ~46 acres; and furthermore, occurrences are generally restricted to wet ecotonal habitats along the margins of pocosins, both of which are generally avoided by tactical vehicle operators as poor quality maneuver areas. Thus, rough-leaved loosestrife is not a significant encroachment factor for tactical vehicle maneuver on MCB Camp Lejeune. However, a number of rough-leaved loosestrife occurrences that are located within the G-10 impact area have the potential to alter vegetation management practices in the impact area, primarily due to potential constraints on herbicide use. The use of prescribed fire alone has not been entirely effective at maintaining vegetation height to standards, leading to ongoing problems with target visibility. MCB Camp Lejeune is currently evaluating potential impact area vegetation management strategies through the NEPA and Section 7 consultation processes.

3.3.2.3 Sea Turtles

The principal sea turtle encroachment issue for amphibious operations is related to potential impacts on sea turtle nesting activity during nighttime training operations; either through direct injury, nest damage, and/or the effects of artificial nighttime lighting. Comprehensive nest surveys are conducted daily during the sea turtle nesting season (mid-May through August), and all nests that are discovered on the amphibious training beach are relocated to beach sites outside of the designated training area. During nighttime operations, the training beach is continuously monitored by natural resources personnel who ensure that any nesting females and/or new nests are avoided. Nest relocation ensures that training constraints are limited to a relatively short period of time. During the offshore phase of amphibious operations, tactical vehicles are relatively slow moving vessels that present a minimal collision risk to sea turtles; and consequently, the potential presence of sea turtles in the water has not been a constraint issue for mechanized training.

3.3.2.4 Seabeach Amaranth

Seabeach amaranth is an annual plant that overwinters in the form of tiny seeds that are widely and irregularly dispersed by wind and waves during the dormant season. Consequently, the growing season distribution of plants during any given year is difficult to predict. Comprehensive beach surveys are conducted from late-spring through late-summer, and identified plants are marked with signs to prevent vehicular impacts. Seabeach amaranth generally exhibits an affinity for overwash flats in the vicinity of inlets, and occurrences on the amphibious training beach have not been a significant constraint issue for mechanized training.

3.3.2.5 Wetlands

Wetlands make up approximately half (44 percent) of the total Camp Lejeune land area (Figure 2-4). Wetlands are generally not suited for tactical vehicle maneuver; and the development of improved trails or crossings in wetlands is subject to CWA Section 404 permitting requirements,

including costly compensatory mitigation to off-set impacts. The wetland credits provided by the GSRA mitigation bank are nearly exhausted. Although wetlands are a natural and beneficial component of the training landscape that enhances realism, the vast extent of wetlands on Camp Lejeune and the cumulative constraints imposed by wetlands and listed species presents a significant challenge to the accommodation of tactical vehicle maneuver training. Wetlands are also a major constraint on new construction in the Cantonment Area, as most suitable upland tracts have been previously been developed. Camp Lejeune is currently exploring opportunities to expand mechanized maneuver capabilities in wetlands on GSRA. Investigations are focusing on the capabilities of mineral soil wetlands at the lower end of the hydroperiod frequency spectrum to support mechanized operations.

3.4 REGIONAL CONSERVATION PARTNERING

MCB Camp Lejeune recognizes that the development and maintenance of regional conservation partnerships is essential to sustain mission capabilities and ecosystem integrity in the face of rapid population growth and urban expansion along its boundaries.

3.4.1 Readiness and Environmental Protection Integration (REPI) Program

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

3.4.2 North Carolina Onslow Bight Conservation Forum (NCOBCF)

In 2003, MCB Camp Lejeune entered into a MOU establishing the North Carolina Onslow Bight Conservation Forum (NCOBCF). The NCOBCF is a partnership of regional military installations; federal, state, and local agencies, and environmental groups whose goal is to advance landscape-level conservation efforts within the Onslow Bight region through enhanced cooperation and communication. In addition to MCB Camp Lejeune, participants include: Marine Corps Air Station Cherry Point, US Fish and Wildlife Service, US Forest Service, USDA Natural Resources Conservation Service, NC Wildlife Resources Commission, NC Department

of Environment and Natural Resources, NC Department of Transportation, The Nature Conservancy, NC Coastal Land Trust, and North Carolina Coastal Federation. The mission of the NCOBCF is: “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.” The NCOBCF established conservation targets consisting of core biodiversity areas, connecting conservation corridors, and ecological buffers to managed lands. Managed land buffers encompass lands within 0.5-mile of the boundaries of MCB Camp Lejeune and Croatan National Forest that have restoration potential and/or provide a smoke buffer between managed areas and surrounding urban areas.

3.4.3 RCW Recovery and Sustainment Program (RASP)

The RCW Recovery and Sustainment Program (RASP) was developed by MCB Camp Lejeune and USFWS as a strategy to establish new RCW subpopulations or add to the existing Coastal NC Primary Core (CNCPC) subpopulation while simultaneously alleviating constraints on the Marine Corps training mission. The RASP allows MCB Camp Lejeune to enter into agreements with agencies, non-governmental organizations, and private landowners to establish new RCW groups on off-base properties that contribute to the CNCPC. In return, MCB Camp Lejeune’s on-base RCW recovery goal can be reduced, thereby alleviating constraints on mission-critical range and training area capabilities. Rigorous modeling analyses are used to evaluate the potential biological functionality of individual RASP properties as well as their potential to contribute to the ecological functionality of the overall CNCPC population. RASP property agreements must provide for the management and protection of the properties and their associated RCW groups in perpetuity. Although the RASP may eventually lead to a reduction in the number of active RCW clusters on MCB Camp Lejeune, the establishment of RCW groups on RASP properties has the potential for net beneficial effects on the recovery of the overall CNCPC population by increasing connectivity between subpopulations, increasing the viability of certain subpopulations, or minimizing threats to population viability. Through the establishment of RASP properties adjacent to the Base, MCB Camp Lejeune has the opportunity to mitigate external urban encroachment threats as well as RCW constraints that are internal to the Installation.

3.4.4 North Carolina Wildlife Action Plan (NCWAP)

The North Carolina Wildlife Action Plan (NCWAP) (NCWRC 2005) establishes a state-wide initiative to preserve biodiversity through landscape-level conservation efforts. The NCWAP emphasizes strong partnerships among natural resource agencies, organizations, academics, and private landowners; and recognizes the importance of natural community preservation at the landscape-level as central to biodiversity conservation. The NCWAP identifies 13 priority

habitats that are key targets for acquisition, including five that are especially relevant to MCB Camp Lejeune: beaches and estuarine islands, coastal wetlands, maritime forest, longleaf pine forest, and small wetland communities. The goals of the NCWAP initiative as they relate to the Onslow Bight region essentially overlap those of the NCOBCF, which the NCWAP specifically identifies as an example of how a successful partnership can affect meaningful conversation on the ground. The NCWAP offers additional opportunities for open communication and coordination with regional partners.

3.5 COMPLIANCE WITH ENVIRONMENTAL LAWS, REGULATIONS, AND EXECUTIVE ORDERS

Installation compliance with natural resource laws and regulations is vital to ensure that military training can continue without significant additional regulatory constraints being placed on mission capabilities. The natural resources management program, acting in accordance with this INRMP, is responsible for compliance with a number of legal mandates that have the potential to significantly affect mission capabilities on MCB Camp Lejeune; notably the ESA, CWA, and NEPA.

3.5.1 Endangered Species Act

Pursuant to the ESA, MCB Camp Lejeune is legally mandated to sustain and advance the recovery of federally listed threatened and endangered species that occur within its boundaries. MCB Camp Lejeune is subject to the provisions of Section 9 of the ESA, which prohibit the take (e.g., harass, harm, kill) of listed species by federal agencies. Section 7 of the ESA requires MCB Camp Lejeune to consult with the USFWS and/or NOAA's National Marine Fisheries Service (NMFS) to ensure that actions it proposes to undertake will not appreciably reduce (i.e., "jeopardize") the likelihood of the survival and/or recovery of a listed species. Consultations conclude with a jeopardy/no-jeopardy determination and the issuance of a biological opinion and incidental take statement by the USFWS and/or NMFS. Although MCB Camp Lejeune is prohibited from undertaking actions that will jeopardize the continued existence of a listed species, Section 7 affords some flexibility to the military mission through exemptions from the Section 9 prohibitions on take. In the case of non-jeopardy determinations for military actions, incidental take statements exempt federal agencies from the Section 9 prohibitions on take if they comply with the reasonable and prudent measures and terms and conditions of an incidental take statement. This exemption allows takings of listed species that are incidental to otherwise lawful military activities, thus providing the military with the flexibility to accommodate new missions. Additional flexibility was incorporated into the ESA through the National Defense Authorization Act of 2004, which exempts military installations from critical habitat designations so long as an INRMP acceptable to the Secretary of the Interior is in place. In order to qualify for the exemption, INRMPs must provide for the implementation of effective conservation measures that will sustain and advance the recovery of listed species.

MCB Camp Lejeune's ability to advance mission sustainability through these exemptions is dependent on the Installation providing a net overall benefit to listed species. Successful management and recovery efforts have thus far allowed MCB Camp Lejeune to benefit from both of these exemptions, particularly in regard to the RCW and the loggerhead sea turtle. In the case of the RCW, successful efforts to expand the population have provided MCB Camp Lejeune with the flexibility to complete new range projects through the incidental take provisions of Section 7. MCB Camp Lejeune was also exempted from recent designations of critical habitat for the loggerhead sea turtle along the majority of the North Carolina coast. The natural resources management program will continue to support mission sustainability through Section 7 consultation and the implementation of management actions that will advance the recovery of listed species and ensure the Installation's eligibility for exemptions from Section 9 and the designation of critical habitat.

3.5.2 Clean Water Act

The natural resources management program is responsible for compliance with Executive Order 11990 (Protection of Wetlands) and the provisions of Section 404 of the CWA regulating the discharge of dredged or fill material in wetlands. EO 11990 directs all federal agencies to "minimize the destruction, loss or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands." Section 404 of the CWA establishes a program, administered by the US Army Corps of Engineers (USACE), to regulate activities that impact wetlands through a permitting review process. Wetlands are widely distributed across MCB Camp Lejeune and account for nearly half (44 percent) of the total installation land area. Given the expansive nature of wetlands on MCB Camp Lejeune and the large contiguous land areas that are required for combined arms mechanized maneuver training and mission support openings such as live-fire ranges and landing zones; wetland compliance requires extensive integrated planning, proactive management, and coordination with regulatory agencies. The EIWG reviews all new construction and range development projects to identify potential wetland impacts. If potential wetland impacts are identified, the EIWG works with the project proponent to minimize or avoid wetland impacts through practicable alternatives and/or project modifications. Unavoidable wetland impacts that exceed the acreage threshold for a nation-wide or regional general permit are not eligible for a Categorical Exclusion (CATEX) and require the preparation of an Environmental Assessment (EA). In the case of all unavoidable wetland impacts, clearance for projects to proceed is contingent on the acquisition of all necessary federal and state wetland permits and the establishment of provisions for any compensatory mitigation that may be required. MCB Camp Lejeune has established a number of policies to protect wetlands against potential disturbance from construction and mechanized training activities. The base established a policy in 2010 requiring a 50 ft protective buffer between the limits of construction/clearing activities and jurisdictional wetlands. Off-road mechanized maneuver

operations must follow standard operating procedures (SOPs) that are designed to minimize the potential for wetland impacts, and range vegetation maintenance activities in wetlands employ Best Management Practices (BMPs) to minimize the potential for soil and vegetation disturbance.

3.5.3 National Environmental Policy Act

Compliance with the National Environmental Policy Act (NEPA) ensures that environmental considerations are integrated into the Marine Corps project planning and decision-making process on MCB Camp Lejeune. The EMD NEPA Section is responsible for implementing the requirements of NEPA in accordance with MCO P5090.2A (Environmental Compliance and Protection Manual) and Base Order 5090.12 (Environmental Impact Review Procedures). Natural resource managers participate in the NEPA environmental impact analysis process through membership in the Environmental Impact Working Group (EIWG). The EIWG reviews all proposed projects to determine the appropriate level of NEPA analysis. The EIWG works with project proponents to minimize or avoid impacts through the development of practicable alternatives and/or project modifications. EIWG meetings provide a forum for the discussion and resolution of potential environmental impacts that may affect the Installation's conservation, compliance, and mission sustainability goals. The interdisciplinary make-up of the EIWG provides an opportunity to advance mission sustainability through the integration of training and conservation objectives.

3.6 INRMP REVIEW AND REVISION

The Sikes Act requires periodic reviews of the INRMP at intervals not to exceed 5 years. DoD has established policy requiring more frequent internal annual INRMP reviews. Pursuant to the Sikes Act, 5-year external INRMP reviews are conducted by MCB Camp Lejeune in full cooperation with USFWS, NCWRC, and the NCDMF. Annual internal reviews are conducted by the integrated CWG, thus providing opportunities for MCB Camp Lejeune's training and natural resources management communities to review and discuss the effectiveness of the INRMP in achieving full integration of military mission and conservation goals and objectives. To remain an effective mission sustainability tool over the long-term, the INRMP must be periodically reviewed and revised to reflect changes in the military mission, lessons learned from the implementation of management actions, and additions to the scientific knowledge base that drives natural resources management decisions.

4.0 NATURAL RESOURCES MANAGEMENT PROGRAM ACTIONS

4.1 PROTECTED SPECIES MANAGEMENT

As a federal agency, the Marine Corps is required under the Endangered Species Act (ESA) of 1973 (16 USC 1531 et seq.) to conserve (i.e., recover) listed species on its properties. Provisions in the 2004 National Defense Authorization Act allow military installations to be excluded from critical habitat designation given that the following are true: the INRMP provides (1) a benefit to the species; (2) certainty that the management plan will be implemented; and (3) certainty that the conservation effort will be effective.

Threatened and Endangered Species are those species listed by USFWS as threatened or endangered. The federal classification system for listed species is as follows:

- **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,
- **Candidate (CS):** Species for which there is sufficient information on biological vulnerability and threats to support proposals to list them as endangered or threatened, and
- **Threatened due to similarity of appearance [T(S/A)]:** A species that is threatened due to similarity of appearance with another listed species and is listed for its protection. Taxa listed as T(S/A) are not biologically endangered or threatened and are not subject to Section 7 consultation.

MCB CAMP LEJEUNE THREATENED AND ENDANGERED SPECIES PROGRAM

Compliance with the ESA is an important part of protecting MCB Camp Lejeune's primary mission of training and maintaining combat ready troops. Compliance with the ESA means that MCB Camp Lejeune must carry out programs that promote recovery of listed species, and must consult with the USFWS on actions that may affect listed species. In addition to ESA compliance, further measures may be necessary to allow for exemption from critical habitat designation. In order to meet these obligations, MCB Camp Lejeune implements recovery plan guidelines, as well as any terms and conditions of past and future biological opinions. MCB Camp Lejeune actively manages for recovery of known populations of threatened and endangered species and periodically and systematically surveys for new populations. The

endangered species program can be categorized into four functional areas; protection, management, monitoring, and consultation.

The most important tool to avoid unauthorized “take” is protection of threatened and endangered species and their habitats from impacts due to development or other actions that may affect the species. For most threatened and endangered species on Base, this protection comes in the form of restricted access to particular areas or restrictions on the type of activities that may occur within a given area. Areas where activity is restricted due to the presence of threatened or endangered species will be clearly delineated with signs, paint, or other obvious markings. Protective measures for each species are specified in their respective sections below.

Management for listed species may focus on habitat, populations, or both. In most cases, ecosystem management activities, such as the use of prescribed fire, will benefit listed species. However, in order to promote survival and recovery most effectively, MCB Camp Lejeune, working with the USFWS, has identified specific management needs for each federally listed species. Intensity of management for each species will vary depending on available science and on the ability of MCB Camp Lejeune to take actions. For example, in the case of RCW, there is ample scientific literature and evidence supporting the effectiveness of habitat alteration and the creation of artificial cavities as a way to promote population growth. For a species like seabeach amaranth, an unpredictable annual plant, protection of the plant and its habitat, rather than management, is the most effective tool to promote the recovery of the species.

In order to gauge the effectiveness of management activities and to assess any population trends, an effective monitoring program must be implemented for each species. Monitoring is an essential aspect of any adaptive management program. MCB Camp Lejeune has implemented monitoring protocols for each threatened or endangered species. As with management activities discussed above, the intensity of the monitoring will depend on the type and amount of information needed to carry out an effective program.

4.1.1 Threatened and Endangered Species at MCB Camp Lejeune

MCB Camp Lejeune is home to nine species that are federally listed as threatened or endangered, proposed for listing as threatened or endangered, or a candidate for federal listing. They include the following species:

- Red-cockaded woodpecker (*Picoides borealis*) (E),
- Green sea turtle (*Chelonia mydas*) (T),
- Loggerhead sea turtle (*Caretta caretta*) (T),
- Rough-leaved loosestrife (*Lysimachia asperulaefolia*) (E),
- Seabeach amaranth (*Amaranthus pumilus*) (T),

- Piping plover (*Charadrius melodus*) (T),
- Red knot (*Calidris canutus*) (T),
- Hirst's panic grass (*Dichanthelium hirstii*) (CS), and
- American alligator (*Alligator mississippiensis*) [T(S/A)]*.

*The American alligator T(S/A), which is found on MCB Camp Lejeune, is federally listed as threatened due to its similarity of appearance to the endangered American crocodile. The American alligator is considered recovered, and actions that may affect it do not trigger section 7 consultation with the USFWS.

The endangered eastern cougar (*Puma concolor cougar*) is believed to be extirpated from Onslow County. Pondberry (*Lindera melissifolia*), a federally listed endangered plant, was reportedly collected on MCB Camp Lejeune from a single location in GSRA and identified off-site. However, the presence of pondberry on MCB Camp Lejeune has never been confirmed, despite repeated surveys.

The bald eagle (*Haliaeetus leucocephalus*) has been removed from the endangered species list, but it remains protected under the Bald and Golden Eagle Protection Act (BGEPA). Protective measures and monitoring requirements for bald eagles, described in this chapter, are requirements of MCB Camp Lejeune's permit under this law.

Although the management activities covered in this INRMP occur on land, military training activities that take place in the water may affect other protected species. The following federally listed species may occur in the waters surrounding MCB Camp Lejeune:

- Leatherback sea turtle (*Dermochelys coriacea*) (E),
- Kemp's ridley sea turtle (*Lepidochelys kempii*) (E),
- Hawksbill sea turtle (*Eretmochelys imbricata*) (E),
- Atlantic sturgeon (*Acipenser oxyrinchus*) (E),
- Shortnose sturgeon (*Acipenser brevirostrum*) (E),
- Fin whale (*Balaenoptera physalus*) (E),
- Humpback whale (*Megaptera novaeangliae*) (E),
- Northern right whale (*Balaena glacialis*) (E),
- Sei whale (*Balaenoptera borealis*) (E),
- Sperm whale (*Physeter catodon*) (E), and
- West Indian manatee (*Trichechus manatus*) (E).

All marine mammals, including non-federally-listed species, are protected by the Marine Mammal Protection Act (MMPA). Marine mammals and the MMPA will be discussed in Section 4.1.6.

4.1.2 Critical Habitat

With the passing of the National Defense Authorization Act of 2004, military lands were granted an exemption from the designation of critical habitat for endangered species, provided that an INRMP provides a benefit to threatened and endangered species. In order to meet the standard for exemption, an INRMP must meet the criteria discussed earlier; that is:

- A benefit must be provided for threatened and endangered species,
- The installation must provide certainty that it will be implemented, and
- The plan must be effective and should be developed with cooperating agencies that include USFWS and state fish and wildlife agencies.

Of the threatened and endangered species listed above, the piping plover, green sea turtle, and loggerhead sea turtle have had critical habitat designated by USFWS. Of these, only the piping plover and loggerhead have had critical habitat designated in the continental United States.

In 2001, the USFWS designated several areas along the North Carolina Coast as critical wintering habitat for the piping plover, with the closest habitat occurring at New Topsail Inlet just south of the Base on the Atlantic Coast. There is no designated critical habitat on MCB Camp Lejeune.

Critical habitat for the loggerhead sea turtle was designated in 2014. The nesting beaches and nearshore waters surrounding MCB Camp Lejeune were exempted from critical habitat because of protective measures already in place and additional measures MCB Camp Lejeune agreed to include in this INRMP.

4.1.3 ESA Section 7 Consultation

MCB Camp Lejeune regularly consults with the USFWS to ensure that Marine Corps actions are not likely to jeopardize the continued existence of any endangered or threatened species and are in compliance with the ESA. Pursuant to Section 7 of the ESA, Federal agencies such as the Marine Corps must consult with USFWS if their action "may affect" a federally listed endangered or threatened species (50 CFR 402). Such consultations may be formal or informal. When necessary, MCB Camp Lejeune prepares a biological assessment of the effects of a proposed action on listed species. Section 9 of the ESA prohibits unauthorized "take" of a threatened or endangered species. A "take" includes the direct killing, harming, or harassing of a

species, or destruction of habitat that may be important for the species' survival or recovery. For projects resulting in take, an incidental take statement must be obtained from the USFWS.

For projects that may affect listed species, MCB Camp Lejeune Threatened and Endangered Species Program staff will support development of projects through participation in the planning and design process. Relative impacts of projects and alternatives will be evaluated, and potential avoidance and mitigation measures will be identified. When appropriate, USFWS or NMFS input will be solicited during the design process and through Section 7 consultations.

The Biological Assessment and Biological Opinion for this INRMP will function as the consultation of record for all listed species for the next 5 years or until such time as a new consultation supersedes the measures in this document. Terms and conditions and conservation measures may continue in this INRMP, but the intent of this INRMP is to include all necessary protection, monitoring, and management measures for listed species.

GSRA Incidental Take Agreement

This plan and its associated Biological Assessment establishes an agreement with the USFWS that the occurrence of any new threatened and endangered species appearing in GSRA that results from beneficial fire management and other natural resource management effects will not result in additional constraints on training or range development. This agreement reaffirms an agreement already in place for RCW (Figure 4-1), but also will cover all species currently listed under the ESA, as well as species such as the eastern diamondback rattlesnake (*Crotalus adamanteus*) and Carolina gopher frog (*Rana capito*) that may become federally listed in the future. This agreement essentially pre-approves incidental take to any new occurrence of a listed species in GSRA, above the baseline. The baseline for RCW is zero clusters. This agreement will apply to any incidental take resulting from all training activities and range development projects, as well as any supporting infrastructure and facility development projects. All consultation requirements associated with this agreement will be completed during the USFWS INRMP review and approval process. Subsequent to the INRMP consultation, any listed species that appear as a result of prescribed fire or other habitat management activities can be taken



Figure 4-1. Adult female RCW

without further USFWS approval or consultation. MCB Camp Lejeune will notify USFWS of any incidental take, potentially in annual INRMP update reports.

4.1.4 Threatened and Endangered Species Management

Outlined below are programs that address protection, management, and monitoring for all protected, threatened, and endangered species that regularly occur on MCB Camp Lejeune. It is MCB Camp Lejeune's belief that this INRMP provides a conservation benefit to each of these species and outlines a clear, measurable path to implementation. Further, MCB Camp Lejeune believes that the Threatened and Endangered Species programs described in this chapter meet the necessary requirements to exempt the Base from designated critical habitat for any of the listed species on Base.

4.1.4.1 Red-cockaded Woodpecker

For the 2013 nesting season, MCB Camp Lejeune reported 114 active RCW clusters. This represents an increase of 256 percent since 1986, when intensive population monitoring began, and a 44 percent increase during implementation of the current INRMP (Figure 4-2). Since signing of the last INRMP, MCB Camp Lejeune's RCW population has averaged 5.2 percent growth per year. Locations of active and inactive clusters are shown in Figure 4-3.

PREVIOUS RED-COCKADED WOODPECKER PLANS

1999 RCW Plan

In 1999, MCB Camp Lejeune coordinated with the USFWS to develop the Mission-Compatible, Long-Range RCW Management Plan (1999 RCW Plan). The plan was endorsed in December 1999 with implementation initiation in 2000. A Biological Opinion supporting plan implementation was signed November 30, 1999. The 1999 RCW Plan established a mission-compatible RCW goal of 173 active clusters, outlined management strategies, and accounted for incidental take. According to the 1999 plan, all restrictions on the military mission would be removed once the mission compatible goal of 173 clusters was met and maintained.

The 1999 RCW Management Plan set a local recovery goal of 173 active clusters on Mainside and Verona (Figure 4-4). This goal was based on available acreage, excluding GSRA, and accounted for incidental take in support of mission-essential construction and range development in the GSRA Mechanized Assault Course and the Cantonment-Housing Area.

In support of future facility development, up to six RCW clusters in the Cantonment-Housing Area on Mainside MCB Camp Lejeune were subject to incidental take under the 1999 Plan. The 1999 plan identified five potential RCW clusters subject to incidental take for the Mechanized

Assault Course, which was not built. Current efforts to develop a mechanized maneuver area are focused on GSRA, which does not contribute to the MCB Camp Lejeune RCW recovery goals.

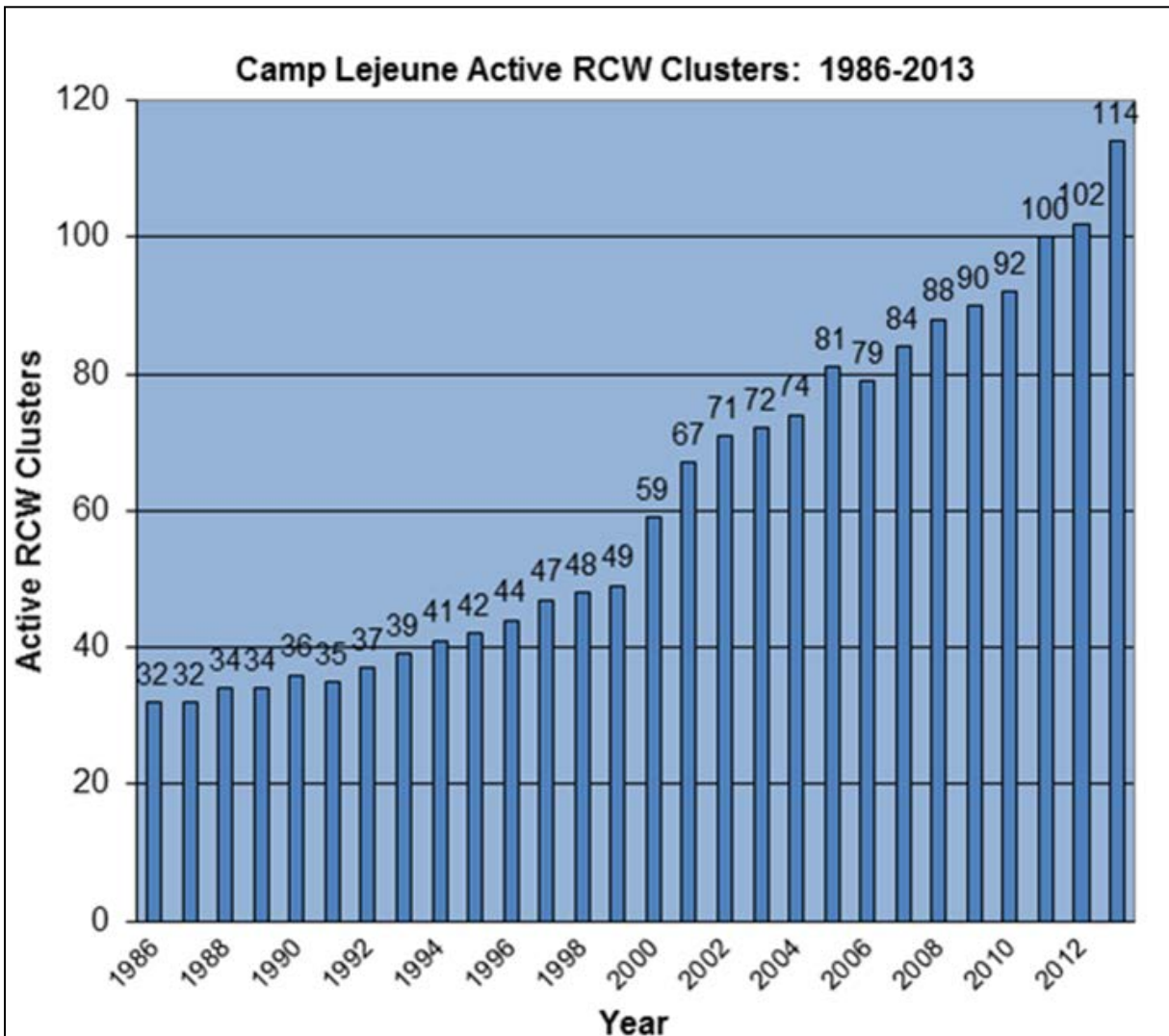


Figure 4-2. Number of active RCW clusters on MCB Camp Lejeune from 1986 to 2013

RCW Management – 2007 INRMP

In the 2007 plan, MCB Camp Lejeune introduced the concept of partition-level management, unmarked clusters only in High-Use Training Areas, and population milestones which, when met, will allow MCB Camp Lejeune to remove buffers from an increasing percentage of RCW clusters.

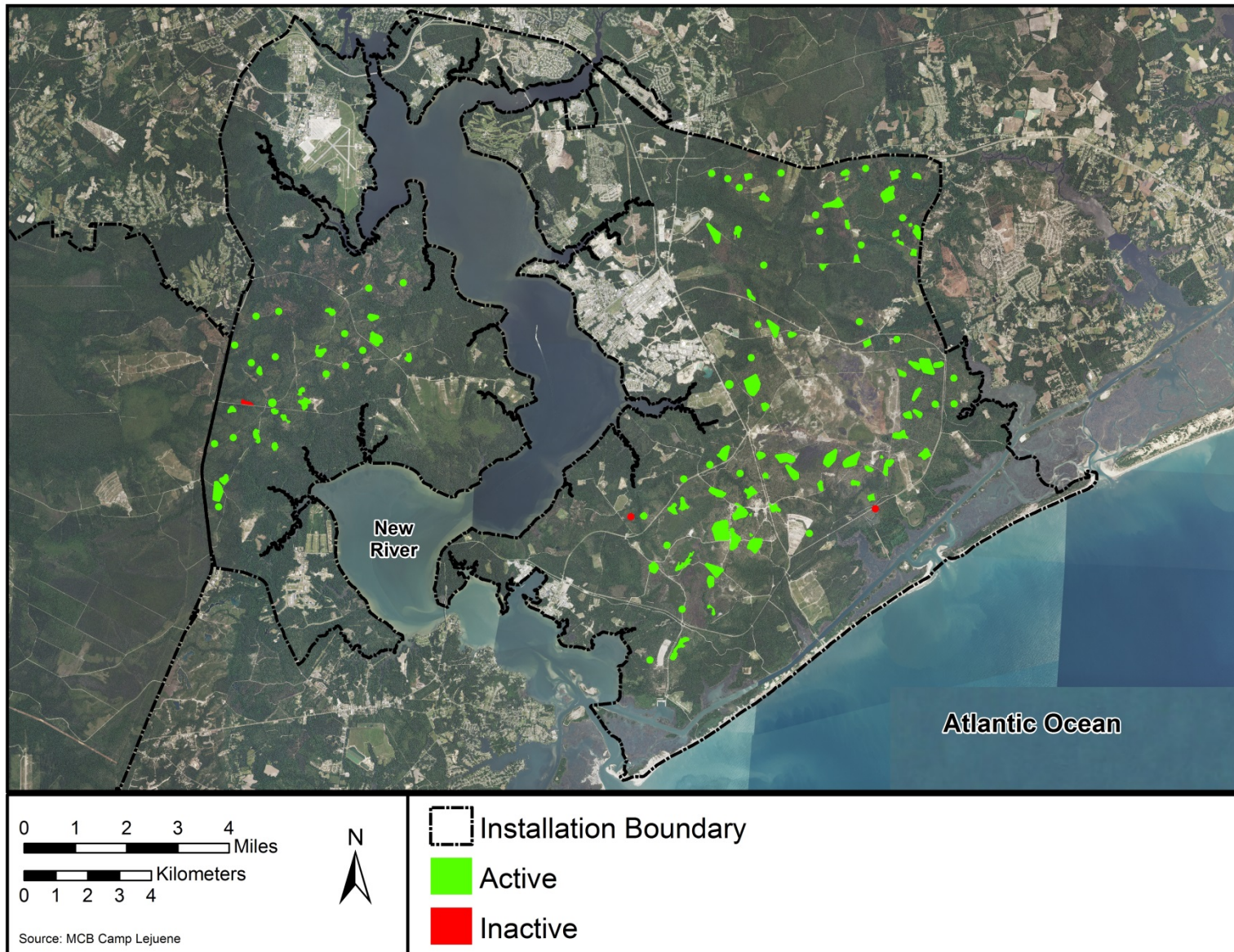


Figure 4-3. Active and inactive RCW clusters on MCB Camp Lejeune as of April, 2013

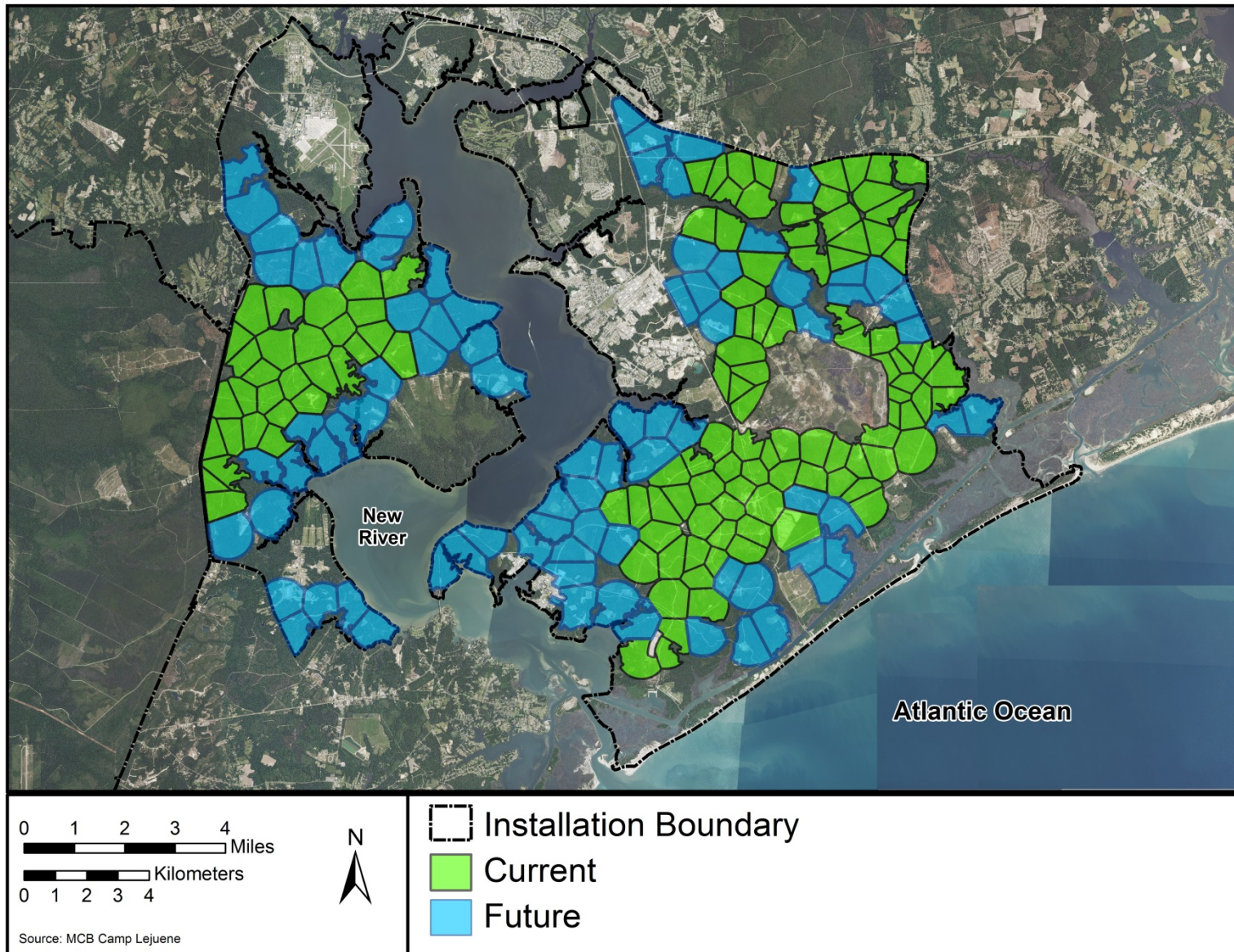


Figure 4-4. RCW management partitions

2014 RCW MANAGEMENT PLAN

For the current INMRP, MCB Camp Lejeune will continue to manage RCW habitat at the partition level. Partition level management will remain essentially unchanged from 2007. MCB Camp Lejeune will continue to manage for a minimum of 120 acres of good quality foraging habitat as defined in the 2003 RCW Recovery Plan (USFWS, 2003). For planning purposes, the objective of partitions is an average of 200 acres of suitable or potentially suitable habitat, as recommended in the 2003 RCW Recovery Plan. A goal in this INRMP will be to increase the frequency of burning across the Base, and move closer to an average of a 3-year return interval, with an increasing percentage of burning occurring in the growing season.

Although partition-level habitat management will remain essentially the same, this INRMP incorporates a number of RCW population and habitat management changes that are designed to alleviate constraints on military training capabilities. An overarching goal of this INRMP will be to facilitate off-road mechanized maneuver training. Management of RCW will play a critical role in the development of off-road mechanized maneuver training capabilities. In GSRA, MCB Camp Lejeune will suspend planting longleaf pine, and management aimed specifically at RCW habitat improvement will be put on hold pending completion of the planning/design process for the GSRA TVMC or at the end of the 5-year INRMP period, whichever comes first. Prescribed burning for ecosystem restoration and general habitat improvement will continue on GSRA during the interim planning period, and MCB Camp Lejeune will continue to implement timber stand improvement projects to increase productivity and reduce fuel levels.

In this INRMP, there are no designated or mapped “high-use training areas.” Instead, whether a cluster is to be marked will be determined through coordination between EMD and G3 at the time of installation based upon the expected impact on tactical maneuver by operating forces. Unmarked clusters will be more likely in highly used training areas. Additionally, we may decide not to install, shift, or postpone recruitment clusters in highly-used training areas. Finally, this plan will simplify the system of population milestones introduced in the 2007 INMRP for demarking clusters.

RCW Habitat Management

MCB Camp Lejeune will continue to evaluate and treat RCW foraging habitat at the partition level. The objective of partition-level management is to provide sufficient suitable habitat within each individual foraging partition and improve habitat quality with each successive treatment. Conversion of off-site pine to longleaf may create near and midterm exceptions to the continual improvement guidelines, but will result in net habitat improvement over the long term. A detailed explanation of Partition Level Management is provided in the revised MCB Camp Lejeune RCW Recovery Plan (Appendix 6).

Forest management is a main component of managing habitat for RCW. The Forestry section is responsible for prescribing silvicultural treatments to the MCB Camp Lejeune forest landscape, including all RCW partitions. The Threatened and Endangered Species section at MCB Camp Lejeune works closely with the MCB Camp Lejeune Forestry section to ensure that all proposed silvicultural prescriptions will benefit the RCW where appropriate, and that those prescriptions follow the guidelines of the 2003 RCW Recovery Plan. Silvicultural activities to benefit RCW may include thinning of mature pine timber to no less than 40 sq ft of basal area, removal of mature canopy hardwoods (canopy hardwoods are not to exceed 10 percent in good quality RCW habitat), retention of potential cavity trees, and 2-aged and uneven-aged management for pine. More details of the silvicultural techniques can be found in Appendix 8, Silvicultural Systems Utilized on MCB Camp Lejeune.

Forest management will continue to operate at the compartment level (See Section 4.2, Forest Management), treating each compartment on a 10-year cycle. However, compartments will also be evaluated at the partition level to ensure that treatments meet the partition level RCW habitat objectives. Partitions will generally be assessed and treated on the 10-year compartment schedule; however, partitions in urgent need of management, such as those expected to be occupied by RCWs in the short term, or those with a majority of old loblolly, will be addressed outside of the 10-year prescription cycle. Although partitions may overlap forest stand and compartment boundaries, most forest management treatments will be prescribed at the stand level. Forest management will be consistent with all recommendations in the 2003 RCW Recovery Plan with respect to size of clear-cuts and acceptable silvicultural techniques.

Forest management will continue to emphasize increasing the amount of good quality foraging habitat as described in the 2003 RCW Recovery Plan, while also converting from off-site species to longleaf pine. Foraging habitat guidelines from the 2003 RCW Recovery Plan 2nd Revision (USFWS, 2003) are reproduced in Appendix 6. Consistent with these guidelines, MCB Camp Lejeune will manage toward a minimum of 120 acres of “good quality” foraging habitat and will increase the acreage of habitat meeting some or all of the characteristics of good quality habitat through the application of prescribed fire, silvicultural treatments (including pine thinning and canopy hardwood removal), and hardwood/midstory management. Longleaf pine restoration may result in temporary degradation of habitat quality.

The role of fire in the longleaf pine/wiregrass ecosystem is varied and includes suppression of hardwood midstory, forest fuels reduction, and propagation of herbaceous plants through the stimulation of flower, seed and fruit production. Many species that occur in the longleaf pine/wiregrass ecosystem show adaptations to frequent, low intensity fires. The application of prescribed burning is a major component of RCW habitat management on MCB Camp Lejeune. See Section 4.2, Wildland Fire Management, for more detail on MCB Camp Lejeune’s prescribed burning program. Historically, most of the forests on MCB Camp Lejeune would have burned every 2 to 3 years, primarily in the growing season. This frequency and timing

provide the greatest benefit to RCW and other listed species, as well as help create and maintain an open training environment for Marines. Goals for RCW management in this INRMP are to burn as much of the Base forested areas as possible on a 3-year frequency, and to increase the proportion of fires that occur in the growing season.

Hardwood encroachment, whether in the midstory or in the canopy, is a leading cause of cluster abandonment by RCW. The primary means of hardwood suppression on MCB Camp Lejeune will continue to be the application of prescribed fire to the landscape during the growing season as much as possible. Mechanical removal of hardwoods may be utilized in partitions where fire may not have occurred in several years or in current clusters showing signs of hardwood encroachment. The Base Forestry section will accomplish this during timber thinning operations or separately by mechanical means. Discussions of these methods can be found in Chapter 4, Sections 4.2 and 4.3.

RCW Cluster Management and Protection

Management of RCW clusters involves ensuring sufficient usable cavities, controlling midstory, protecting cavity trees from prescribed fire and wildfire, and identifying (marking) cavity trees and buffer zones to protect clusters from certain aspects of military training.

MCB Camp Lejeune maintains a minimum of four suitable RCW cavities per group. Each RCW cavity tree is assigned a unique identification number. The global positioning system (GPS) location of the cavity tree is recorded, as is the tree species, physical characteristics, cavity condition, and cavity status. The cavity trees are protected from prescribed fire treatments by clearing vegetation in an approximate 12-foot radius from the base of the tree (Figure 4-5). To prevent cluster abandonment resulting from hardwood encroachment, the cluster is treated by prescribed burning on a 3-year rotation basis. Further, if hardwoods or pine trees threaten to block access to the cavity, the trees will be selectively removed. Also, if hardwood midstory becomes a problem throughout a cluster, the midstory will be removed, either manually or mechanically.



Figure 4-5. RCW cavity tree with vegetation-free buffer for prescribed fire treatments

Cluster protection involves marking clusters with painted buffers and imposing training restrictions within those buffers. As with the previous INRMP, some RCW clusters will not be marked and the proportion of marked clusters will decrease as the population grows. With this

INRMP, MCB Camp Lejeune will continue to paint buffers at 200 ft from the cavity trees, with a secondary invisible buffer of 50 ft around marked cavity trees. Appendix 6 contains a detailed description of the training activities allowed in marked RCW clusters.

Population Milestones and Monitoring

MCB Camp Lejeune will continue to implement a system by which training restrictions are removed from clusters as population milestones are met. Milestones will be in increments of 25 active clusters, and the percentage of unmarked clusters will increase as each milestone is met. The actual number of marked clusters will vary depending on population growth and occupation rate of recruitment clusters. The actual distribution of recruitment clusters, and numbers of marked and unmarked clusters, will depend on site-specific circumstances and actual growth rates in active clusters. Appendix 6 contains a more detailed forecast table.

Marked clusters will continue to have military training restrictions. However, once MCB Camp Lejeune reaches its recovery goal of 173 active clusters, it will have the option of removing all training restrictions from all clusters. At that point, MCB Camp Lejeune will be required to maintain a recovered population of at least 173 active clusters. Given this consideration, MCB Camp Lejeune may elect to retain some restrictions on some clusters until there is a comfortable buffer above the threshold of 173 active clusters.

MCB Camp Lejeune's RCW population has been intensively monitored since 1985. Population demographics, reproductive success, and home range data is collected and interpreted annually. Breeding season monitoring records clutch sizes and fledgling success, with every fledgling receiving identifying bands. Breeding status of adult birds is also documented annually, allowing accurate accounts of the number of helpers in the population. Results of this monitoring are reported to the USFWS annually. MCB Camp Lejeune will continue to monitor 100 percent of its RCW population in this manner. A detailed monitoring plan is included in Appendix 6.

Management in Support of Training Projects in RCW Habitat

Threatened and endangered species managers will participate in the range development process to help avoid and minimize impacts on RCW clusters and foraging habitat. Future projects and alternatives, including BCTMC (CAAAC Phase I), will be evaluated for relative impacts and potential mitigation measures.

Where possible, RCW management will focus on areas not designated for future projects, and/or management will be done in a way that minimizes potential conflicts. Where impacts to current or future habitat are unavoidable, RCW managers can mitigate impacts through strategic placement of artificial cavities and recruitment clusters.

In areas planned for future RCW clusters, RCW managers will place recruitment clusters in ways that minimize future conflicts. Areas without active clusters have ample flexibility in terms of

placement of the cavity trees and acreage of foraging partitions that allows for avoidance of conflicts with known training priorities. As much as possible, MCB Camp Lejeune RCW managers will seek to manage habitat in a way that avoids conflicts with known future projects.

Where impacts to existing clusters are unavoidable, artificial cavities can be used to replace lost cavities or to shift nesting activity away from areas of high-intensity training. MCB Camp Lejeune has achieved some success in minimizing the loss of clusters due to the G-10 Range Transformation by installing replacement clusters near clusters that were removed for new ranges. In an effort to assess impacts of mechanized training in RCW habitat, a habitat monitoring plan will accompany future training corridor projects like the BCTMC. MCB Camp Lejeune will proceed in its development of the BCTMC with the assumption that off-road tactical vehicle and tracked vehicle maneuver is not compatible with RCW management practices. The period of this INRMP will be used to monitor and evaluate RCW responses to off-road maneuver to validate or invalidate this assumption.

RCW Recovery and Sustainment Program (RASP)

The RASP was developed by MCB Camp Lejeune and USFWS as a strategy to establish new RCW subpopulations or add to existing subpopulations within the CNCPC while simultaneously alleviating constraints on the Marine Corps training mission. The RASP allows MCB Camp Lejeune to enter into agreements with agencies, non-governmental organizations, and private landowners to establish new RCW groups on off-base properties that contribute to the CNCPC. In return, MCB Camp Lejeune's on-base RCW recovery goal can be reduced, thereby alleviating constraints on mission-critical range and training area capabilities.

Although the RASP may eventually lead to a reduction in the number of active RCW clusters on MCB Camp Lejeune, the establishment of RCW groups on RASP properties may have a net beneficial effect on recovery of the overall CNCPC population by accomplishing one or more of the following; increasing connectivity between subpopulations, increasing the viability of certain subpopulations, or minimizing threats to population viability. Rigorous modeling analyses are used to evaluate the potential biological functionality of individual RASP properties as well as their potential to contribute to the ecological functionality of the overall CNCPC population. RASP property agreements must provide for the management and protection of the properties and their associated RCW groups in perpetuity.

RASP does not establish an RCW credit/debit process, nor does it authorize incidental take for projects on MCB Camp Lejeune. The Section 7 consultation process and any incidental take authorizations for projects that are expected to result in RCW take on MCB Camp Lejeune will be separate from the RASP process. However, RASP will allow MCB Camp Lejeune to expand the scope of Section 7 consultations to include the entire CNCPC population. Currently, Section 7 consultations for on-base projects consider the effects of take on the RCW population inside the base boundary. Under RASP, Section 7 consultations can consider the effects of take on the

overall CNCPC population, including RCW groups on RASP properties. It is expected that RASP properties and their associated RCW groups off-set any decreases in functionality associated with project-related RCW take on MCB Camp Lejeune. This off-setting effect would provide USFWS with greater flexibility in making jeopardy/non-jeopardy determinations and authorizing incidental take for proposed range projects on MCB Camp Lejeune.

Section 7 consultations will employ modeling analyses to essentially weigh the negative effects of on-base take against the positive effects of the RASP properties on the ecological functionality of the overall CNCPC population. As stated in the USFWS Biological Opinion for the RASP: “This balancing will be based on the ecological function of the CNCPC population as a whole and may or may not represent a direct 1:1 relationship between the number of RCW groups on the RASP properties and the RCW groups that would be affected by the proposed action.” Thus, the benefits provided by a specific RASP property will depend on its contribution to the ecological functionality of the CNCPC population, which in turn is influenced by a number of factors; including proximity to other CNCPC subpopulations, distribution within the landscape, and readiness (i.e., suitability as foraging and nesting habitat and time to maturity).

4.1.4.2 RCW Conservation Goals and Measures

GOAL/OBJECTIVE TES1: Manage RCW habitat to increase “good quality” habitat for each partition.

- **Action 4.1-01:** *MCB Camp Lejeune will manage for RCW habitat at the partition level, both within and outside of the normal silvicultural prescription cycle.*
- **Action 4.1-02:** *Restore longleaf pine within the guidelines of the 2003 RCW Recovery Plan for the RCW on Mainside. Longleaf pine restoration in the GSRA will be reevaluated upon completion of the TVMC range planning and development process.*
- **Action 4.1-03:** *Make progress toward burning all existing and potential RCW habitat on a 3-year rotation, and increasing growing season burning to greater than 50 percent.*

GOAL/OBJECTIVE TES2: Promote RCW population growth toward 173 active clusters through cluster management and protection and through population manipulation.

- **Action 4.1-04:** *Implement monitoring and protection plan for RCW.*
- **Action 4.1-05:** *Maintain minimum growth rate of 5 percent per year (avg. over 10 years).*

GOAL/OBJECTIVE TES3: Develop and maintain a complete and current data set to effectively manage RCW on MCB Camp Lejeune.

- **Action 4.1-06:** *Monitor 100 percent RCW population annually.*

- **Action 4.1-07:** *Survey annually for new cavities.*

GOAL/OBJECTIVE TES4: Manage MCB Camp Lejeune’s RCW population to increase mission flexibility for future training and range development needs.

- **Action 4.1-08:** *Apply RCW population model to forecast impacts to demographic stability from range and facility development.*
- **Action 4.1-09:** *Implement management strategy that allows for removal of training restriction as population milestones are met.*
- **Action 4.1-10:** *Maintain 200 ft cluster buffer.*
- **Action 4.1-11:** *Direct RCW management to allow for future mechanized maneuver corridors through RCW habitat.*
- **Action 4.1-12:** *Implement a study to monitor the effects of mechanized maneuver in the BCTMC corridor.*

4.1.4.3 Sea Turtles

The ESA protects all six species of sea turtles in the United States. Two species, the green sea turtle and the loggerhead sea turtle (Figure 4-6), are listed as threatened and nest at MCB Camp Lejeune on Onslow Beach. Three additional endangered species, the Atlantic hawksbill turtle, the Atlantic leatherback turtle, and the Kemp’s ridley turtle occur in the waters off the coast of MCB Camp Lejeune, but are not known to nest aboard the installation. Both leatherbacks and Kemp’s ridleys have nested in North Carolina, but not on MCB Camp Lejeune. Protective measures outlined here will apply to any species of turtle that nest on Onslow Beach. Sea turtle nesting has been monitored on Onslow Beach since 1979.

Approximately 11 miles of MCB Camp Lejeune Beach are monitored annually. From mid-May through August, Base personnel conduct daily morning surveys of Onslow Beach to look for sea turtle crawls. When crawls are found, numbers and locations of sea turtle nests and crawls are recorded. If training is to occur at night, Base personnel will conduct night surveys and, in addition to looking for crawls, record individual tagging and size data and allow for immediate protection of sea turtle nests. Brown’s Island, a duded impact area, is monitored at least twice per week during the nesting seasons by air. Sea turtle nests found in the designated military training portion of the beach are relocated. Nest relocations occur no later than 9:00 A.M. Nests laid below the mean high tide line are also eligible for nest relocation.

As the nests near the end of incubation, they are checked each morning for signs of hatching, hatchling emergence, or predation. After emergence, hatchling tracks are counted to estimate a measure of success before the completion of nest inventory.

The northern end of Onslow Beach and Brown's Island are designated as the N-1/BT-3 Impact Area (Figure 4-7). Currently, access to the north end of Onslow Beach is authorized with certain safety precautions. Vehicular traffic on wet sand is authorized after weekly sweeps for unexploded ordnance. Brown's Island is inaccessible, except by boat, and it is not regularly checked for unexploded ordnance. Therefore, no ground-based monitoring or nest management occurs there.

The shorebird and sea turtle nesting season occurs from April 1 to August 31, during which time recreational driving on Onslow Beach is restricted to training areas only. Recreational driving is permitted on the beach to the inlet outside of the nesting season. This restriction helps conserve sea turtles and other sensitive species and habitat on South Onslow Beach.

Onslow Beach is an index nesting site for the State of North Carolina, which makes the data collected here important to regional sea turtle management and recovery. MCB Camp Lejeune enters nesting data directly into the NCWRC database via the Seaturtle.org website. A detailed description of protective measures for sea turtles, which also exempt MCB Camp Lejeune from critical habitat for the loggerhead sea turtle, can be found in Appendix 9.



Figure 4-6. Loggerhead sea turtle hatchling

4.1.4.4 Sea Turtle Conservation Goals and Measures

GOAL/OBJECTIVE TES5: Continue current management and monitoring of sea turtles on Onslow Beach and Brown's Island.

- **Action 4.1-13:** *Protect sensitive habitat at South Onslow Beach.*
- **Action 4.1-14:** *Enter sea turtle data into NCWRC database via seaturtle.org.*
- **Action 4.1-15:** *Continue to implement protective measures for sea turtles in-water (see Appendix 10 for in-water training protocol for sea turtles and marine mammals).*

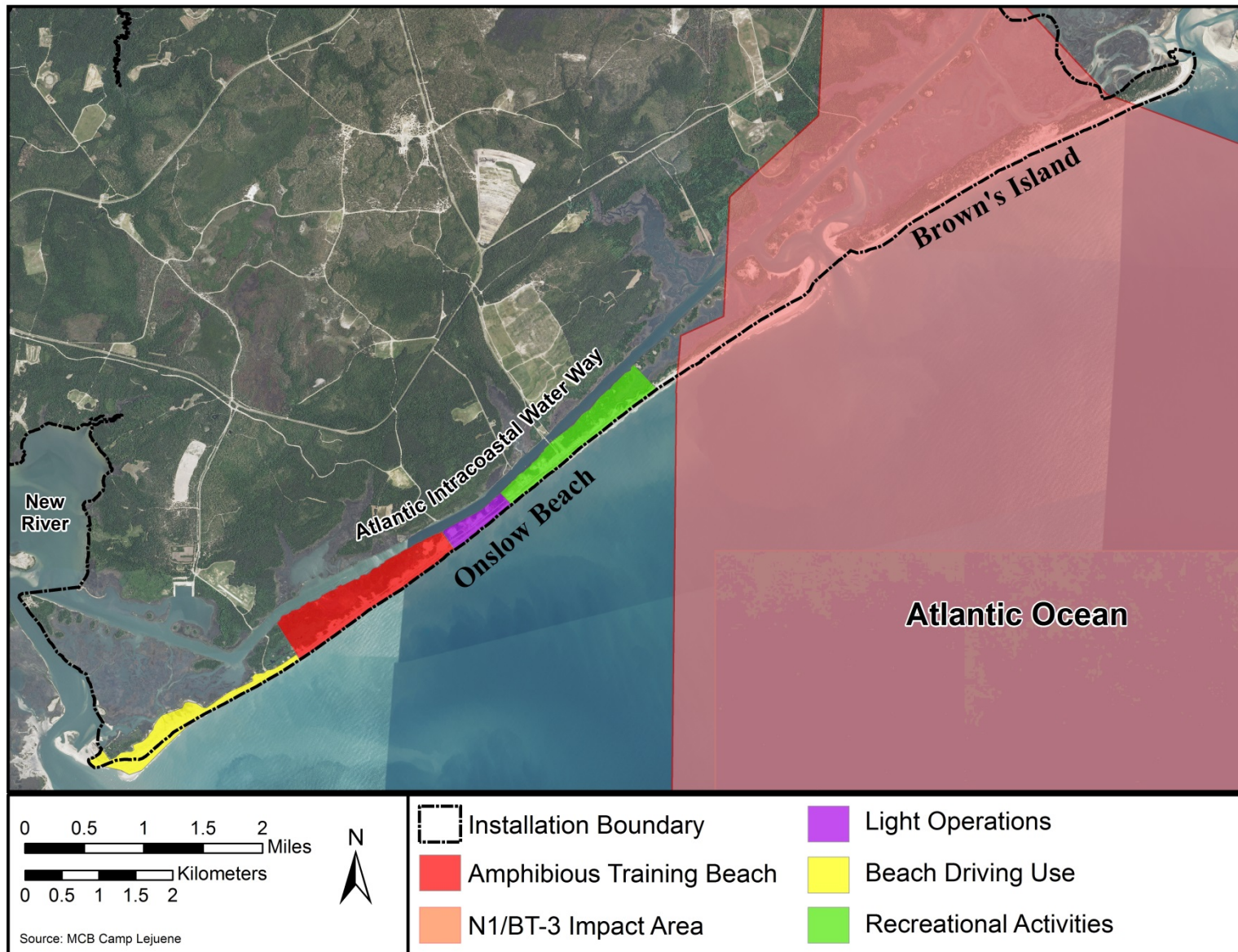


Figure 4-7. Onslow Beach and Brown's Island map showing designated training and recreational areas

- **Action 4.1-16:** *Implement MCB Camp Lejeune sea turtle protocol.*
- **Action 4.1-17:** *Continue to reduce sources of artificial lighting on Onslow Beach.*

4.1.4.5 Rough-leaved Loosestrife

Rough-leaved loosestrife (Figure 4-8) typically occurs at the ecotone between savanna or flatwoods and pocosins, where the water table is near the surface during winter and early spring.

Plants do best in habitat where shrubby vegetation is kept low by frequent natural or prescribed fires. Rough-leaved loosestrife is managed on MCB Camp Lejeune through the application of prescribed fire at a return treatment interval of 2 to 3 years. Fire management may be supplemented by mowing of shrubby vegetation with a brush mower in the winter, when rough-leaved loosestrife is dormant. Known sites occurring in a Duke Energy utilities power line right-of-way on Base are maintained through periodic mowing. Additionally, beneficial silvicultural measures, such as commercial thinning and harvest treatments that remove up to 25 percent of the canopy cover on rough-leaved loosestrife-occupied sites, may be employed to improve habitat conditions.



Figure 4-8. Rough-leaved loosestrife

Approximately 46 acres of habitat are currently occupied by rough-leaved loosestrife at MCB Camp Lejeune (Figure 4-9). Rough-leaved loosestrife sites on MCB Camp Lejeune are protected through the application of land restrictions for specific training, management, and construction activities. Rough-leaved loosestrife sites will be buffered and marked with signs identifying the area as a rough-leaved loosestrife site, and stating prohibited activities (no digging, no vehicles, and no bivouacs). The protective buffer for rough-leaved loosestrife extends 100 ft from the most peripheral individual plants. In total, the marked buffers protect approximately 75 acres of habitat. The following restrictions apply in rough-leaved loosestrife buffer zones:

- Vehicular traffic is prohibited with the exception of those responding to a fire emergency or associated with an authorized silvicultural treatment,
- Excavation and/or soil disturbance is prohibited,
- Bivouacking or extended occupation of the site is prohibited, and
- Alteration of hydrologic conditions is not authorized.

Any management activity within rough-leaved loosestrife sites will be done with minimal soil disturbance. Skid trails, mechanical site preparation, and mechanical treatments to control competition will be prohibited within rough-leaved loosestrife sites and buffer zones. Also, except in cases where a wildfire endangers life or property, fire containment lines will not be placed in buffer areas or in a way that would alter hydrology.

A Geographic Information Systems (GIS) layer of high-probability rough-leaved loosestrife habitat for MCB Camp Lejeune is used to assess potential impacts of development or management activities. Any activities that may impact rough-leaved loosestrife sites proposed in or near high probability habitat will require a site survey by the Threatened and Endangered Species section prior to implementation of the activity. If a survey results in the discovery of a new rough-leaved loosestrife site, the above restrictions apply.

In 2011, MCB Camp Lejeune completed a 10-year monitoring study developed by the North Carolina Plant Conservation Program. Since completion, MCB Camp Lejeune has monitored all known rough-leaved loosestrife sites on a 2-year cycle, with half of the sites being monitored each year. Current recommendations from the USFWS and North Carolina Natural Heritage Program are that rough-leaved loosestrife sites be monitored on a 3-year cycle. A new monitoring plan for MCB Camp Lejeune will be developed for the 2015 season.

Rough-leaved Loosestrife Management in Support of Training Projects

Threatened and endangered species managers will participate in the range development process to help avoid and minimize impacts on rough-leaved loosestrife sites. Future projects and alternatives, including the BCTMC and the TVMC, will be evaluated for relative impacts, and potential mitigation measures will be evaluated. Similar to the RCW management in the GSRA, growth of rough-leaved loosestrife populations above the baseline in the GSRA will be considered “incidental take” in order to meet range or training facilities development necessary to meet emerging training requirements. MCB Camp Lejeune is currently evaluating proposed changes in vegetation maintenance procedures within the G-10 and K-2 impact areas; including the potential use of aerial herbicide treatments to maintain vegetation height and target visibility.

The G-10 contains known rough-leaved loosestrife populations as well as additional high probability habitat areas that could potentially be affected by herbicide treatments. An EA is currently being prepared that will address the overall environmental effects of the proposed changes. Threatened and endangered species managers have discussed with USFWS the potential effects of herbicide use in the G-10 on rough-leaved loosestrife. USFWS has indicated that it will provide formal comments through the Section 7 consultation.

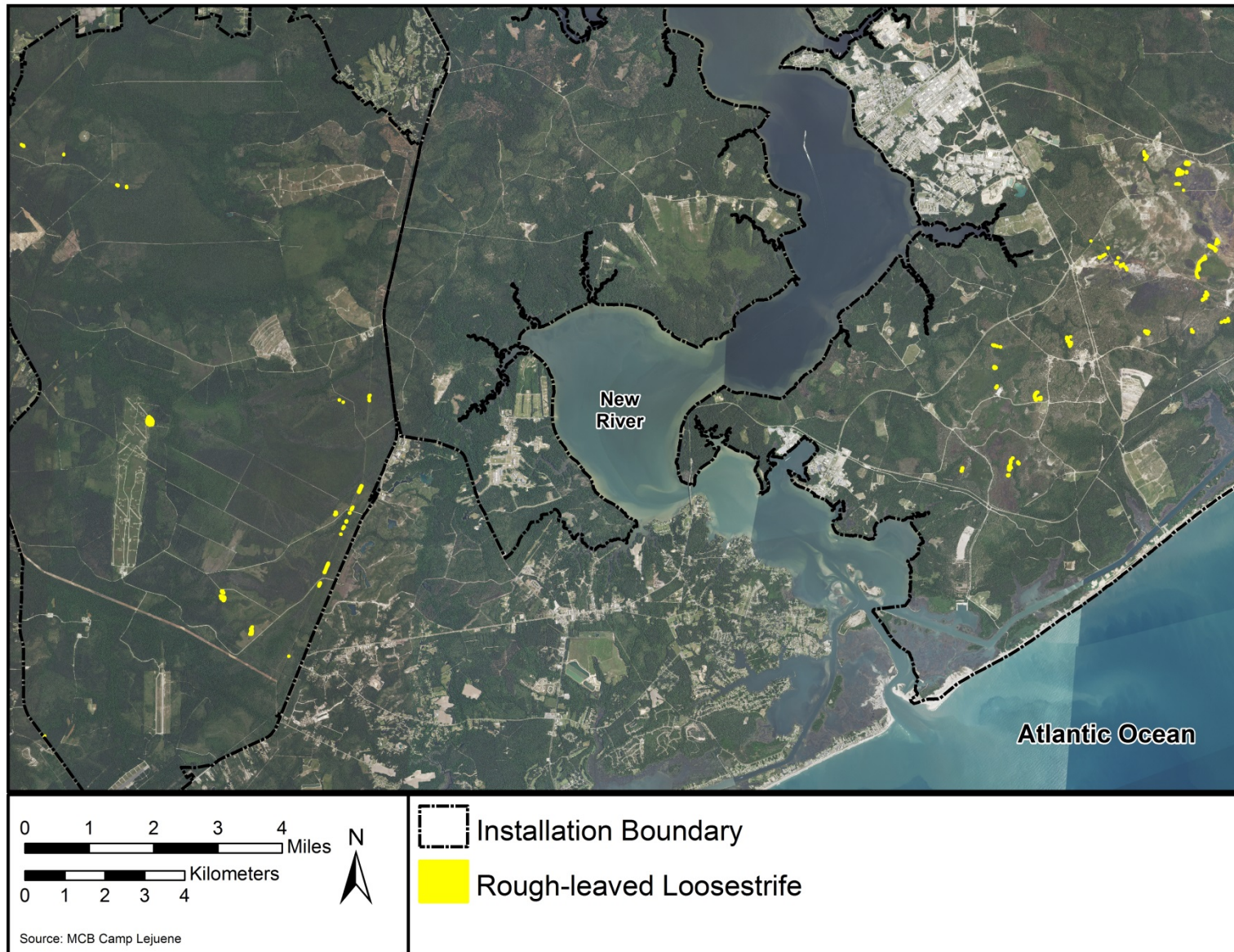


Figure 4-9. Map of rough-leaved loosestrife locations on MCB Camp Lejeune

4.1.4.6 Rough-leaved loosestrife Conservation Goals and Measures

GOAL/OBJECTIVE TES6: Maintain a complete and current data set to effectively manage rough-leaved loosestrife on MCB Camp Lejeune.

- **Action 4.1-18:** *Continue to implement reduced rough-leaved loosestrife monitoring protocol.*
- **Action 4.1-19:** *Update GIS layer for rough-leaved loosestrife on a yearly basis.*
- **Action 4.1-20:** *Survey high-probability rough-leaved loosestrife habitat in areas to be affected by management or development actions to include the entire GSRA.*

GOAL/OBJECTIVE TES7: Carry out management activities that will promote conservation of rough-leaved loosestrife.

- **Action 4.1-21:** *Prescribe-burn rough-leaved loosestrife habitat every 2 to 3 years.*
- **Action 4.1-22:** *Maintain and update buffer areas around rough-leaved loosestrife sites.*
- **Action 4.1-23:** *Protect rough-leaved loosestrife sites from soil disturbance and changes to hydrology.*

4.1.4.7 Seabeach Amaranth

Seabeach amaranth (Figure 4-10) is an annual plant that typically grows in overwash areas or along the beachfront. It has been described as a dune-builder because it frequently occupies areas seaward of primary dunes, often growing closer to the high tide line than any other coastal plant. Though germination may occur anywhere on Onslow Beach, populations tend to arise at the New River Inlet, in an overwash flat on the southern portion of the beach, and in the vicinity of Onslow North Tower (Figure 4-11). The most significant threats to amaranth are beach stabilization structures, beach grooming, herbivory, and in certain areas, unauthorized recreational vehicle use on beaches. Surveys of Onslow Beach are conducted by two to five personnel on foot. Searches include the upper beach shelves between the wrack line and primary dune line and all overwash areas.



Figure 4-10. Seabeach amaranth on Onslow Beach

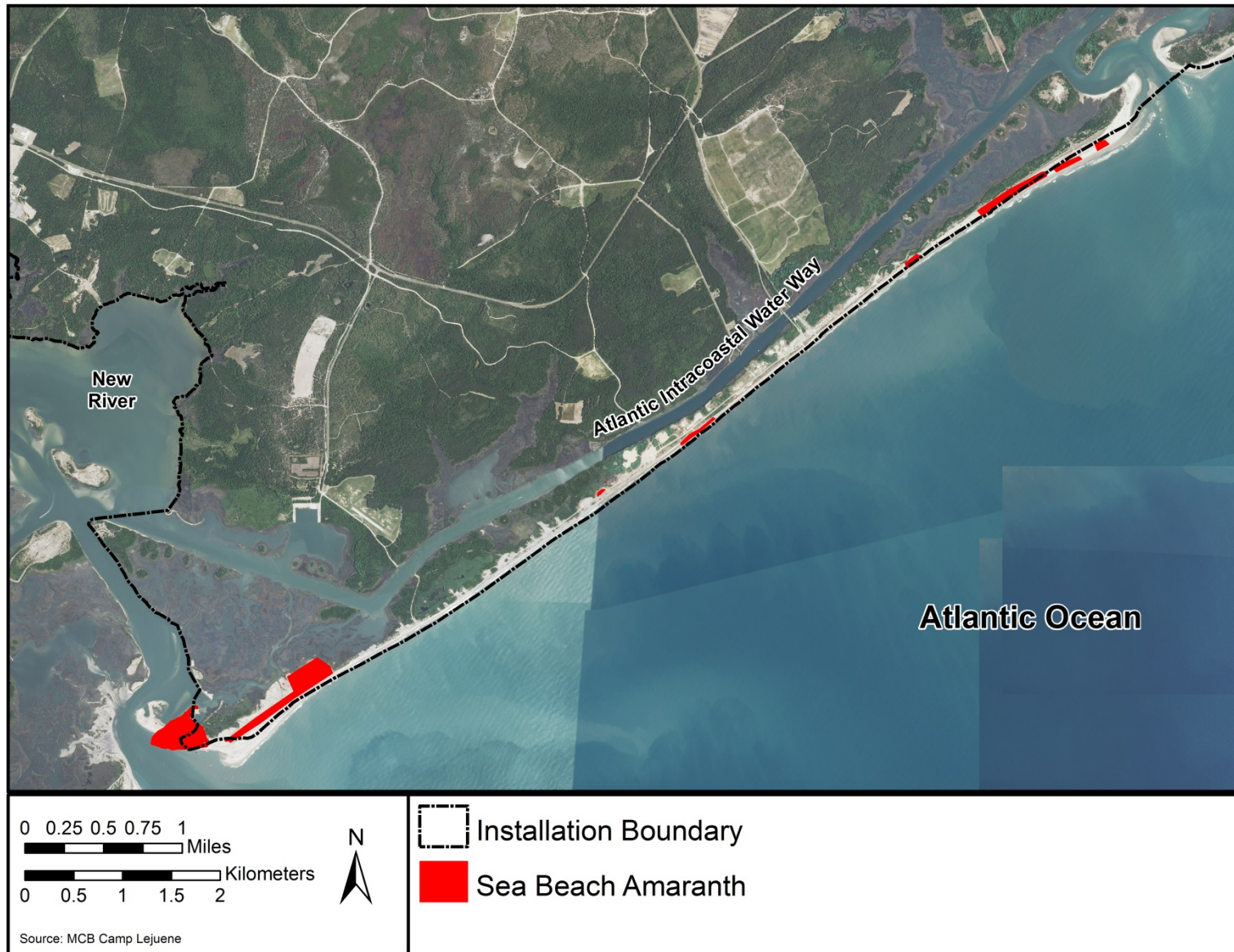


Figure 4-11. Locations of seabeach amaranth on Onslow Beach over the past 5 years

Individual plants are counted and recorded. A GPS unit is used to record individual plants in areas with fewer than three plants/square meter. Upon encountering extensive populations with greater than three plants/square meter, the area is broken down into informal segments. These segments are recorded as polygons with the GPS unit, and plants are individually counted within each segment. Surveys are conducted periodically throughout the growing season, beginning in late spring and ending in mid- to late-August when plants are fully-grown and flowering. The surveys are timed early enough to precede common, late-summer tropical storms that have the potential to inundate or destroy seabeach amaranth populations.

Once identified, seabeach amaranth sites are marked with signs to prevent military, recreational beach driving, and pedestrian traffic from harming the plants. The plants are also monitored for webworm herbivory or other causes of mortality. Potential habitat in overwash areas is protected from vehicle traffic year-round with a system of poles and signs designed to keep drivers to the seaward side of certain areas

4.1.4.8 .Seabeach Amaranth Conservation Goals and Measures

GOAL/OBJECTIVE TES8: Protection of seabeach amaranth and habitat on Onslow Beach

- **Action 4.1-24:** *Protect sensitive habitat at South Onslow Beach.*
- **Action 4.1-25:** *Annually survey potential seabeach amaranth habitat on Onslow Beach.*
- **Action 4.1-26:** *Mark and protect seabeach amaranth sites.*

4.1.4.9 Piping Plover

Suitable habitat for piping plover (Figure 4-12) is available on Onslow Beach for nesting, over-winter foraging, migrating, and roosting. Nesting piping plovers were documented on Onslow Beach in 2009, and foraging birds were documented during the winter, spring, and fall migration periods, and during the nesting season. Beginning in 2000, bi-weekly shorebird surveys along the accessible portion of Onslow Beach have been conducted. Information continues to be recorded and forwarded to the USFWS and the NCWRC. Starting in April, high quality potential nesting habitat is posted protected, and the surveys become more intensive as the beach is monitored for evidence of nesting behavior. MCB



Figure 4-12. Piping plover on Virginia Key, FL, identified as a juvenile from the 2009 Camp Lejeune nest. (Photo credit: Trey Mitchell)

Camp Lejeune also participates in international piping plover census counts both over winter and in the breeding season.

Piping plovers that are spotted during the nesting season will be observed for signs of breeding behavior. If breeding behavior is detected, or a nest is located outside of the military training portion of the beach, appropriate protective measures will be implemented: the areas will be posted to prohibit disturbance, including pedestrians and pets. Given the essential nature of the military training portion of the beach and the generally low likelihood that piping plovers would use that portion of the beach, MCB Camp Lejeune will pursue an incidental take statement for piping plover impacts in the military portion of the beach.

Potential piping plover habitat tends to occur in overwash and inlet areas where seabeach amaranth occurs and other shorebirds and least terns tend to nest. Potential piping plover nesting areas will be protected no later than March 15 of each year. Additionally, recreational driving on Onslow Beach is prohibited in the south of the Amphibious Training Area between April 1 and August 31. April 1 was chosen specifically to protect nesting shorebirds, including piping plovers.

Sand fencing and planting dune grasses are done annually to stabilize the beach between South Tower and North Tower. However, in order to help conserve piping plovers and other species, no sand fencing or dune planting takes place south of South Tower or north of North Tower.

4.1.4.10 Piping Plover Conservation Goals and Measures

GOAL/OBJECTIVE TES9: Conserve piping plover populations.

- **Action 4.1-27:** *Conduct bi-weekly surveys for piping plover and during the breeding season census window.*
- **Action 4.1-28:** *Protect piping plover nests and habitat from training and outdoor recreation impacts.*
- **Action 4.1-29:** *Report plover sightings to NCWRC.*

4.1.4.11 American Alligator

The American alligator (Figure 4-13) is federally listed as threatened due to its similarity of appearance to the American crocodile, which is listed as endangered by the USFWS. American alligator populations



Figure 4-13. American alligator in Orde Pond

are present on MCB Camp Lejeune and in surrounding waterways.

MCB Camp Lejeune monitors the American alligator population on the Installation. Nighttime spotlight surveys will be conducted as needed on tributaries of the New River and other habitats during summer months to identify population trends. Locations and approximate sizes will be recorded for each sighting. MCB Camp Lejeune will coordinate access for NCWRC staff performing alligator surveys on tributaries of the New River within the MCB Camp Lejeune operating area.

4.1.4.12 American Alligator Conservation Goal and Measure

GOAL/OBJECTIVE TES10: Maintain current data on American alligator population.

- **Action 4.1-30:** *Cooperate with any State surveys in the New River and tributaries.*

4.1.4.13 Hirst's Panic Grass

Hirst's panic grass (Figure 4-14) has been documented in four populations worldwide. Historically, it was found in coastal plain habitats in the states of New Jersey, Delaware, North Carolina, and Georgia, though it is likely extirpated from Georgia. Currently, Hirst's panic grass is known to exist in one site in New Jersey, one site in Delaware, and two sites in North Carolina, both of which are on Marine Corps Base MCB Camp Lejeune (NatureServe, 2014).

Hirst's panic grass is currently a candidate for federal listing, which means that it is a plant for which "the Fish and Wildlife Service has on file sufficient information on biological vulnerability and threat(s) to support issuance of a proposal to list. However, issuance of a proposed rule is currently precluded by higher priority listing actions (61 FR 7596-76 13 [February 28, 1996])." Hirst's panic grass, which grows in ephemeral pools and other areas that are periodically inundated with water, exists within a fire-dependent landscape and thrives under a sparse tree canopy. Consistent with the surrounding landscape, fire will be used to control midstory vegetation. When necessary, the canopy over these sites will be thinned, preferably by hand.



Figure 4-14. Inflorescence of Hirst's panic grass

A monitoring protocol for Hirst's panic grass was developed in 2014 (see Appendix 11). Following this protocol, MCB Camp Lejeune will annually monitor for Hirst's Panic Grass and send monitoring reports to the NC Natural Heritage Program.

4.1.4.14 Hirst's Panic Grass Conservation Goals and Measures

GOAL/OBJECTIVE TES11: Promote recovery of Hirst's panic grass.

- **Action 4.1-31:** *Annually implement monitoring protocol for Hirst's panic grass.*
- **Action 4.1-32:** *Conduct habitat management actions to maintain and enhance Hirst's panic grass sites at MCB Camp Lejeune when necessary.*

4.1.4.15 Red Knot

Red knot (Figure 4-15) does not nest in North Carolina, but it may be found in small numbers in the state throughout the year. Red knot primarily uses the North Carolina coast, including MCB Camp Lejeune, during its migration, and in the winter. MCB Camp Lejeune's coastal habitat provides intertidal beach and mudflats for foraging, and beach for roosting during red knot migration. The species will benefit from continued protection of the coastal habitat on the south end of Onslow Beach, as well as the lack of human disturbance on the north end of Onslow Beach and on Brown's Island. Those prescriptive measures in place for the protection of the piping plover also benefit the red knot.



Figure 4-15. Rufa red knot. (Photo credit: US Geological Survey)

4.1.4.16 Red Knot Conservation Goals and Measures

GOAL/OBJECTIVE TES12: Promote recovery of red knot through continued protection of habitat and monitoring.

- **Action 4.1-33:** *Protect sensitive habitats on the south end of Onslow Beach.*
- **Action 4.1-34:** *Conduct biweekly shorebird surveys.*

4.1.4.17 Bald Eagle

The first recorded bald eagle nest on MCB Camp Lejeune was documented in 2000. At the time of the signing of the last INRMP in 2007, there was still one documented bald eagle nest on Base, and the bald eagle (Figure 4-16) was still listed as threatened under the ESA. Since that time, the bald eagle has been delisted and an additional six nests have been found on MCB Camp Lejeune. For the 2013 to 2014 nesting season, five active nests were reported, four of which were fledging at least one chick.

Although the bald eagle was federally delisted, the species remains protected under the BGEPA. Prohibitions of the BGEPA include prevention of “take” without a permit. The BGEPA defines “take” as “pursue, shoot at, poison, wound, kill, capture, trap, collect, destroy, molest, or disturb. “The act defines disturb as “to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on best scientific information available: 1) injury to an eagle, 2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or 3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior.”

In 2011, MCB Camp Lejeune was granted a take permit under the BGEPA for disturbance due to normal training activities, including aircraft maneuvers. The permit was renewed in 2014 and is valid through 30 June, 2019. Conditions of the permit include restrictions on human entry within 100 ft of the nest during the nesting season, October 1 through May 15. Monitoring of each bald eagle nest is required on a regular basis. The resulting monthly and annual monitoring reports are submitted to the USFWS Permit Office. Protective measures, monitoring, and reporting requirements are found in Appendix 12.



Figure 4-16. Adult bald eagle on MCB Camp Lejeune

4.1.4.18 Bald Eagle Conservation Goals and Measures

GOAL/OBJECTIVE TES13: Protect bald eagles found on MCB Camp Lejeune.

- **Action 4.1-35:** *Maintain protective measures required as a condition of the BGEPA take permit.*
- **Action 4.1-36:** *Monitor each nest according to conditions of the BGEPA permit.*

- **Action 4.1-37:** *Conduct periodic surveys for potential nests along the New River corridor.*

4.1.5 Species at Risk

4.1.5.1 Federal, State, and Other Regulations

As defined in this INRMP, species at risk (SAR) are those regarded as vulnerable or imperiled that are not yet federally listed under the ESA. Species at risk on MCB Camp Lejeune include those identified as federal SOC by the USFWS, state-listed species, and other species that are considered especially vulnerable based on International Union for Conservation of Nature (IUCN) Red List rankings. Federal SOC are those species regarded as potentially vulnerable by the USFWS for which there is currently insufficient information to support listing as threatened or endangered. The ESA does not address federal SOC, and these species are not subject to Section 7 consultation. State-listed species include animals and plants listed as endangered, threatened, or special concern under the North Carolina Endangered Species Act (NCESA) (General Statute [GS] 113: 331-337) and the North Carolina Plant Protection and Conservation Act of 1979 (NCPCPA) (GS196 106: 202.12-19). The NCESA and NCPCPA afford protection to state-listed species on state or privately-owned lands; however, these laws are not applicable to federal military installations. Although DoD installations are under no legal mandate to manage or protect federal SOC and state-listed species; proactive conservation can help prevent the need for federal listing, thereby avoiding potential future constraints on the military mission. SAR on MCB Camp Lejeune are managed in accordance with the following DoD and USMC policies:

- **DoDI 4715.03** - Natural Resources Conservation Program directs all DoD components, to the extent practicable, to “establish policy and procedures for the management of species at risk (SAR) to prioritize proactive management of those species that, if listed, could adversely impact military readiness. Program objectives shall focus on efforts that have the greatest potential to prevent the listing of SAR (e.g., habitat conservation, planning level surveys, monitoring).”
- **The MCO P5090.2A Ch 3** - Environmental Compliance and Protection Manual provides additional guidelines for management of species at risk by directing Marine Corps installations to “survey and take other appropriate measures to identify, monitor, and manage other species at risk (i.e., state listed species, IUCN Red List threatened, or imperiled species)” when such actions do not conflict with the installation’s military mission.

4.1.5.2 Species at Risk at MCB Camp Lejeune

MCB Camp Lejeune is comprised of a number of diverse natural communities that could provide habitat for up to 99 SAR, including federal SOC and species listed as state threatened, endangered, or state SOC. Known or potentially occurring species include 60 vascular plants, 23 birds, 9 reptiles, 4 mammals, 2 amphibians, and 1 invertebrate (Appendix 13). The Base hosts several SAR populations, including but not limited to:

- Venus flytrap,
- Coastal goldenrod,
- Carolina gopher frog, and
- The eastern diamondback rattlesnake.

MCB Camp Lejeune recognizes 32 SAR that the USFWS has identified as federal SOC. These species, which have the greatest potential for future listing as threatened or endangered, are considered species with high conservation priority and are displayed as Priority 1 species in Table 4-1. SAR benefit from the ecosystem management approach, as well as management

Table 4-1. Priority 1 Species at Risk (USFWS Federal SOC) with Potential to Occur at MCB Camp Lejeune

COMMON NAME	SCIENTIFIC NAME	GLOBAL RANK ¹	IUCN ²	STATE STATUS ³	HABITAT
AMPHIBIANS					
Carolina Gopher Frog	<i>Rana capito capito</i>	G3	NT	T	Breeds in temporary fish-free pools; forages in sandy woods, especially pine-oak sandhills
REPTILES					
Eastern Diamondback Rattlesnake	<i>Crotalus adamanteus</i>	G4	LC	E	Pine flatwoods, savannas, pine-oak sandhills
Southern Hog-nosed Snake	<i>Heterodon simus</i>	G2	VU	SC	Sandy woods, particularly pine-oak sandhills
Diamondback Terrapin	<i>Malaclemys terrapin</i>	G4	NT	SC	Salt or brackish marshes, estuaries
Mimic Glass Lizard	<i>Ophisaurus mimicus</i>	G3	LC	SC	Pine flatwoods, savannas, pine-oak sandhills
FISH					
*American Eel	<i>Anguilla rostrata</i>	G4	NYA	SNR	Spawn in the Atlantic Ocean, and migrates to fresh water and estuaries

Table 4-1. Priority 1 Species at Risk (USFWS Federal SOC) with Potential to Occur at MCB Camp Lejeune (Cont'd)

COMMON NAME	SCIENTIFIC NAME	GLOBAL RANK ¹	IUCN ²	STATE STATUS ³	HABITAT
BIRDS					
Bachman's Sparrow	<i>Aimophila aestivalis</i>	G3	NT	SC	Open longleaf pine forests, old fields [breeding season only]
Eastern Henslow's Sparrow	<i>Ammodramus henslowii susurrans</i>	G4	NT	SC	Clearcut pocosins and other damp weedy fields [breeding season only]
Black Rail	<i>Laterallus jamaicensis</i>	G4	NT	SC	Brackish marshes, rarely fresh marshes [breeding season only]
Eastern Painted Bunting	<i>Passerina ciris ciris</i>	G5T3T4	NT	SC	Maritime shrub thickets and forest edges [breeding season only]
Wayne's Black-Throated Green Warbler	<i>Setophaga virens waynei</i>	G5T3	LC	NL	Unflooded bottomland hardwood forest, often mixed with Atlantic white cedar or cypress
INVERTEBRATES					
Buchholz's Dart Moth	<i>Agrotis buchholzi</i>	G1Q	NYA	NL	Forested wetland, scrub-shrub wetland, pine lowlands
Crystal Skipper	<i>Atrytonopsis new sp 1</i>	G2G3Q	NYA	NL	Found along primary and secondary sand dunes with its host plant, seaside little bluestem (<i>Schizachyrium littorale</i>)
Venus Flytrap Moth	<i>Hemipachnobia subporphyrea</i>	G1	NYA	NL	Longleaf pine uplands in large "stands" of Venus fly traps
PLANTS					
Savanna Onion	<i>Alliums sp.1</i>	G1G2	NYA	NL	Wet savannas
Carolina Spleenwort	<i>Asplenium heteroresiliens</i>	G2	NYA	E	Coquina limestone outcrops
Many-flower Grass-pink	<i>Calopogon multiflorus</i>	G2G3	NYA	E	Savannas
Venus Flytrap	<i>Dionaea muscipula</i>	G3	NYA	SC	Savannas, seepage bogs, pocosin edges
Bay Boneset	<i>Eupatorium paludicola</i>	G2	NYA	T	Cypress savannas, clay-based bays, and small depressions ponds
Thin-wall Quillwort	<i>Isoetes microvela</i>	G1	NYA	T	Emergent riverbanks, calcareous influenced riverbanks
Pondspice	<i>Litsea aestivalis</i>	G3?	NYA	SC	Limesink ponds, other pools
Boykin's Lobelia	<i>Lobelia boykinii</i>	G2G3	NYA	E	Depression ponds and meadows and clay-based cypress savannas

Table 4-1. Priority 1 Species at Risk (USFWS Federal SOC) with Potential to Occur at MCB Camp Lejeune (Cont'd)

COMMON NAME	SCIENTIFIC NAME	GLOBAL RANK ¹	IUCN ²	STATE STATUS ³	HABITAT
PLANTS(Cont'd)					
Loose Water-milfoil	<i>Myriophyllum laxum</i>	G3	NYA	E	Limesink ponds, waters of natural lakes
Carolina Grass-of-parnassus	<i>Parnassia caroliniana</i>	G3	NYA	T	Wet savannas
Pineland Plantain	<i>Plantago sparsiflora</i>	G3	NYA	T	Wet savannas
Awed Meadow-beauty	<i>Rhexia aristosa</i>	G3G4	NYA	SC	Clay-based Carolina bays and limesink ponds
Swamp Forest Beaksedge	<i>Rhynchospora decurrens</i>	G3G4	NYA	T	Swamp forests
Coastal Beaksedge	<i>Rhynchospora pleiantha</i>	G3	NYA	T	Limesink ponds
Thorne's Beaksedge	<i>Rhynchospora thornei</i>	G3	NYA	SC	Wet savannas
Grassleaf Arrowhead	<i>Sagittaria weatherbiana</i>	G3G4	NYA	E	Fresh to slightly brackish marshes, streams, swamps, and pond margins
Smooth-seeded Hairy Nutrush	<i>Scleria sp. 1</i>	G2G3	NYA	NL	Pine savannas over limestone, diabase glades
Spring-flowering Goldenrod	<i>Solidago verna</i>	G3	NYA	NL	Mesic to moist pinelands, pocosin ecotones
Coastal Goldenrod	<i>Solidago villosicarpa</i>	G1	NYA	E	Edges and openings in maritime upland forests
Carolina Least Trillium	<i>Trillium pusillum</i> var. <i>pusillum</i>	G3T2	NYA	E	Ecotones between savannas and nonriverine wet hardwood forests, over marl

Source: NCNHP, 2014

- 1.*American eel (*Anguilla rostrata*) is a Federal SOC that occurs in the waters surrounding MCB Camp Lejeune.
2. Global Rank: G1=Critically Imperiled, G2=Imperiled, G3=Vulnerable, G4=Apparently Secure, G5=Secure, ?=Status uncertain
3. IUCN: EN=Endangered, VU=Vulnerable, NT=Near-Threatened, LC=Least Concern, NYA=Not Yet Assessed
4. NC State Status: E=Endangered, T=Threatened, SC=Species of Concern, NL=Not Listed.

actions directed at other listed species, such as RCW, that will be continued under this plan. Much of the management that benefits SAR meets other obligations under the Endangered Species Act (see Section 4.1.2).

The Land and Wildlife Resources section oversees SAR management at MCB Camp Lejeune. Staff biologists primarily engage in the inventory and monitoring of SAR populations to establish a baseline for abundance and distribution to monitor trends in populations. Staff biologists work in cooperation with foresters and wildland fire managers to incorporate SAR habitat management into annual forest management and prescribed burn plans. Such activities are essential to meet annual SAR management goals.

4.1.5.3 Species At-Risk and Their Ecosystems

LONGLEAF PINE UPLANDS, SAVANNAS, FLATWOODS, PINE-OAK SANDHILLS, ECOTONES

Longleaf pine currently occupies approximately 3 percent of its historic range. Widespread loss and degradation of habitat have imperiled many species that are endemic to longleaf pine ecosystems. However, decades of ecosystem restoration and maintenance at MCB Camp Lejeune has led to the conservation of approximately 14,000 acres of longleaf pine landscape on the installation. The use of prescribed fire, with an emphasis on growing-season burns, is critical to the management and conservation of SAR in longleaf pine ecosystems. Prescribed fire maintains an open, grassy understory with plenty of sunlight and little competition from pyrophobic plants (e.g., loblolly pines, hardwoods).

Wiregrass dominates such understories and comes to seed only as a result of burns conducted in the growing season when competing woody undergrowth is budding and most vulnerable. Though some species (e.g., RCW) can persist in longleaf pine ecosystems that are maintained with mechanical treatments, most Priority 1 SAR prefer sites that are burned regularly, approximately on a 3-year rotation.

The understory of grassy, fire-maintained longleaf pine savannas and associated ecotones provides habitat for several Priority 1 species, including Bucholz's dart moth (*Agrotis buchholzi/carolina*), many-flower grasspink (*Calopogon multiflorus*), Savanna onion (*Allium species I*), Carolina grass-of-parnassus (*Parnassia caroliniana*), pineland plantain (*Plantago sparsiflora*), Smooth-seeded hairy nutrush (*Scleria species I*), spring-flowering goldenrod (*Solidago verna*), Thorne's beaksedge (*Rhynchospora thornei*), Carolina least trillium (*Trillium pusillum*), and Venus flytrap (Figure 4-17). The Venus flytrap moth (*Hemipachnobia subporphyrea*) is known to occur in densely populated Venus flytrap communities and has potential to occur on MCB Camp Lejeune.

Some Priority 1 plants, such as the many-flower grasspink and grass-of-parnassus, are heavily fire-dependent, and blooming is increased by the occurrence of fire. Frequent, growing-season fire also maintains the habitat components that Priority 1 animal species require throughout their life cycles. These species include Carolina gopher frog, mimic glass lizard (*Ophisaurus mimicus*), southern hognose snake (*Heterodon simus*), eastern diamondback rattlesnake, and



Figure 4-17. Modified “flytrap” leaves of Venus flytrap

Bachman's sparrow (*Peucaea aestivalis*). Frequent fire benefits Priority 1 animal species by maintaining an open, grassy understory that:

- Connects habitat and promotes movement,
- Allows for genetic and demographic exchange,
- Improves food resources and breeding habitat, and
- Enables at-risk species to compete and avoid predation.

Additionally, frequent fire encourages the continuous recruitment of young longleaf pines and the long-term development of diverse size-classes of trees. The resulting environment promotes the occurrence of large, longleaf stump holes and downed logs that some at-risk amphibians and reptiles inhabit throughout most of their lives.

SMALL DEPRESSION PONDS IN LONGLEAF PINE ECOSYSTEMS

Small Depression Ponds within longleaf pine ecosystems host endemic flora and fauna that are found in no other habitat. The use of prescribed fire in ecosystem management benefits Priority 1 plant SAR that exclusively live in this habitat. Species that occupy these wetlands include bay boneset (*Eupatorium paludicola*), Boykin's lobelia (*Lobelia boykinii*), coastal beaksedge (*Rhynchospora pleiantha*), loose water-milfoil (*Myriophyllum laxum*), pondspice (*Litsea aestivalis*), grassleaf arrowhead (*Sagittaria weatherbiana*), and awned meadow-beauty (*Rhexia aristosa*). Prescribed fire also maintains the breeding habitat of the Carolina gopher frog, which reproduces exclusively in these ponds.

SALT MARSHES AND ESTUARIES

MCB Camp Lejeune's salt marshes and estuaries provide habitat for several SAR, including diamondback terrapin (*Malaclemys terrapin*) and black rail (*Laterallus jamaicensis*). Diamondback terrapins forage in salt marshes and estuaries, and they nest in sandy areas near the edge of the marsh. Black rails occupy the elevated zones of salt marshes, also referred to as "high marsh," which receive infrequent tidal inundation. Although black rails have not yet been detected on installation, potential salt marsh habitat occurs on the sound side of Brown's Island and Onslow Beach.

MARITIME ECOSYSTEMS

Maritime oak hammocks and shrub thickets provide habitat for eastern painted bunting (*Passerina ciris*), southern hognose snake, and eastern diamondback rattlesnake. While the hognose snake and rattlesnake typically inhabit longleaf pine ecosystems, the eastern painted bunting primarily inhabits maritime oak hammocks and shrub thickets. On MCB Camp Lejeune, these ecosystems occur only on the barrier islands, at the mouth of tidal creeks, and along the

AIWW. The crystal skipper (*Agrotis species I*) is endemic to two barrier islands immediately north of Onslow Beach. Potential habitat occurs in the primary and secondary dunes of Onslow Beach and Brown's Island.

Coastal goldenrod also lives in maritime-influenced ecosystems. This rare plant occurs in only a few locations on MCB Camp Lejeune. Though coastal goldenrod occurs under moderately dense to dense canopies of oak, hickory, and pine, it thrives in sunlight and is often found in open understories. Unlike longleaf pine ecosystems, maritime hammocks and shrub thickets do not require prescribed fire or other active management; hurricanes and large storms provide disturbance that allows maritime ecosystems to thrive.

SWAMP FORESTS, RIPARIAN AREAS, AND OTHER BOTTOMLAND HARDWOOD FORESTS

At-risk species such as thin-wall quillwort (*Isoetes microvela*), Carolina spleenwort (*Asplenium platyneuron*), swamp forest beaksedge (*Rhynchospora decurrens*), and Wayne's black-throated green warbler (*Setophaga virens wayneii*) occur in swamp forest, riparian areas, and other bottomland hardwood forests. Thin-wall quillwort is found along streams that occur under the shade of deciduous swamp forests and is strongly influenced by storm-induced flooding. It grows in sandy alluvium or seasonally exposed riverbanks. Carolina spleenwort occurs on limestone and marl outcroppings in dense hardwood forest. Swamp forest beaksedge occurs in swamp forests (including cypress swamps), marshy shores, and floodplains. Wayne's black-throated green warbler breeds in the headwaters of unflooded, black gum-dominated swamp forests.

4.1.5.4 Species at Risk Conservation Goals and Measures

GOAL: MCB Camp Lejeune will continue ecosystem management to the benefit of all species, including SAR, to ensure long-term support of the installation mission by engaging in management activities to prevent impacts that could lead to listing of the species as threatened or endangered.

OBJECTIVE SAR1: Identify, monitor, and manage SAR, and the habitats in which they occur.

- **Action 4.1-38:** *Conduct SAR inventories prior to land-disturbing activities that may threaten their occurrence. When consistent with the military mission, avoid and minimize impacts to SAR through the NEPA process.*
- **Action 4.1-39:** *Monitor SAR populations on the Installation in collaboration with the USFWS and NCWRC.*
- **Action 4.1-40:** *Implement ecosystem management practices that support the conservation and management of habitat for SAR.*

4.1.6 Marine Mammals

As described in Section 4.1.2 Threatened and Endangered Species, the waters offshore of MCB Camp Lejeune are habitat for several endangered marine mammal species. In addition to the marine mammals listed under the ESA, non-listed marine mammal species also inhabit the waters surrounding MCB Camp Lejeune.

All marine mammals, including those not listed under the ESA, are protected by the MMPA. The MMPA prohibits the taking of marine mammals and defines "take" as "the act of hunting, killing, capture, and/or harassment of any marine mammal; or, the attempt at such." Harassment is defined under MMPA as "any act of pursuit, torment or annoyance which has the potential to either: a.) injure a marine mammal in the wild, or b.) disturb a marine mammal by causing disruption of behavioral patterns, which includes, but is not limited to, migration, breathing, nursing, breeding, feeding, or sheltering."

During a survey conducted by the Duke University Marine Laboratory between 2010 and 2013 (Read et al, 2014), bottlenose dolphins (*Tursiops truncatus*) and spotted dolphins (*Stenella frontalis*) were the only marine mammals detected. Bottlenose dolphins were the only species encountered in the New River and AIWW and were most common nearshore in ocean surveys. Spotted dolphins were only encountered in the ocean and were generally found further off shore than bottlenose dolphins.

In May of 2011, NMFS issued a letter of concurrence stating that Marine Corps training activities at MCB Camp Lejeune are not likely to result in take of marine mammals, provided that a number of mitigation and monitoring measures are implemented. Those measures, which have been incorporated into MCIEAST/MCB 3510.1C (Range SOP), are detailed in Appendix 10.

For projects that may affect marine mammals, MCB Camp Lejeune staff will support development of projects through participation in the planning and design process. Relative impacts of projects and alternatives will be evaluated, and potential avoidance and mitigation measures will be identified. Where appropriate, NMFS input will be solicited during the design process.

4.1.6.1 Marine Mammals Conservation Goals and Measures

GOAL/OBJECTIVE MAR1: Support coastal initiative efforts through impact and avoidance minimization.

- **Action 4.1-41:** *Minimize impacts on endangered species and marine mammals through involvement with the project planning and design process.*
- **Action 4.1-42:** *Evaluate the relative impacts of project alternatives on federally-listed species/marine mammals and identify potential impact mitigation measures.*

- **Action 4.1-43:** *Solicit NMFS/USFWS input during the planning and design phases through ESA/MMPA consultations.*

4.2 FOREST MANAGEMENT

Forest management on MCB Camp Lejeune involves many components, including the support of the military mission, maintenance and enhancement of the ecological integrity of forestlands, compliance with all environmental laws and regulations, and generation of revenue to support active forest ecosystem management (Figure 4-18). The forestland on MCB Camp Lejeune has been under professional forest management since 1946. Currently, there are approximately 90,000 acres of commercial forestland on MCB Camp Lejeune. Portions of MCB Camp Lejeune, such as the G-10, K-2, and BT-3 impact areas, are used exclusively for military training. These areas are not considered commercial forestland.

The Forest Management Section has always provided, and will continue to provide, a forested environment that meets the needs of the military mission and sustains an optimum yield of forest products while complying with all applicable laws, regulations, and orders.

4.2.1 Forest Management Actions

Activities conducted by the Forest Management Section are divided into two major categories: planning and implementation. Planning involves: (1) data collection for approximately 10 of 91 compartments annually; (2) development of the Annual Silvicultural Prescription Plan (ASPP); (3) coordination of the ASPP with other land managers and land use organizations; and 4) compliance with applicable laws, regulations, and orders.

Implementation of the ASPP includes development, timber marking, volume computation, harvesting inspections, and closure procedures on 5 to 7 timber sales annually on an estimated 1,500 to 2,500 acres. In addition, implementation includes forest access road construction, repair, and maintenance, as well as maintaining the subject GIS geodatabase feature classes that support forest management activities.



Figure 4-18. MCB Camp Lejeune provides a continuous flow of quality forest products, the sale of which supports the Forest Management Program.

The ASPP guides the professional management of the forest ecosystems aboard MCB Camp Lejeune. Forest management activities require close coordination with natural resource managers and military training planners to ensure that forest management plans benefit both the military training mission and ecosystem management goals and requirements. The ASPP is a prescription plan developed annually, but it may take several years to implement. Silvicultural prescriptions are based on immediate needs, future desired conditions, and the overall health of the forest.

Forest compartments will be treated on a 10-year prescription cycle. Changes in forest management requirements for RCW habitat will be addressed outside of the 10-year prescription cycle. Forest management will be consistent with the recommendations in the USFWS 2003 RCW Recovery Plan with respect to size of clear-cuts and acceptable silvicultural techniques (Figure 4-19). Silvicultural systems utilized on MCB Camp Lejeune are discussed in Appendix 8.

Figure 4-20 shows a map of MCB Camp Lejeune compartments. The compartment prescription schedule and associated fiscal year entry schedule, to be included in the ASPPs for the next 5 years, is found in Table 4-2. The ASPP has the flexibility necessary to meet land management requirements and address unforeseeable events that may impact the forest ecosystems. As such, the compartment entry schedule may change to meet current management objectives. The current and past ASPPs are available for review upon request.

4.2.1.1 Timber Harvest and Sales

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



Figure 4-19. RCW cavity tree. Environmental Conservation Branch supporting the military mission through consultation with the USFWS to relocate RCW cavities, facilitating range development and expansion projects.

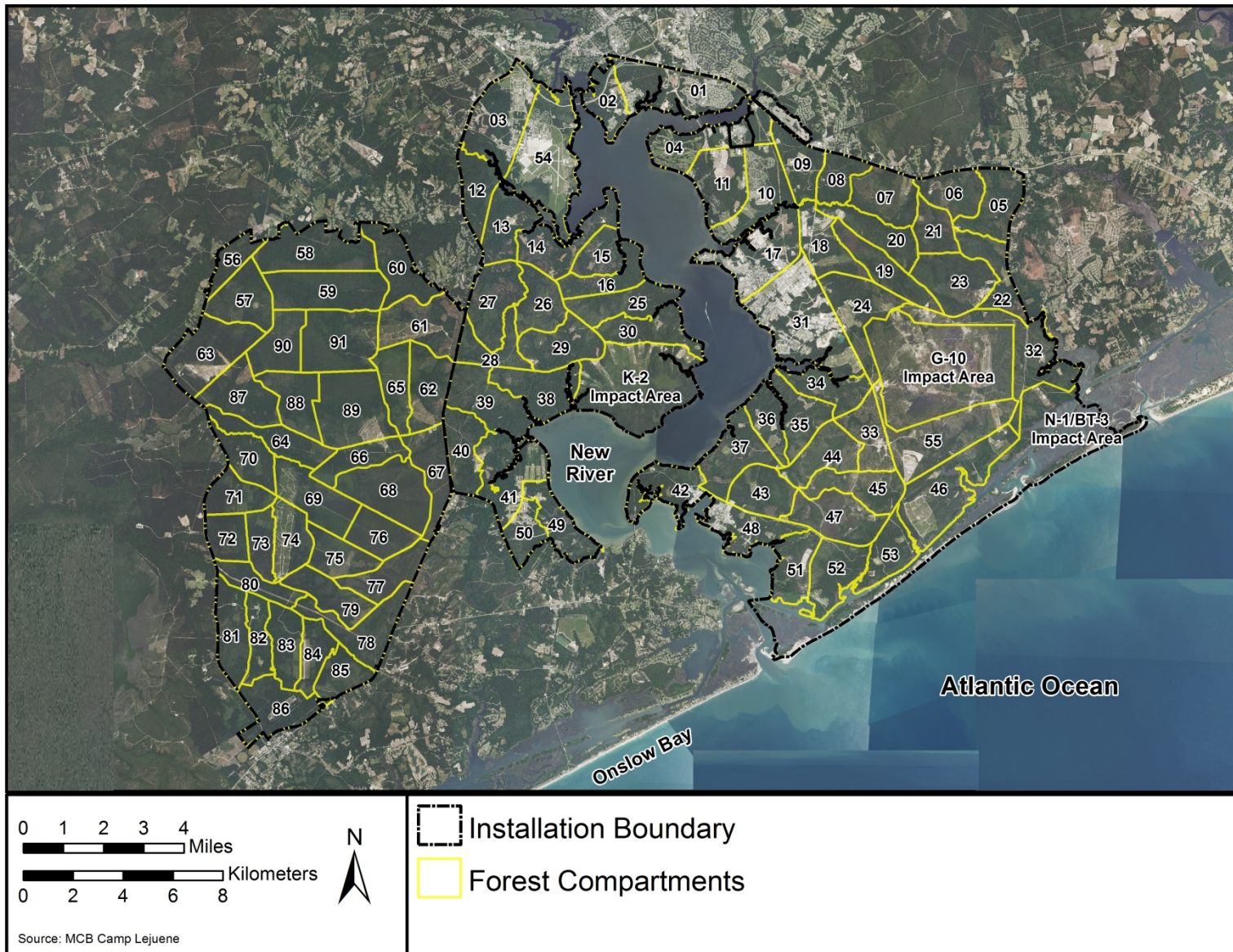


Figure 4-20. MCB Camp Lejeune compartment map

Table 4-2. Compartment Entry Schedule for Development of the ASPP

FISCAL YEAR	COMPARTMENT
2015	20, 23, 39, 40, 45, 47, 56, 59, 77
2016	19, 25, 28, 30, 35, 46, 60, 63, 86
2017	7, 27, 33, 49, 50, 51, 55, 70, 71, 72
2018	16, 18, 21, 29, 34, 37, 41, 67, 78, 81
2019	14, 15, 22, 31, 44, 53, 64, 73,83

4.2.1.2 Forest Regeneration

MCB Camp Lejeune will continue to restore and enhance longleaf pine communities on Mainside and in the Verona Loop training areas to their historic range due to the importance of longleaf pine to RCW and wildland fire management. The number of acres and locations selected for restoration to longleaf pine may vary from year to year depending on mission requirements, RCW habitat requirements, the number of acres available for conversion, and the number of acres currently in longleaf regeneration.

Restoration and enhancement of longleaf pine-dominated communities will continue on sites where they historically occurred, as determined by the Ecological Classification System and Land Type Phases. The Ecological Classification System and Land Type Phases are summarized in Section 2.2 and fully described in Appendix 5. Longleaf pine restoration involves reintroducing longleaf pine to sites where the current species is truly off-site. MCB Camp Lejeune has defined off-site as those sites where a species other than longleaf pine occupies Land Type Phases 902, 1101, 1102, 1103, or 1302. These Land Type Phases will be given priority when converting off-site species to longleaf pine; however, other Land Type Phases that historically contained longleaf pine may be converted. These Land Type Phases include 401, 402, 601, 602, 901, 1001, 1002, 1301, 1303, and 1304.

Existing longleaf pine will be retained when stands that are predominately off-site species are converted. Where the residual timber is of the quality desired for a seed source and the Land Type Phase is appropriate, natural regeneration will be the preferred stand replacement method. Natural regeneration techniques are less labor intensive and more cost effective, and they often produce healthier stands that are better matched to the site. Artificial regeneration will be used in areas where longleaf restoration is desired or where a suitable seed source is not available. Cantonment areas and Land Type Phases that historically contained a minimal amount of longleaf pine and are in need of regeneration may be regenerated naturally or artificially with loblolly pine and/or hardwoods, depending on the suitability of the site.

Current research has shown that seedling stock should be from seed collected as close to the planting site as possible (Figure 4-21). Ideally, MCB Camp Lejeune will utilize planting stock consisting of containerized longleaf seedlings that are contract-grown from seed locally collected

on Base by ECON personnel. In the event seed is unable to be collected, local containerized longleaf seedlings will be used.

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

In regenerated pine stands, mechanical methods of pre-commercial thinning are used to reduce higher than desired stocking levels (tree density). Mechanical methods such as drum chopping or the Hydro-ax mower (Figure 4-22) are used to reduce competition for seedlings, improve wildlife habitat, and help eliminate the buildup of forest fuels during the period the seedlings are most susceptible to damage from intense wildfire. The work is generally accomplished before the seedlings/saplings reach a height greater than 5 ft. If regeneration is taller than 5 ft. or in the case of hardwood regeneration where a specific species is desired over other species, work is accomplished by manual or gas-powered hand tools.



Figure 4-21. (Left) A tree shaker is utilized for longleaf pine cone collection. Figure 4-22. (Right) Drum chopping with a follow-up site preparation burn is a low intensity form of site preparation used on MCB Camp Lejeune.

Site Preparation

Adequate preparation of the site to be regenerated is key to a successful stand regeneration effort. A well-prepared site provides for control of shade tree species, root competition, and soil moisture, all of which are critical in the establishment and growth of intolerant species such as longleaf pine and hard mast producing hardwoods.

The least intensive site preparation method will be applied to each regeneration site. Site preparation methods, by general level of intensity, are identified in Table 4-3. Any combination of natural, mechanical, or chemical methods may be used depending on site conditions. The

methods chosen will be site-specific, and many natural resource management concerns such as undesirable impacts to native vegetation and archeological sites will also be considered.

Archaeological sites that are listed or may be eligible for listing on the National Register of Historic Places (NRHP) will not be degraded as a result of forest management activities. Through consultation and coordination with the North Carolina Office of State Archaeologist (OSA) and North Carolina State Historic Preservation Office (SHPO), all high probability soils at MCB Camp Lejeune have been surveyed to identify archaeological sites, and all sites have been evaluated for NRHP eligibility. Review of the ASPP will identify the location of any archaeological sites that have been listed or determined eligible for listing in the NRHP and will determine if any these sites may be affected by site preparation, fireline construction, skid trails, and the construction of new forest access roads and logging decks. Close day-to-day coordination between Forest Management and Cultural Resource Management sections will be conducted to ensure that significant impacts to NRHP eligible or listed archaeological sites resulting from forest management practices are eliminated.

Midstory Management

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



Figure 4-23. Ideally, prescribed fire is the only maintenance needed for regenerating longleaf stands.

Table 4-3. Examples of Site Preparation Methods by Level of Intensity

LEAST INTENSE				MOST INTENSE			
No Site Prep.	Burn	Drum Chop, Burn	KG Blade, Drum Chop, Herbicide, Burn	KG Blade, Root Rake, Herbicide, Burn	KG Blade, Burn, Bed	KG Blade, Root Rake, Bed	KG Blade, Drum Chop, Root Rake, Bed

Pest Management

Diseases that affect forest trees on MCB Camp Lejeune are not considered to be problematic. Fusiform rust, caused by the fungus *Cronartium fusiforme*, is the most common disease infecting southern pines in the MCB Camp Lejeune area. The disease attacks several southern pine species and can be especially damaging to slash pine and loblolly pine. Cankers on limbs of the diseased tree are not normally a problem. Cankers, formed on the boles of older trees, however, reduce growth, reduce market value, and weaken the stems until breakage in windstorms becomes likely. Infested trees are generally removed during normal silvicultural thinning operations.

The Southern Pine Beetle (SPB) is an insect pest in southern forests that has historically caused extensive damage, on a periodic basis, to forest resources on MCB Camp Lejeune (Figure 24). The SPB is always present but causes major problems only when its population levels increase substantially. These population increases are normally in response to stress placed on trees from drought, windstorms, or hurricanes. Maintaining healthy, vigorously growing trees is the best management course for prevention of SPB outbreaks. The Forest Protection staff annually conducts SPB surveys during the summer. If any infestation sites are identified, control measures are then recommended and implemented accordingly. Additionally, MCB Camp Lejeune actively manages a gypsy moth (*Lymantria dispar*) trapping program in cooperation with the Forest Pest Management Field Office, USFS in Asheville, North Carolina. Each summer, gypsy moth traps, provided by the Forest Pest Management Field Office, are deployed and monitored in recreation and housing areas at MCB Camp Lejeune. Since 2005, forestry personnel have trapped one confirmed and one suspected gypsy moth. No defoliations have been documented to date.



Figure 4-24. Southern Pine Beetle spot. 2005

4.2.2 Forest Management in Support of Proposed Off-road Maneuver Range Development

The ongoing process of planning and designing tactical vehicle maneuver ranges on GSRA precludes the identification of suitable longleaf pine restoration sites at this time. In order to avoid inefficient and ineffective resource allocation, longleaf pine restoration on GSRA will be

put on hold pending completion of the range planning and design process. Potential longleaf restoration sites on GSRA will be reevaluated upon completion of the planning/design process or at the end of the 5-year INRMP period, whichever comes first. Prescribed burning for ecosystem restoration and fuel reduction will continue on GSRA during the interim planning period. MCB Camp Lejeune will continue to implement timber stand improvement projects to increase existing pine stand productivity and reduce fuel levels on GSRA.

Timber stand improvement projects, prescribed burns, and other vegetation management projects will be adjusted as necessary to establish and maintain TVMC and BCTMC training standards for cover, concealment, speed, and mobility. Forest management plans will be updated to reflect changes in management.

4.2.3 Forest Conservation Goals and Measures

GOAL/OBJECTIVE FOR1: Manage forests to support the military mission and promote a healthy and natural forest ecosystem.

- **Action 4.2-01:** *Develop and implement the ASPP.*
- **Action 4.2-02:** *Restore and manage longleaf pine to its historic range, in accordance with the 2003 RCW Recovery Plan, when appropriate and consistent with the military mission.*
- **Action 4.2-03:** *Align forest management practices with the military mission through coordination and planning, ensuring forest management practices are accomplished while eliminating or minimizing negative impacts to the military mission.*

GOAL/OBJECTIVE FOR2: Promote responsible timber harvesting.

- **Action 4.2-04:** *Follow Best Management Practices (2006 NC Div Forest Resources) for all forestry-related activities.*
- **Action 4.2-05:** *Monitor timber harvest and regeneration operations to ensure contract requirements are met.*

GOAL/OBJECTIVE FOR3: Manage for multiple uses of forest lands.

- **Action 4.2-06:** *Provide a forested environment that meets the needs of the military mission and provides accessibility for recreation opportunities, while ensuring compliance with applicable laws, regulations, and orders.*
- **Action 4.2-07:** *Provide an optimum yield of sustainable forest products.*

4.3 WILDLAND FIRE MANAGEMENT

4.3.1 Prescribed Fire

Historically, fire was the single most important natural process that shaped the landscape of the Southeastern Coastal Plain. Natural ignitions, mainly from lightning strikes, and fires started by Native Americans, provided the source for fires that burned much of the landscape, generally at 1 to 3-year intervals. These fires, with their short return intervals, were responsible for maintaining very open, park-like expanses under what was then a longleaf pine overstory (Figure 4-25). The ecosystems which flourished under these conditions were fire-maintained and in some cases actually required fire for some portion of its lifecycle. Early settlers continued the Native American practice of burning woodland to clear underbrush and improved grazing for their cattle. Today, forest managers use prescribed burning to mimic the historic role of fire in the southern pine woodland.



Figure 4-25. (Left) The herbaceous understory shown in this longleaf stand has been well maintained with prescribed burning. Figure 4-26. (Right) Prescribed fire is used as a tool to meet natural resource goals and objectives.

Fire-maintained stands of longleaf pine typify the historic southern pine woodland. Prescribed burning is one of the most important treatments that natural resource managers in the southeast can apply in terms of time, cost, and effectiveness. Fire has many beneficial uses, including ecosystem restoration, maintenance of threatened or endangered species habitat, maintenance of quality browse for wildlife, reduction of forest fuels available to wildfires, site preparation for forest regeneration, and reduction in the amount of hardwood brush. While it is true that fire is a very important tool in the treatment of southern forests, there are some impacts that may be of concern. Fire affects the aesthetic quality of the burned area, has potential to affect growth on residual trees, generates smoke that may affect surrounding areas, and can potentially escape and become a wildfire (Figure 4-26).

Controlled burns are normally conducted on MCB Camp Lejeune in the dormant and growing seasons between the first of November and the end of July. Growing season burns are conducted primarily for hardwood and understory brush control, ecosystem restoration, and threatened and endangered species management.

There are approximately 83,000 acres of forest at MCB Camp Lejeune that receive some level of fuels management through prescribed fire or mechanical mastication. Every year the Forest Protection staff generates a Prescribed Burn Plan, with assistance from the other natural resource programs, to ensure that all priority areas (Figure 4-27) are identified. This cooperation allows for adaptive management and underscores the relative need for fire among the various habitats throughout the landscape. Priorities will be based on various factors such as time since last burn, RCW cluster maintenance, and RCW recruitment site preparation. This plan will assist in ensuring a suitable allocation of resources across the landscape for application of prescribed burning treatments. Burning will be conducted with the primary focus on restoration of the landscape to more closely mimic that of pre-settlement conditions.

Training ranges in GSRA will continue to be scheduled for annual prescribed burns because of the high occurrence of wildfires and the high potential of a catastrophic wildfire. Training ranges in Verona and Mainside will be scheduled on a 2-year cycle due to the lower potential for catastrophic wildfires. In order to maintain and improve the current training environment, while also working towards the goal of RCW recovery, MCB Camp Lejeune will be scheduled for prescribed burn treatments on a 3 to 5-year cycle. There will be more emphasis on prescribed fire frequency and growing season burns, especially in RCW sites, rather than total acres burned per year. The Forest Protection staff will also be pursuing aerial ignition as a tool to treat more areas with prescribed fire.

Before prescribed burning treatments, data on fuel loads, fuel conditions and smoke sensitive areas are collected for each of the treatment areas. Fuel loading describes the type and amount of vegetation available to sustain a fire. Fuel conditions describe the orientation of the fuels and fuel hazards. Smoke sensitive areas include population centers, hospitals, schools, highways, and recreational areas where smoke can negatively affect health, safety, and aesthetics. This data is factored into the annual Prescribed Burn Plan. Areas in which prescribed burning treatments will meet multiple objectives are given higher priorities. The North Carolina Forest Service's Smoke Management Guidelines are followed and coordinated with the District 4 office in New Bern, prior to actual ignition.

There are areas of MCB Camp Lejeune in which the understory fuels have not been maintained at the level required for effective prescribed burning to take place. Mechanical treatments, which involve mowing understory vegetation, will be used to restore these fire-neglected areas to a condition that will enable the reintroduction of prescribed fire. Mowing understory vegetation

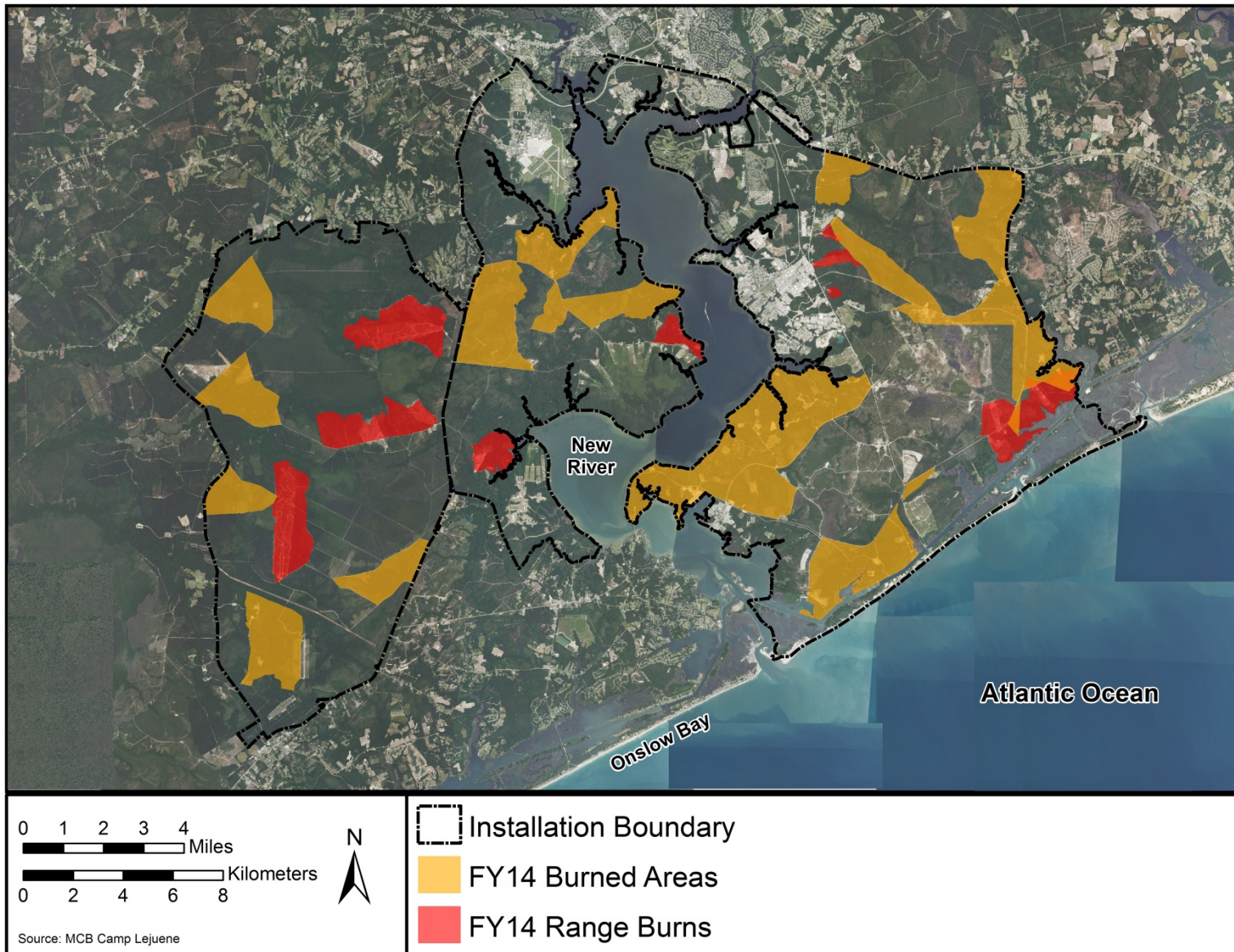


Figure 4-27. Areas prioritized for prescribed burn treatments. Red indicates range burns and yellow indicates areas of highest priority for burning.

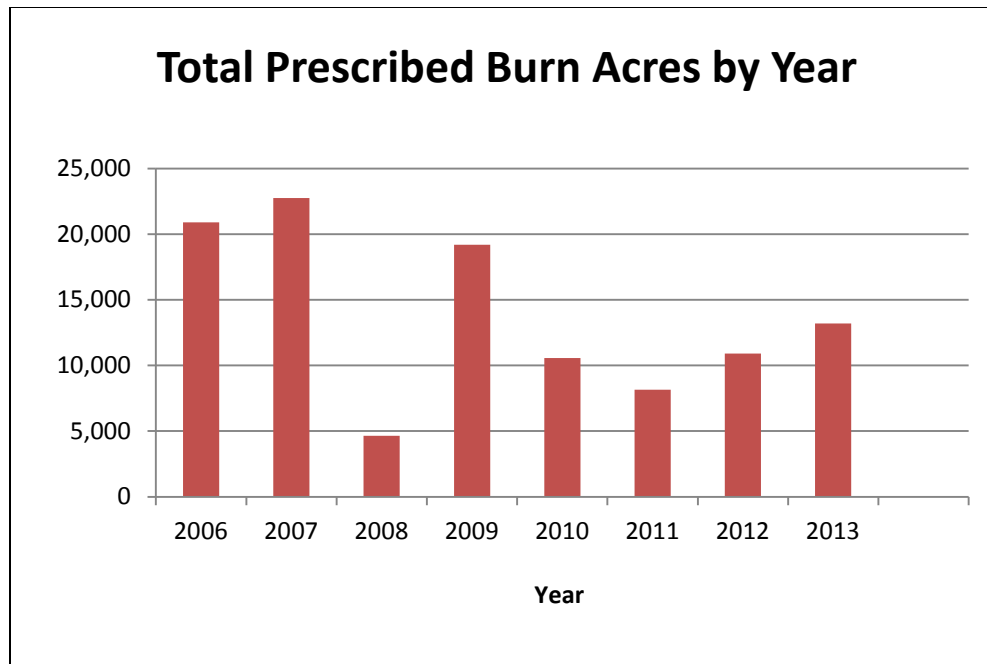


Figure 4-28. Prescribed burning acres at MCB Camp Lejeune from 2006-2013

changes the fuel orientation from vertical to horizontal, reduces shading of the fuel from the understory shrubs and brush, and allows for increased wind flow and drying of the fuels. Re-introduction of fire should enhance the understory and promote the development of an herbaceous ground layer. The annual prescribed burning acres accomplished for MCB Camp Lejeune for the period 2006-2013 is shown in Figure 4-28.

4.3.2 Wildfire Suppression

The primary function of MCB Camp Lejeune is the training of combat-ready Marines. As Marines train they use a number of pyrotechnic devices and fire incendiary rounds, resulting in the ignition of a large number of wildfires every year. The Forest Protection Program conducts prescribed burning across the MCB Camp Lejeune landscape to mitigate impacts from wildfires. The prescribed burning treatments help reduce the intensity of wildfires by reducing the amount of fuel available to a wildfire.

Trained and experienced initial attack personnel determine the appropriate suppression response to each individual wildfire based on threats to human life, property, natural resources, cultural resources, time of year, weather conditions, fuel conditions and other fire occurrences. Once a decision is made, the wildfire is directly suppressed, indirectly suppressed, or allowed to burn to containment. Sometimes a combination of these strategies is employed. Direct suppression involves construction of handlines, the use of tractor/plow units to construct firelines, and/or the use of wildland fire engines to minimize the size and spread of the fire.

Indirect suppression can involve any of the previous tactics plus the use of natural and/or manmade barriers to contain the spread of the fire to a predetermined size. Indirect suppression is often the only option in areas of MCB Camp Lejeune where UXO is present. Non-management ignited fires are allowed to burn to natural and/or existing manmade barriers when resources or property are not threatened and smoke from the fire is not likely to cause a problem in smoke sensitive areas. The decision to allow a non-management ignited fire to continue to burn can only be made by a qualified member of the Forestry staff and/or the MCB Camp Lejeune Fire Department. During the period of 2006-2013, the Base Forestry section responded to 670 wildfires, which burned a total of 32,786 acres. Some of these fires were allowed to burn to containment with limited suppression actions for natural resource benefit.

The management of hazardous areas in the wildland/urban interface was a goal in the 2007 INRMP in order to mitigate the potential for wildfire damage to private or installation property. The 2007 INRMP identified areas that were proposed for high priority fuels management. With the development of an additional live fire range in GSRA more areas have been identified as high priority. The proposed treatment area is highlighted in Figure 4-29. Proposed treatments consist of reducing pine stocking to 50 to 60 ft² of basal area and using mechanical treatments to reduce ground vegetation and shrubs in a ¼ mile buffer along the identified areas. The mechanical treatment will utilize a mowing machine to alter the orientation of the surface and shrub fuels from a vertical arrangement to a horizontal arrangement. Such treatment will limit wildfires to the surface and prevent transition of wildfire to the crowns of the standing timber. This treatment will provide defensible space for suppression forces to undertake control actions. Bottomland areas will be excluded from this treatment, as they are less of a fire hazard threat, to prevent damage to those fragile systems.

4.3.3 Wildland Urban Interface

Wildfire Management Plans address the threat of wildland fire to forested lands and neighboring communities and urban areas. MCB Camp Lejeune's Wildland Fire Management Plan (WFMP) (Appendix 7) describes the fire management program and the activities and methods used to ensure appropriate measures are taken, in both wildfire and prescribed fire, to enhance and maintain military training and natural resources. The ultimate intent of the WFMP is to:

- Reduce wildfire potential,
- Outline program safety,
- Protect and enhance natural resources,
- Integrate applicable state and local permit and reporting requirements, and
- Implement ecosystem management goals and objectives.

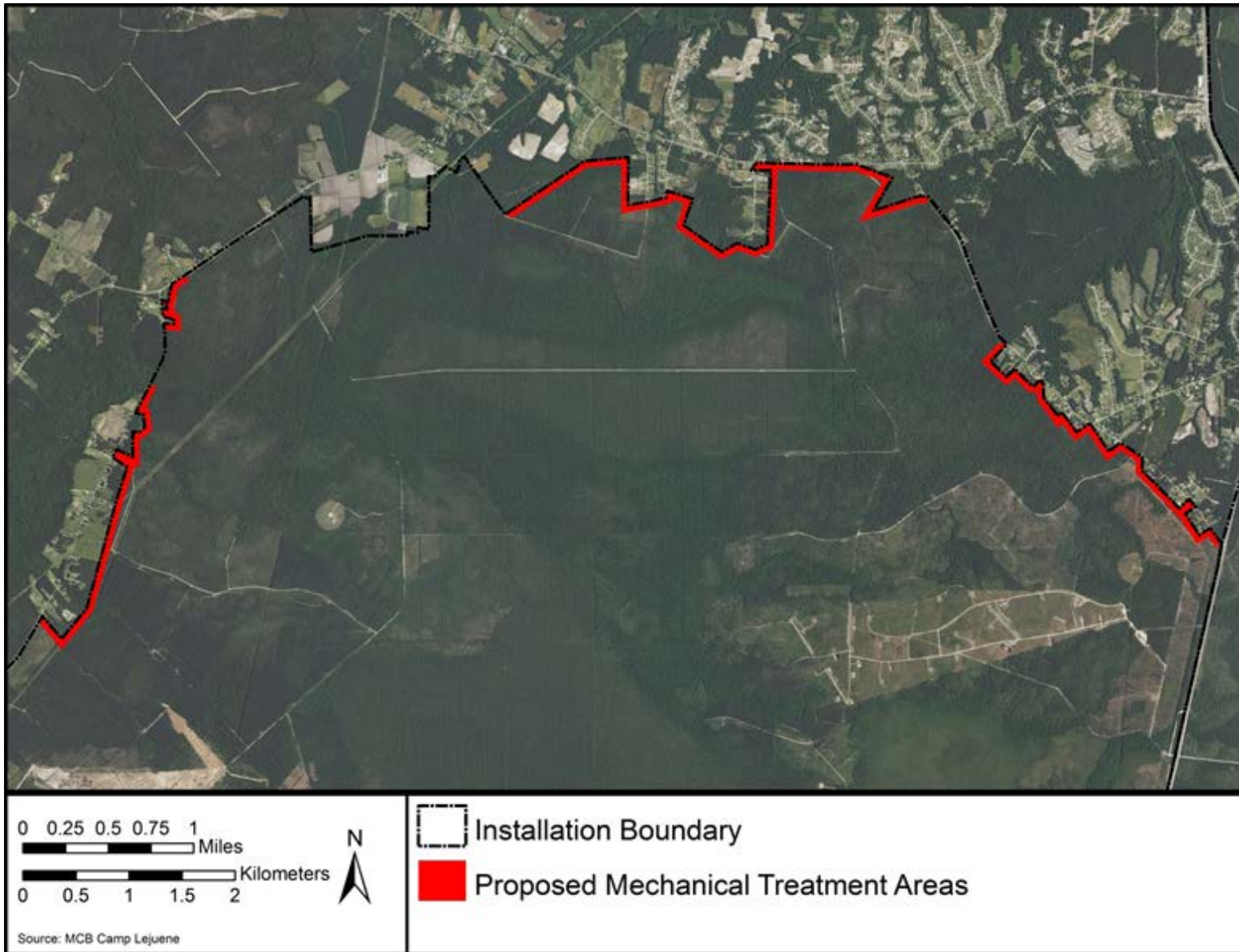


Figure 4-29. Proposed areas for mechanical fuels treatment in the northern GSRA

In order to sustain and enhance the high-quality training environment for current and future Marine Forces, the Base must have an effective wildland fire management program (BO 5090.113). 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 Forest Protection Program is responsible for assisting the Fire and Emergency Services Division in the control of wildfires and for the planning and implementation of the annual prescribed burn plan.

4.3.4 Wildland Fire Conservation Goals and Measures

GOAL/OBJECTIVE WLF1: Integrate prescribed fire with the military mission to support training and natural, healthy ecosystems.

- **Action 4.3-01:** *Implement annual prescribed burn plan.*
- **Action 4.3-02:** *Monitor long-term changes in landscape conditions.*

GOAL/OBJECTIVE WLF2: Manage forests to reduce loss of training time and potential damage to MCB Camp Lejeune and private property due to wildfire

- **Action 4.3-03:** *Implement Wildland Fire Management Plan.*
- **Action 4.3-04:** *Support the annual table-top exercise to coordinate incident management strategies in response to wildland fires at MCB Camp Lejeune.*

4.4 FISH AND WILDLIFE MANAGEMENT

4.4.1 Federal, State, and Other Regulations

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. 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) and continued to implement this policy in the 2013 INRMP Implementation Manual (DoDM 4715.03). The overarching goal of the policy for ecosystem management adopted from DoDM 4715.03 is:

“To ensure that military lands support present and future training and testing requirements while preserving, improving, and enhancing ecosystem integrity. Over the long term, this 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.”

Consistent with DoD and Marine Corps policy established to protect and conserve natural resources, MCB Camp Lejeune has established a “coordinated program of actions for conserving, enhancing, and regulating indigenous wildlife and its habitats, including conserving non-game species, managing and harvesting game species, and controlling animal damage.”

The NCWRC is the state government agency created by the General Assembly in 1947 to conserve and sustain the state’s fish and wildlife resources through research, scientific management, wise use, and public input. The mission of the NCWRC is to conserve North Carolina’s wildlife resources and their habitats and provide programs and opportunities that allow hunters, anglers, boaters; other outdoor enthusiasts to enjoy wildlife-associated recreation. In North Carolina, NC GS charge the NCWRC with stewardship of all wildlife resources. Under this statute, "no person may take, possess, buy, sell, or transport any wildlife - whether dead or alive, in whole or in part. Nor may any person take, possess, buy, sell, or transport any wildlife resources in violation of the rules of the NCWRC," except as specifically permitted (Article 22. Regulation of Wildlife § 113-291). Regulations pertaining to the protection of federally and state listed species are addressed in the Protected Species Management Section (Section 4.1).

Fish and wildlife management on MCB Camp Lejeune is based upon a landscape level approach focusing on habitats rather than individual species. This basic strategy to restore and maintain native landscapes in an ecosystem and adaptive management framework in support of military training benefits the widest range and diversity of both game and non-game species. Focusing management efforts on habitat components instead of individual species enables MCB Camp Lejeune to ensure the long-term sustainability and viability of all wildlife populations on the Installation.

4.4.2 Fishing Program

Fishing is one of the most popular forms of outdoor recreation in North Carolina. More than 2,000 fishing permits are sold each year on MCB Camp Lejeune. The quality of recreational fishing opportunity is dependent upon fisheries productivity, availability, and accessibility. Access to good fishing locations and properly managed fishing ponds can provide excellent fishing experiences for existing fishermen, and generate new interests in fishing by both children and adults. MCB Camp Lejeune offers managed ponds, fishing docks, piers, and boat launches that provide anglers access to freshwater and saltwater fishing areas on the Installation. There are four managed freshwater fishing ponds on MCB Camp Lejeune; Henderson Pond, Hickory Pond, Orde Pond, and a former borrow pit known as the Old Landfill Pond (Figure 4-30). The ponds provide a convenient opportunity for authorized personnel to engage in an outdoor pastime enjoyed by all ages.

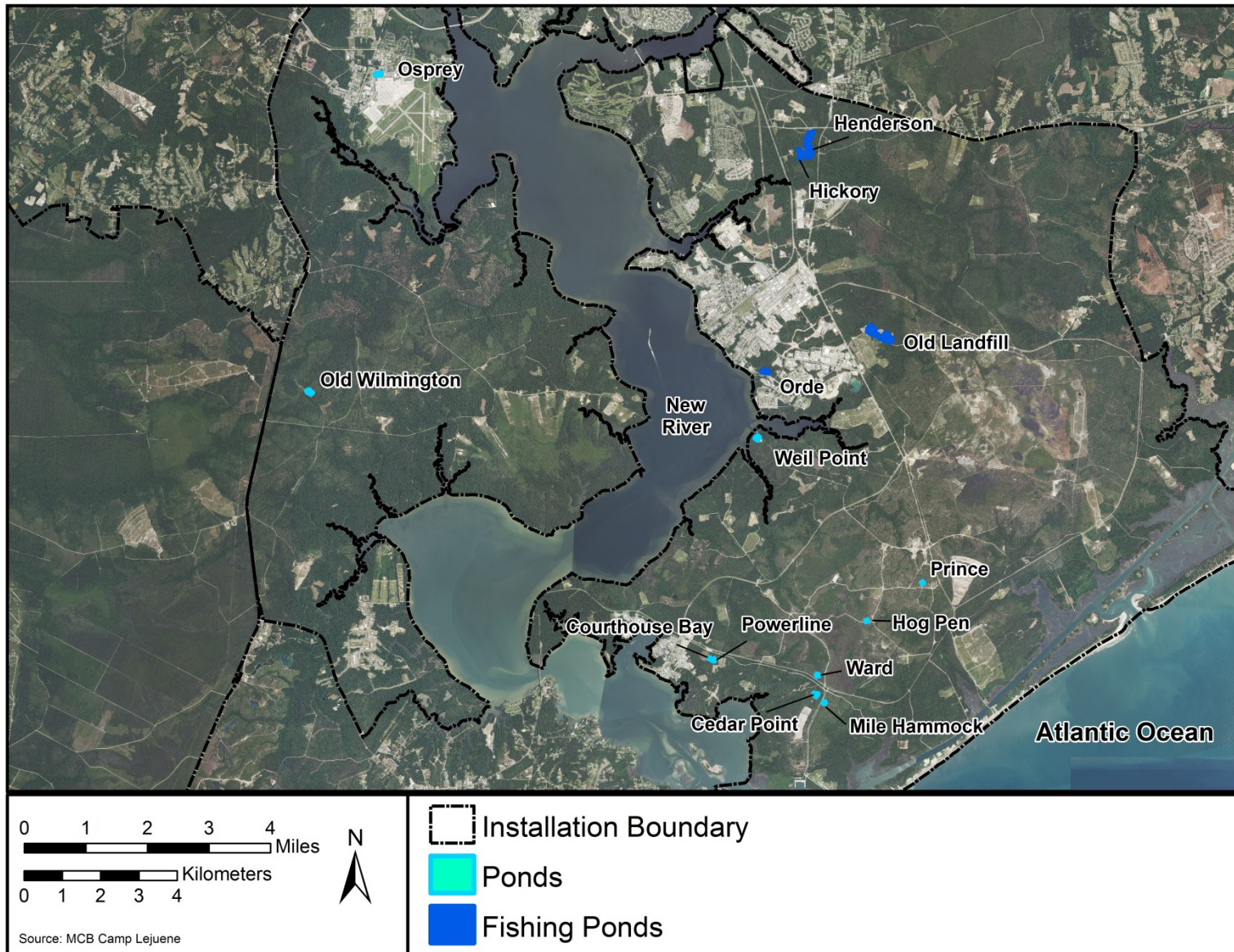


Figure 4-30. Freshwater fishing ponds on MCB Camp Lejeune

4.4.2.1 Fishing Pond Management

Maintenance of freshwater ponds is divided into a tiered strategy of focused, semi-natural, and native pond management actions, with an emphasis on focused pond management. Focused pond management includes fish stocking, aquatic weed control, pH balancing with lime, and fertilizer applications. Focused pond management and mowing the shoreline perimeter of ponds are management activities that are required to keep fishing ponds in ideal condition.

Fish Stocking

The Land and Wildlife Resources Section established the fishing ponds on the Installation and is responsible for their maintenance and management. Freshwater fishing ponds are stocked annually with game fish species that include largemouth bass (*Micropterus salmoides*), bluegill (*Lepomis macrochirus*), redear sunfish (*Lepomis microlophus*), and channel catfish (*Ictalurus punctatus*). Fisheries managers recommend these species, which have become widely accepted by fishing enthusiasts as desirable game fish, for stocking managed ponds.

Shoreline Mowing and Access Road Maintenance

Accessibility is an important component to fishing programs. Well-maintained access roads, adequate parking, and reasonable accommodations for convenient access to a number of places to fish encourage participation by fishermen of all skill levels and provide participants an atmosphere where they can fish and not feel crowded or imposed upon. Mowing shorelines around fishing ponds promotes and facilitates access, helps reduce exposure to insect pests, and provides an attractive area that satisfies a wide range of participants. Portions of shorelines are left unmowed around some ponds in order to limit stormwater runoff into ponds, reduce shoreline erosion, and improve habitat for young fish.

Aquatic Weed Control

Aquatic weeds in managed fishing ponds are generally undesirable. They interfere with fishing (especially shoreline fishing), take up nutrients needed for phytoplankton growth, and may cause depletion of dissolved oxygen if they die off suddenly. No single method will effectively control the range of aquatic weed species which may be encountered. Therefore, resource managers use a combination of methods shown to control aquatic weeds in ponds. Aquatic weeds are controlled by stocking ponds with fish that consume vegetation, pond fertilization, and the use of approved aquatic herbicides. Triploid grass carp are a sterile form of white amur carp (*Ctenopharyngodon idella*) commonly stocked by wildlife staff as needed to control a wide variety of submersed aquatic weeds. Fertilization produces a phytoplankton bloom that discourages most aquatic weeds by shading them out so that they cannot become established. Floating and emergent aquatic weeds and shoreline plant species such as algae, pondweed

(*Potamogeton* spp.), water lily (*Nymphaea* spp.), bladderwort (*Utricularia* spp.), cattail (*Typha* spp.), sedges, and alligator weed (*Alternanthera philoxeroides*) are controlled with herbicides.

4.4.3 Game Management Program

MCB Camp Lejeune's game management program focuses on a variety of species including upland game birds, small game, big game, furbearers, and migratory waterfowl. Open hunting seasons for species within these groupings are controlled by state and federal regulations and are coordinated with Base programs and policy regulations. The lack of a specific management strategy for any given species does not detract from that species importance and contribution to ecosystem-level processes and planning.

4.4.3.1 Big Game Species

Big game species in North Carolina are white-tailed deer, wild turkey, and black bear. Deer and turkey are by far the most popular game species on the Installation, and approximately 2,000 hunters purchase permits to hunt these species every year. Reporting all game harvests is a requirement for authorized personnel hunting on MCB Camp Lejeune. Hunters must register any harvested deer, turkey, or bear with the NCWRC in accordance with established NC Big Game Reporting System requirements.

White-tailed Deer

White-tailed deer are the most frequently hunted game species on MCB Camp Lejeune. White-tailed deer are habitat generalists that use virtually every successional stage of all forest and grassland ecosystems on the Installation. The species is therefore common, and no habitat-specific measures are necessary for conserving white-tailed deer on Base. Instead, white-tailed deer management at MCB Camp Lejeune (consistent with NCWRC) has been directed toward improving the sex and age ratio of the resident deer herd through aggressive harvest strategies and maintaining the herd within ecological and cultural carrying capacities. Hunting pressure can sometimes result in fewer bucks being allowed to reach maturity. In 1998, MCB Camp Lejeune implemented antler restriction regulations in Hunting Zone 2 (Figure 4-31) that offer more protection to yearling bucks and allow them to reach maturity. A legal buck deer in Hunting Zone 2 is defined as having branched antlers (both beams) and possessing a minimum of five total antler points.

The primary goals of the game management program are to improve the age structure of the buck herd by allowing young bucks to mature before they are available for harvest, encourage hunters to reduce the take of immature bucks, and increase hunter opportunity for taking mature deer.

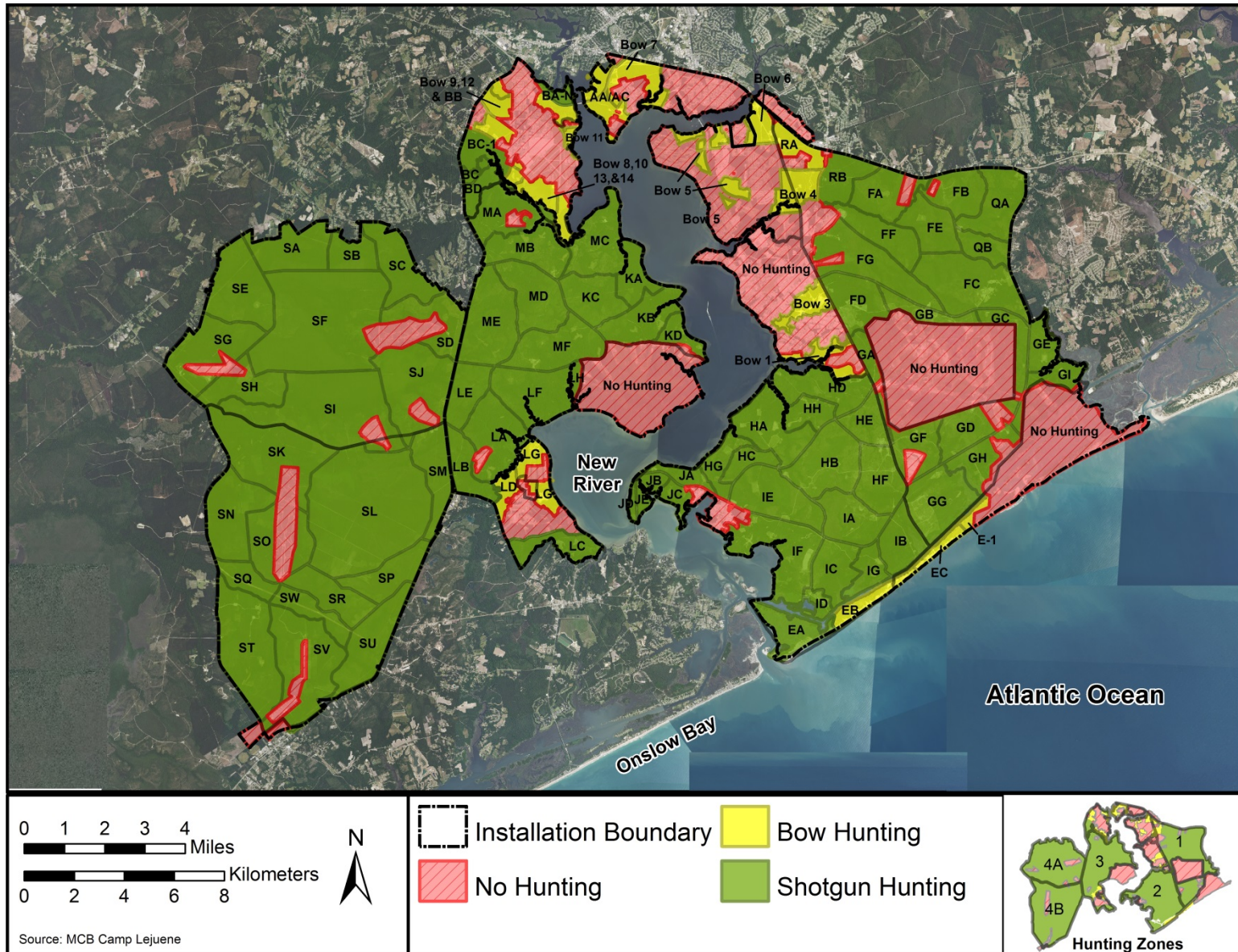


Figure 4-31. Hunting zones at MCB Camp Lejeune

Deer harvests on MCB Camp Lejeune typically range from 500 to 800 deer taken during the annual hunting season. Deer herd trends can be monitored if enough data are collected over time. Age data provides information about deer herd characteristics, hunting or mortality pressure on a particular age-class, and progress of deer management programs. Body weights, age, and antler measurements are collected every year from every deer harvested.

Wild Turkey

Wild turkeys are the second most popular game species on the Installation. Management for wild turkeys, as with other game species, is based upon providing quality habitat throughout the life cycle of the species. Restoration of longleaf pine and regular prescribed fire benefits wild turkeys by providing suitable foraging, nesting, and brood rearing habitat. Hardwood-dominated drainages also serve as important roosting and foraging habitat for wild turkeys (Figure 4-32).



Figure 4-32. Wild turkeys foraging in wildlife food plot near hardwood-dominated wetland area

When harvesting timber, hardwood drains are avoided and the retention of mast-producing hardwood trees that provide critical food important for healthy turkey populations is considered during annual silviculture prescriptions. Turkey harvests on MCB Camp Lejeune fluctuate and follow trends in poult recruitment from previous breeding seasons and hunting pressure. The highest recorded wild turkey harvest on MCB Camp Lejeune occurred during the spring of 2012, with 70 birds harvested. Body weights, spur length and beard length are collected from every turkey harvested. The NCWRC conducts wild turkey observation surveys each summer to gain insight into wild turkey productivity and carryover of gobblers from the previous spring turkey season across the various regions of the state. MCB Camp Lejeune participates in statewide survey efforts coordinated by the NCWRC. Survey results are collected and provided to the NCWRC on an annual basis.

Black Bear

Black bears prefer large expanses of uninhabited woodland or swampland with dense cover. On MCB Camp Lejeune, hardwood drains, swamps, and pocosins provide ideal bear habitat. However, recent research has shown bears to be much more adaptable to habitat changes than previously thought (NCWRC, 2008). Due to the adaptable nature of bears and improved management by wildlife agencies, black bear populations are increasing and bear range is expanding across North Carolina. As a result, bears and humans are coming into contact with each other more frequently. This contact has been evident on MCB Camp Lejeune and is based on casual observances, reports of bears in residential areas, and the number of bears reported to have been struck and killed by vehicles.

Although common, black bear are the least harvested big game animal on MCB Camp Lejeune. Hunters harvest less than one black bear per year on average at MCB Camp Lejeune. Thirteen black bears were taken by hunters between the period of 2000 to 2013. Wildlife staff collect and supply information from black bears harvested by hunters, killed on roadways, and other factors to the NCWRC. MCB Camp Lejeune supports statewide efforts to explain bear management, educate the public on bear safety tips, and address human-bear interactions consistent with state guidelines.

4.4.3.2 Small Game Species

Small game species found on the Base include upland game species, and waterfowl. Upland species include mourning doves, squirrels, northern bobwhite, cottontail rabbits, and webless migratory birds such as American woodcock (*Scolopax minor*) and rail species. Some upland game species like southeastern fox squirrels are considered by many hunters as trophy small game. Waterfowl found on the base and in surrounding waters include puddle duck and diving duck species as well as resident Canada geese (*Branta canadensis*). The NRE (New River Estuary) is extremely important for migratory and overwintering waterfowl. In some years, nearly 30,000 ducks, mostly lesser scaup (*Aythya affinis*), can be seen on the river gathered in large rafts from Montford Point south to Stone Bay. MCB Camp Lejeune coordinates with the NCWRC in order to provide access through controlled airspace over the installation to allow resource managers to perform late-winter waterfowl surveys on the New River. Wood ducks (*Aix sponsa*) are also common and a very popular game bird. Wood ducks depend upon forested wetland habitat for food and cover. Beaver ponds throughout the installation provide ideal wood duck habitat. Breeding areas must have trees for nesting cavities and food near permanent freshwater lakes and streams.

Furbearers

Regulated trapping is the key tool used by the wildlife managers to proactively manage furbearer populations so that they are in balance with people, threatened and endangered species, and the available habitat. MCB Camp Lejeune offers a wide variety of furbearers trapping opportunities including raccoon, opossum, skunk, bobcat, coyote, otter, mink, nutria, muskrat, and beaver. Fox trapping in accordance with local laws is not allowed in Onslow County. Wildlife staff often direct licensed trappers on the Installation to areas where removal of species such as beaver and coyote is desirable. Harvesting these animals during trapping season benefits the Installation by reducing, or even eliminating, the need to remove animals under depredation programs.

4.4.3.3 Food Plot Planting

Food plots on MCB Camp Lejeune are part of the overall game management program in which the top priority is providing high quality hunting experiences while maintaining high quality habitat. Food plots increase the value of hunting experiences by making deer and turkey more visible for viewing opportunities by hunters, and they improve the diet quality of forage for both game and non-game species. The presence of food plots also represents the Installation's commitment to game management, which can benefit the relationship between the installation and hunters who desire to see a visible manifestation of their annual permit fees. Hunters benefit from the interspersed managed clearings by having breaks in contiguous forestland that provide a variety of hunting opportunities.

MCB Camp Lejeune currently manages approximately 200 acres of wildlife clearings in over 150 plots. The number and size of clearings within individual forest compartments vary. Each spring, approximately 40 acres are planted in a variety of seed-producing annual grasses and plants (browntop and dove proso millets, and sunflowers) specifically to attract mourning doves, as well as to provide food and cover for a wide range of wildlife species. Fall or cool season plantings on the remaining acreage are tailored primarily toward white-tailed deer and turkey. Cool-season small grains (oats, wheat, rye), several clover varieties (arrow-leaf, white ladino, crimson), and common brassica's including kale, rape, and turnips are planted each fall beginning in September.

The decision to create new wildlife food plots is based on identified need, location to existing food plots, proximity to other forest openings, and relationship/integration with other land management activities. New wildlife food plots are integrated into work plans associated with annual forest prescription plans.

4.4.4 Non-game Species

The Marine Corps is dedicated to conserving and promoting non-game wildlife and their habitats through survey and monitoring programs, species management, and habitat protection or

restoration projects consistent with the mission. Although these programs and projects target non-game animals and their habitats, federally listed species protected by the ESA as well as game species such as deer and turkey also benefit because they share many of these same habitats.

In North Carolina, there are more than 1,000 non-game mammals, reptiles, birds, amphibians, mollusks and crustaceans. Non-game wildlife includes all wild animals except those that can legally be taken by hunting and fishing. In most areas of the United States, non-game species comprise greater than 80 percent of the faunal diversity. Many of these species are common backyard inhabitants, but some, such as the spotted turtle, are habitat specialists and can only be found in specific habitat types and wetland areas. For example, unique habitats such as lime-sink depression complexes present on MCB Camp Lejeune contain a wide range of floral and faunal diversity and serve as breeding and forage areas for avian, amphibian, and reptilian species. The Carolina gopher frog, a habitat specialist and species at risk, is known to breed in a number of depression ponds on the Base.



Figure 4-33. Wildlife biologist installing fox squirrel nest box

The Base will continue to conduct, or support others in conducting studies that help land managers better understand the diversity and distribution of non-game wildlife resources on MCB Camp Lejeune. These studies have included monitoring neotropical migrant birds, surveys for arthropod (insect), lepidoptera (butterfly), reptiles (snakes, turtles), amphibians (frogs, toads, and salamanders), and freshwater fishes.

Non-game management activities aboard MCB Camp Lejeune are diverse and range from nest box programs for species such as eastern blue birds and purple martins, and fox squirrels (Figure 4-33), performing cover board surveys for reptiles, and developing calling-amphibian survey routes, to making recommendations to project planners on new proposals that avoid or minimize impacts to wildlife by night lighting, deforestation, herbicide application, and stormwater runoff.

Non-game wildlife with special habitat requirements or sensitive species, such as amphibians that have complex lifecycles and depend on both terrestrial and aquatic components, are considered in management actions from a landscape perspective. Bachman's sparrows are considered one of the best indicators of a healthy longleaf pine ecosystem. Research to learn more about Bachman's sparrows may lead to management discoveries that will benefit the many

other plant and animal species dependent upon the longleaf pine ecosystem. See Sections 4.1 and 4.5 for more information regarding species at risk and migratory bird conservation at MCB Camp Lejeune.

MCB Camp Lejeune's basic strategy to maintain training areas in a relatively natural state in support of training provides benefits to non-game wildlife species. However, many non-game species also benefit from the various land management activities that take place aboard the Base such as longleaf pine forest management, wetlands protection, managing wildlife plots and performing prescribed burning. Anytime habitat diversity is increased, there is likely to be an increase in the number of species using the habitat. The current program of a timber management system maintained by prescribed fire provides for a broad range of forest stand ages maintained across the landscape and results in a greater abundance and diversity of wildlife. Formal surveys and casual, incidental observations made by wildlife biologists and technicians provide information on non-game wildlife whose populations are influenced by these management actions.

4.4.5 Nuisance Wildlife Management or "Wildlife Damage Control"

Nuisance wildlife is often referred to as wildlife that causes property damage, presents a threat to public safety, or causes an annoyance within, under or upon buildings. Most people consider an animal to be a nuisance when it becomes invasive or destructive. The species most often cited as a nuisance on MCB Camp Lejeune include raccoons, foxes, starlings, snakes, alligators, bats, Canada geese, and white-tailed deer.

Wildlife-caused damage is primarily related to feeding activities, but also occurs regularly in association with denning, nesting and roosting behaviors. Wildlife-caused damage can often be prevented simply by removing food sources, cover materials or vegetation, overhanging tree limbs, or other means of access that attract and hold wildlife in a particular location. When wildlife-damage becomes severe, corrective actions are necessary.

Consistent with state resource agency guidelines, MCB Camp Lejeune recommends the following steps to limit wildlife damage:

- Remove food sources, cover materials or vegetation, overhanging tree limbs, or other means of access that initially attracted and is now holding wildlife in your location,
- Establish protective structures or barriers to prevent wildlife from entering and damaging property,
- Humanely remove wildlife from buildings and grounds,
- Permanently repair buildings to prevent re-infestation, and
- Monitor buildings and grounds periodically for recurring problems, taking appropriate, immediate attention to control and prevent damage.

MCB Camp Lejeune participates in the North Carolina Wildlife Damage Control Agent Program and complies with all depredation permits needed to trap and lethally control wildlife outside the regulated trapping season. Wildlife staff attend annual training workshops and provide quarterly or annual reports in accordance with all depredation program permits. All nuisance wildlife complaints are investigated. Wildlife staff develop plans to trap or may remove the offending wildlife immediately, depending on the situation.

MCB Camp Lejeune also has a support agreement with USDA Animal and Plant Health Inspection Service (APHIS) Wildlife Services (WS) to assist in wildlife damage control. The purpose of this interagency agreement is to facilitate removing any species of wildlife from sites identified by MCB Camp Lejeune when wildlife-damage becomes severe, and corrective actions are necessary on properties within the MCB Camp Lejeune complex.

WS activities are conducted in cooperation with other federal, state and installation regulations. The WS program uses an Integrated Wildlife Damage Management (IWDM) approach in which a series of methods may be used or recommended to reduce wildlife damage. These methods include the alteration of cultural practices as well as habitat and behavioral modification to prevent damage. However, controlling wildlife damage may require that the offending animal(s) be removed or that the populations of the offending species be reduced.

WS uses proven wildlife damage management techniques and equipment to alleviate wildlife damage. Methods approved by the installation for alleviating damage include both non-lethal and lethal actions depending on the situation. Lethal removal will primarily be accomplished using trapping and spotlight/shooting. The proposed wildlife damage management program will include monitoring and operational efforts to reduce wildlife damage at sites identified by MCB Camp Lejeune. The removal of offending wildlife will reduce government damage and assist in protecting human health and safety. Wildlife predators including foxes and coyotes discovered to be digging into sea turtle nests or preying on shorebird nesting areas will also be removed from designated areas of Onslow Beach to protect state and federally threatened and endangered species.

4.4.5.1 Nuisance Wildlife Species of Interest

Some wildlife species due to their reputation, size, or status as protected species or game animals require special equipment or permits to remove the animal and alleviate damage. Explaining the circumstances for prescribing wildlife damage control techniques and the situations where they are authorized is a challenge for wildlife staff responsible for prescribing the best course of action needed for the desired outcome for both humans and wildlife. Coyotes, bats, bears, alligators, geese, and deer are wildlife species on MCB Camp Lejeune that can pose a challenge for wildlife managers who address complaints and must make a determination on whether wildlife is truly a public safety threat, or merely causing an annoyance.

Coyotes

Coyote sightings have increased along with increases in coyote populations. Discussion of the impacts of coyotes on game populations and concerns of their presence in urban areas are common and often reveal misconception about the species. Urban and suburban coyotes are symptoms of a broader issue. While their range has increased, so has the continued expansion of housing subdivisions and other development into what used to be undeveloped wildlife habitat, especially on the expanding fringes of large existing developments. This has increased the potential for encounters and conflicts between people and all wildlife, including coyotes. Trapping and other traditional nuisance control actions cannot eliminate urban coyote problems, but are incorporated into management plans and provide temporary solutions in some situations.

Bats

Federally listed bats are afforded all protections by the ESA. Bats listed by the state of North Carolina are regulated by the Protection of Endangered/Threatened/Special Concern (15A NCAC 10I § 0102), while unlisted bats are protected by general restrictions under the North Carolina Regulation of Wildlife statute (Article 22 § 113-291).

Seventeen bat species occur in North Carolina including seven species that are listed as either endangered, threatened or of special concern (NCWRC, 2005). A number are year-round residents but others are here seasonally. These beneficial mammals consume tons of insects daily. However, conflicts occur when bats take up residence, sometimes in large numbers, in the attics of homes and other buildings where the accumulation of urine and feces can endanger human health.

Managing a nuisance bat incident can be very challenging as the control of nuisance bats is subjected to careful scrutiny and interagency coordination. Once it has been confirmed that bats are present, wildlife staff determine if there is damage, if there is a health risk, and if some intervention is warranted. There are circumstances in which “no action” is the correct action because of the beneficial role of bats. Intervention may be necessary in cases where there is risk of contact, damage from excreta accumulations, stains on buildings, and smells. MCB Camp Lejeune coordinates with state resource managers to assist in determining when intervention may be necessary and what the best courses of action are needed to solve the problem. Recommendations for the exclusion of bats from an entire structure (attics, crawl spaces, etc.) are generally avoided from May 1 through August 1 because breeding colonies may be present.

Black Bear (in urban areas)

Black bears and humans on MCB Camp Lejeune are coming into contact with each other more frequently. As with other wildlife, good management has resulted in increased populations while the housing subdivisions and other development continue expansion into previously undeveloped areas that support bear populations. In most cases of bear contact, the cause of the problem is

unsecured garbage that attracts bears. Wildlife staff encourage base residents to modify their habits to prevent bear from being attracted to their homes and neighborhoods and request simple steps be taken to avoid interactions that might become dangerous. Collisions with automobiles are another common situation where personnel on the base come into contact with bear. Mortality reports for all reported bear/automobile collisions are reported to state resource managers.

Canada Geese

Resident Canada geese have been identified on MCB Camp Lejeune as a species of management concern. Conflicts between Canada geese and humans on MCB Camp Lejeune have increased as goose populations have grown. Resident Canada geese may be a nuisance due to their droppings, aggressive behavior, or they may represent a potential serious environmental threat or risk to human health and safety (Figure 4-34).

It is also well documented that Canada geese are a strike hazard for aircraft, particularly at or near airports where goose movement intersects take-off and landing zones. Methods to manage damage from resident Canada geese will include both non-lethal and lethal actions depending on the situation.



Figure 4-34. Canada goose protecting her nest along a stormwater pond shoreline.

Alligators

Alligator populations continue to grow in North Carolina as a result of protection by state and federal statutes. Consequently it is not unusual for one or more to take up residence in managed fishing ponds, near docks and fishing piers, and more recently, in stormwater ponds associated with urban development near schools and housing areas. Problems are seldom encountered if the alligators are left alone and are not given food. Warning signs are posted in urban environments where alligators are known to be present. When alligators do become a problem, wildlife resource professionals determine the best course of action which may sometimes include removal of the animal. Alligators are protected by state and federal law and cannot be harassed, harmed, or captured unless authorized.

White-tailed Deer (urban areas)

An increase in urban development aboard MCB Camp Lejeune has forced the wildlife occupying portions of the base to reside in increasingly smaller tracks of woods and small fragmented woodlots, many of which are adjacent to major roadways and other developed areas. With the decrease in available habitat for species such as white-tailed deer, there has ultimately been a visible increase in human/deer interactions in recent years. Human/deer interactions have resulted in damage to vehicles from deer/vehicle collision, as well as vegetation damage to landscaping. Droppings on lawns and playgrounds, and concerns of tick-borne illness also give residents cause for concern. Urban deer populations are currently managed by archery hunting permitted in areas where it is compatible with adjacent land use. Archery hunters are encouraged to harvest more does and not just bucks in these areas. MCB Camp Lejeune monitors and records deer/vehicle collisions, tick-borne illness cases aboard the base, as well as vegetation damage and other nuisance deer complaints. Proposals to expand archery hunting areas or requests for depredation actions to remove deer will also be considered as needed.

4.4.6 Fish and Wildlife Conservation Goals and Measures

GOAL/OBJECTIVE FWL1: Manage fish and wildlife habitat to support game species.

- **Action 4.4-01:** *Manage food plots in support of the game management program.*
- **Action 4.4-02:** *Manage freshwater fishing ponds.*
- **Action 4.4-03:** *Conduct annual surveys for game species, including wild turkey, American woodcock, and northern bobwhite and contribute data to state resource managers.*
- **Action 4.4-04:** *Continue antler-restriction harvest strategy in Hunting Zone 2 to reduce the harvest of immature bucks, and increase hunter opportunity for taking mature deer.*
- **Action 4.4-05:** *Retain mast-producing trees when harvesting timber, where it does not conflict with other habitat management requirements.*

GOAL/OBJECTIVE FWL2: Conserve and promote non-game wildlife and their habitats.

- **Action 4.4-06:** *Continue programs that benefit non-game wildlife including nest box programs for species such as eastern blue birds and purple martins, cover board surveys for reptiles, and calling amphibian survey routes.*
- **Action 4.4-07:** *Perform annual surveys and monitor population trends for non-game wildlife.*

GOAL/OBJECTIVE FWL3: Manage nuisance wildlife to protect the health and safety of tenants on MCB Camp Lejeune.

- **Action 4.4-08:** *Trap and remove nuisance wildlife.*
- **Action 4.4-09:** *Coordinate depredation actions required for nuisance wildlife management with the NCWRC and USFWS.*
- **Action 4.4-10:** *Provide guidance to installation personnel to assist them in solving problems associated with nuisance wildlife.*

4.5 MIGRATORY BIRD MANAGEMENT

Hundreds of species of migratory birds occur in eastern North Carolina. Some migrate short distances within the borders of the United States. Others use breeding grounds in the United States and Canada and overwinter in southern North America, Central and South America, the West Indies, and the Caribbean. Some non-migratory bird species also receive protection under the MBTA.

The MBTA is the primary legislation in the United States established to conserve migratory birds. The MBTA prohibits the taking, killing, or possessing of migratory birds, their eggs, parts, and nests unless permitted by regulation. As of November 2013, 1,026 species were included on the list of migratory birds (78 FR 212). Non-native species such as house sparrow (*Passer domesticus*), European starling (*Sturnus vulgaris*), rock pigeon (*Columba livia*), and mute swan (*Cygnus olor*) are not protected by the MBTA. Furthermore, native game birds such as eastern wild turkey and northern bobwhite quail are also not protected by the MBTA.

The USFWS issues special depredation permits that allow the lawful take of migratory birds on the Installation. These permits allow MCAS New River to take management actions regarding Bird/Animal Aircraft Strike Hazards (BASH) at airfields. See Section 4.6 for details on the Installation's BASH program.

The Final Rule on Take of Migratory Birds by the Armed Forces (50 CFR Part 21) allows for the incidental take, with limitations, of migratory birds by DoD during military readiness activities. If MCB Camp Lejeune determines that a proposed or an ongoing military readiness activity may result in a significant adverse effect on a population of a migratory bird species, they must confer and cooperate with the USFWS to develop appropriate and reasonable conservation measures to minimize or mitigate identified significant adverse effects. MCB Camp Lejeune provides annual reports on migratory bird conservation measures that have been implemented and the effectiveness of the conservation measures in avoiding, minimizing, or mitigating take of migratory birds.

Additional protection for migratory birds on federal properties is provided by Executive Order (EO) 13186 – Responsibilities of Federal Agencies to Protect Migratory Birds of 2001. This EO encourages incorporation of comprehensive migratory bird management objectives in agency management plans and requires federal agencies to enter into a MOU on migratory birds with the USFWS.

The DoD-USFWS MOU on migratory birds directs DoD and USFWS to strive to protect, restore, enhance, and manage habitat of migratory birds on DoD-managed lands; and to promote collaborative projects such as the Monitoring Avian Productivity and Survivorship (MAPS), Breeding Bird Survey (BBS), Christmas Bird Counts, bird atlas projects, or game bird surveys on DoD lands. The MOU is a 5-year agreement that must be reviewed and renewed by the participating parties every 5 years. It was most recently renewed in 2014.

Responsibilities identified in the MOU specific to DoD include:

- Incorporating conservation measures addressed in Regional or State Bird Conservation Plans in INRMPS,
- When consistent with safety and security, allowing USFWS and other partners reasonable access to military lands for conducting surveys,
- Engaging in early planning and scoping with the USFWS prior to starting any activity that is likely to affect populations of migratory birds in order to proactively address migratory bird conservation and in order to initiate appropriate actions to avoid or minimize the take of migratory birds, and
- Managing military lands and non-military readiness activities in a manner that supports migratory bird conservation.

Land management actions recommended in the migratory bird MOU include protecting and restoring important bird habitats, controlling invasive species that threaten migratory bird habitat, considering the effects of prescribed fire on migratory birds, designing new utility and energy infrastructure to avoid and minimize impacts on migratory bird populations, and ensuring that recreational activities and public access are consistent with migratory bird conservation goals.

Prioritization, inventory, monitoring, and habitat conservation efforts related to migratory birds species are based on this MOU. See Appendix 14 for more information on the 2014 DoD-USFWS MOU on migratory birds.

4.5.1 Focal Migratory Bird Species

Nearly 300 species of migratory birds are known to occur or have potential to occur on MCB Camp Lejeune and Base properties, including MCAS New River (Appendix 15). The Installation

focuses inventory, monitoring, and habitat conservation efforts for 34 species that are designated as USFWS Birds of Conservation Concern (BCC), Partners in Flight (PIF) US-Canada Species of Conservation Concern (SoCC), and/or are common birds in steep decline by PIF. Common birds in steep decline included species that have undergone a >50 percent decline in the US since 1967 (PIF, 2010) (Table 4-4). The Land and Wildlife Resources section oversees inventory, monitoring, and habitat conservation for these species. Conservation of Priority 1 SAR are addressed in Section 4.1. The Threatened and Endangered Species section at MCB Camp Lejeune leads conservation efforts for the recently de-listed bald eagle, another focal migratory bird species (Section 4.1).

The 2014 DoD PIF Strategic Plan is a broad-ranging management strategy that has been vetted through Office of Secretary of Defense (OSD) and the Military Services and is now available online at <http://dodpif.org/plans/stratplan.php>. This document identifies actions that support and enhance the military mission while working to secure bird populations. It also provides a scientific basis for maximizing the effectiveness of resource management, enhancing the biological integrity of DoD lands, and ensuring continued use of these lands to fulfill military training requirements.

Table 4-4. Focal Migratory Bird Species of Concern

Scientific Name	Common Name	USFWS BCC ¹	PIF SoCC ²	PIF Steep Decline ²	Habitat
YEAR-LONG RESIDENTS					
<i>Haliaeetus leucocephalus</i>	Bald Eagle	✓			Near water
<i>Lanius ludovicianus</i>	Loggerhead shrike			✓	Grasslands, longleaf pine, beach
<i>Melanerpes erythrocephalus</i>	Red-headed Woodpecker	✓	✓	✓	Longleaf pine
<i>Peucaea aestivalis</i>	Bachman’s Sparrow	✓	✓		Longleaf pine
<i>Sitta pusilla</i>	Brown-headed Nuthatch	✓			Longleaf pine
BREEDING SEASON					
<i>Antrostomus vociferus</i>	Eastern Whip-poor-will	✓	✓	✓	Longleaf pine and pine-hardwood forests near open areas
<i>Charadrius wilsonia</i>	Wilson's Plover	✓			Beach
<i>Coccyzus americanus</i>	Yellow-billed Cuckoo	✓		✓	Mature hardwood and pine-hardwood forests, especially with creeks nearby
<i>Coccyzus erythrophthalmus</i>	Black-billed Cuckoo		✓	✓	Pocosins, thickets

Table 4-4. Focal Migratory Bird Species of Concern (Cont'd)

Scientific Name	Common Name	USFWS BCC ¹	PIF SoCC ²	PIF Steep Decline ²	Habitat
BREEDING SEASON (Cont'd)					
<i>Geothlypis formosa</i>	Kentucky Warbler	✓	✓		Mature hardwood and pine-hardwood forests, especially with creeks nearby
<i>Haematopus palliatus</i>	American Oystercatcher	✓			Beach
<i>Helmitheros vermivorus</i>	Worm-eating Warbler	✓			Mature hardwood and pine-hardwood forests, especially with creeks nearby
<i>Hylocichla mustelina</i>	Wood Thrush	✓	✓		Mature hardwood and pine-hardwood forests, especially with creeks nearby
<i>Laterallus jamaicensis</i>	Black Rail	✓			High saltmarsh
<i>Limnothlypis swainsonii</i>	Swainson's Warbler	✓			Mature bottomland hardwood forests, swamps
<i>Passerina ciris ciris</i>	Painted Bunting	✓			Maritime woodland
<i>Picoides borealis</i>	Red-cockaded Woodpecker		✓		Longleaf pine
<i>Protonotaria citrea</i>	Prothonotary Warbler	✓	✓		Mature bottomland hardwood forests, swamps
<i>Setophaga discolor</i>	Prairie Warbler	✓	✓	✓	Scrub-shrub forest and thickets
<i>Sternula antillarum antillarum</i>	Least Tern	✓			Beach
WINTER SEASON					
<i>Ammodramus caudacutus</i>	Saltmarsh Sparrow	✓	✓		Salt marsh
<i>Ammodramus henslowii susarrans</i>	Henslow's Sparrow	✓	✓		Wet prairies and old fields
<i>Calidris alpina</i>	Dunlin	✓			Beach and mudflats
<i>Coturnicops noveboracensis</i>	Yellow Rail	✓			Marshes and flooded fields
<i>Euphagus carolinus</i>	Rusty Blackbird	✓		✓	Edges of wet forests and grasslands
<i>Falco peregrinus</i>	Peregrine Falcon	✓			Beach and coastline
<i>Limnodromus griseus</i>	Short-billed Dowitcher	✓			Beach and mudflats
<i>Tringa flavipes</i>	Lesser Yellowlegs	✓			Wet grasslands and interior mudflats

Table 4-4. Focal Migratory Bird Species of Concern (Cont'd)

Scientific Name	Common Name	USFWS BCC ¹	PIF SoCC ²	PIF Steep Decline ²	Habitat
SEASONAL TRANSIENTS					
<i>Calidris canutus rufa</i>	Red Knot (Eastern)	✓			Beach
<i>Calidris pusilla</i>	Semipalmated Sandpiper	✓			Beach
<i>Charadrius nivosus</i>	Snowy Plover	✓			Beach
<i>Dolichonyx oryzivorus</i>	Bobolink		✓	✓	Grasslands
<i>Elanoides forficatus</i>	Swallow-tailed Kite	✓	✓		Large grasslands
<i>Gelochelidon nilotica</i>	Gull-billed Tern	✓			Beach
<i>Rynchops niger</i>	Black Skimmer	✓			Beach

Sources: ¹USFWS, 2008; ²PIF, 2012

Focal migratory birds at MCB Camp Lejeune occur as (1) year-round residents, which live on the Installation throughout the year; (2) as breeding residents, which breed in the region and migrate to the tropics in the winter; (3) as winter residents, which breed farther north and over winter here; (4) or as transients, which use the stopover habitat on the Installation during migration (see Table 4-4).

Year-Round Residents

Loggerhead shrike (*Lanius ludovicianus*), red-headed woodpecker (*Melanerpes erythrocephalus*), brown-headed nuthatch (*Sitta pusilla*), and Bachman’s sparrow (Figure 4-35) reside at MCB Camp Lejeune throughout the year. Loggerhead shrike may inhabit grasslands, longleaf pine savannas, and dune habitat on the Installation. Red-headed woodpecker and brown-headed nuthatch, among the most common species in longleaf pine ecosystems, prefer mature, open-canopied pine forest with a grassy, herbaceous understory. Management of grasslands and longleaf pine ecosystems is vital to continued conservation of these species.



Figure 4-35. Bachman’s sparrow

Breeding Residents

Eastern whip-poor-will (*Antrostomus vociferus*) breeds on the Installation in open pine or pine-hardwood forests near savannas or grasslands. Wayne's black-throated green warbler (*Setophaga virens wayneii*) breeds in the headwaters of swamps, once historically dominated by Atlantic white cedar, but now dominated by black gum (e.g., Juniper Creek). Prothonotary (*Protonotaria citrea*) and Swainson's warblers (*Limnothlypis swainsonii*) breed in swamp habitat such as mature bottomland hardwood forests, banks of wide creeks, freshwater reservoirs, and beaver ponds. Wood thrush (*Hylocichla mustelina*), yellow-billed cuckoo (*Coccyzus americanus*), Kentucky (*Oporornis formosus*), and worm-eating warblers (*Helmitheros vermivorum*) primarily breed in the riparian zones of mature hardwood and pine-hardwood forests. Black-billed cuckoo (*Coccyzus erythrophthalmus*) not yet detected on the Installation breeds in pocosins and wet, tree-dense areas.

Winter Residents

The saltmarsh sparrow (*Ammodramus caudacutus*) and rusty blackbird (*Euphagus carolinus*), both considered "Vulnerable" by the International Union for Conservation of Nature, are winter residents at MCB Camp Lejeune. Saltmarsh sparrow typically overwinters on the sound side of the barrier islands in salt marshes; however, encroaching, non-native common reed (*Phragmites australis*) has rendered much of the sparrow's local environment uninhabitable. Rusty blackbird inhabits the edges of wet forests and fields. Another winter resident, the peregrine falcon (*Falco peregrinus*), overwinters on the barrier islands and along the Intracoastal Waterway. The yellow rail (*Coturnicops noveboracensis*) is known to overwinter in marshes and wet fields in the region; however, it has not yet been detected on the Installation.

Transients

The swallow-tailed kite (*Elanoides forficatus*), bobolink (*Dolichonyx oryzivorus*), and lesser yellowlegs are migratory species that do not frequently inhabit MCB Camp Lejeune. The swallow tailed kite forages over grasslands, marshes, and other open lands. Bobolink inhabits grasslands and old fields during migration. Lesser yellowlegs inhabits large wet grasslands, large wetlands, and muddy areas away from shorelines. These uncommon, transient species are only occasionally observed on the Installation during migration.

4.5.2 Inventory and Monitoring for Migratory Birds

Migratory bird surveys assist resource managers in detecting population trends and meeting bird conservation goals. In-house inventory and monitoring of migratory birds at MCB Camp Lejeune typically includes vehicle-based transects to count shorebirds on Onslow Beach, point counts for breeding birds at stream crossings, area searches, and participation in national or regional surveys.

Methods for riparian point counts follow those used by the Rocky Mountain Bird Observatory and allow for estimation of occupancy and density. Area searches are conducted for rare bird species with numbers that are too low to allow for estimation of occupancy or density. These species include black rail, Wayne's black-throated green warbler, saltmarsh sparrow, Henslow's sparrow, loggerhead shrike, and rusty blackbird. MCB Camp Lejeune annually contributes to several bird monitoring efforts, including the Audubon Christmas Bird Count, the Onslow County Spring Migratory Bird Count, North American Marsh Bird Monitoring Network, and Nightjar Survey Network.

The annual Audubon Christmas Bird Count allows MCB Camp Lejeune and local volunteers to participate each year in an all-day census of early-winter bird populations (Figure 4-36). The results of the survey are compiled into the longest running citizen science survey in the world, which represents over a century of data on trends of early-winter bird populations across the Americas (National Audubon Society, 2014). The Onslow County Spring Migratory Bird Count is an annual countywide survey in which local birders count all birds encountered in



Figure 4-36. Volunteers participate in annual bird count at MCB Camp Lejeune

Onslow County during one day in areas that are favorable to migratory bird species. Biologists at MCB Camp Lejeune cover the portion of Onslow County that is occupied by the Installation.

The Installation visits designated stations three times per year to conduct standardized bird counts that target rails and other marshland song birds in support of the North American Marsh Bird Monitoring Network. Additionally, MCB Camp Lejeune participates in the Nightjar Survey Network by conducting annual night-time surveys for nightjars during the birding season. Focal nightjar survey species include the eastern whip-poor-will, common nighthawk (*Chordeiles minor*), and chuck-will's-willow (*Antrostomus carolinensis*). MCB Camp Lejeune also coordinates the use of restricted airspace for aerial surveys of wintering waterfowl on New River performed by the NCWRC.

4.5.3 Habitat Conservation for Migratory Birds

Priority migratory bird habitats for the Southeastern Coastal Plain have been identified by the South Atlantic Migratory Bird Initiative (SAMBI), a coalition of partners including PIF, USFWS, NCWRC, and other state agencies and private organizations (Watson, 2008). Focal

migratory bird species on MCB Camp Lejeune are primarily associated with grassland, bottomland hardwood, freshwater and salt marsh, scrub-shrub, pocosin, longleaf pine, and beach, ecosystems which may require active management for their restoration and maintenance.

Grasslands

Historically, grass-dominated communities in the Southeast Coastal Plain consisted of relatively small openings within the forest-dominated landscape and sparsely forested savannas that were maintained by frequent fires. While remnant native grasslands are limited at MCB Camp Lejeune, the expansive impact areas, airfields, and ranges provide a significant amount of grassland bird habitat. Grassland management and restoration tools include prescribed fire, mowing, native species planting, and non-native plant removal. Use of prescribed fire, well-planned mowing regimes, and planting of native species are conservation measures used to avoid or minimize the take of migratory birds or enhance the quality of the habitat used by migratory birds in grasslands.

Scrub-shrub Forests and Thickets

Historically, early-successional scrub-shrub habitats were created and maintained by disturbance events such as fires, tornadoes, hurricanes, and small farming operations. Elimination of fire and small-scale farming from much of the landscape has led to the loss of most scrub-shrub forests and thickets from the Southeast. Timber harvests and wildland fire create early-successional habitat across the Installation.

Emergent Wetland Habitats

Freshwater marshes, tidal flats, and tidal marshes are extremely important to rails and bitterns, whereas intertidal mudflats and impoundments are seasonally important for shorebirds, waterbirds, and waterfowl. These wetland habitats are primarily protected through the CWA and related authorities. Active management such as invasive plant removal and the restoration of natural hydrologic regimes are measures that can be undertaken to enhance existing riparian and wetland habitats at MCB Camp Lejeune.

Riparian, Bottomland Forests, and Pocosins

There has been extensive drainage and conversion of forested wetlands throughout the Southeast, which is associated with great losses of forest-interior and area-sensitive species. Stream side forests and bottomland forested wetlands at MCB Camp Lejeune are limited, but support a number of rare and declining migratory bird species. Managing for large expanses of mature forested wetlands and riparian areas by preventing encroachment, maintaining the natural hydrologic regime, and removing invasive plants will help prevent further loss of habitat for these species.

Much of the Installation, especially in the GSRA, is dominated by pocosins. Since the Marine Corps acquired GSRA in 1992, over 800 acres of pocosin have been restored at the 1,250.5-acre wetland mitigation site on GSRA. In addition to meeting the Base's wetland mitigation banking needs, this area provides habitat for migratory birds.

Longleaf Pine Ecosystems

Longleaf pine was historically present on an estimated 92 million acres stretching from southeastern Virginia to east Texas (Frost, 1993). MCB Camp Lejeune will continue to convert and restore longleaf pine ecosystems to the benefit of migratory bird conservation. Additionally, protection of snags and mature trees with hollows, particularly during management activities such as prescribed fire and timber harvesting, is critically important to avoid or minimize the take of migratory birds or enhance the quality of the habitat used by migratory birds.

Beach and Barrier Island Habitats

MCB Camp Lejeune's oceanfront beaches, mudflats, and saltmarshes on the sound side of barrier islands provide important foraging habitat for migratory and wintering shorebirds, resident colonial nesting water birds, and migratory raptors. Such habitat is also found on the southern and northern ends of Onslow Beach and Brown's Island. Conservation measures for piping plovers and red knots (Section 4.1) benefit many other shorebirds.

4.5.4 Migratory Bird Conservation Goals and Measures

GOAL: Sustain and enhance populations of bird species that utilize MCB Camp Lejeune year-round and during seasonal migration, while supporting the military mission.

OBJECTIVE MIG1: Continue land management activities in support of military training through conservation and management of migratory birds and their habitat.

- **Action 4.5-01:** *Conduct annual migratory bird surveys, including planning level surveys that support long range master planning efforts and migratory bird conservation initiatives.*
- **Action 4.5-02:** *Protect priority migratory bird habitats where such protections provide a benefit to species and can be integrated with training activities.*

4.6 BIRD/ANIMAL AIRCRAFT STRIKE HAZARD MANAGEMENT

The BASH program management at MCB Camp Lejeune, administered by MCAS New River Environmental Affairs Department (EAD), requires professional staff with knowledge of BASH species ecology, behavior, and expertise in wildlife trapping and dispersal. Tools for dispersal, harassment, and/or removal include firearms, lasers, vehicles, effigies, pyrotechnics, paintball

guns, and addling (use of oil spray to disrupt egg development). The Bird Hazard Working Group (BHWG), responsible for the design and implementation of the BASH program, meets semiannually for updates and review of BASH information, policy, and procedure. The BHWG includes representatives from flight safety, airfield management, base operations, air traffic control, civil engineering, wildlife management, environmental management, MCB Camp Lejeune Range Control, and other organizations at MCB Camp Lejeune concerned with bird hazards (Air Station Order [ASO] 3710.40C).

4.6.1 Bird/Animal Aircraft Strike Hazard Implementation

The BASH program addresses management of airfield ecosystems, including wildlife, their food source, and habitat, to reduce the risk of wildlife collision with aircraft in all phases of maneuver and to improve conditions for safe aircraft landings. MCAS New River's BASH program is designed to identify and communicate hazardous conditions; establish operating procedures to avoid high hazard situations; and establish guidelines to eliminate, control, or reduce environmental factors that attract birds and other wildlife to the airfield operational area (AOA). Guidance for airfield BASH management is provided by ASO 3710.40C – Bird/Animal Aircraft Strike Hazard Plan, depredation permits from the NCWRC and the USFWS, and periodic Wildlife Hazard Assessments conducted by the USDA APHIS WS.

ASO 3710.40C establishes procedures for aircraft and airfield operations and communication and provides guidelines to eliminate, control, or reduce environmental factors that attract birds and wildlife; to disperse and/or remove birds and other wildlife near runway approach/departure corridors, along flight paths, landing zones across base, and other high-hazard areas; and to collect and report all bird/animal strikes and near misses. The order further assigns duties and responsibilities relevant to BASH reduction to various MCAS New River and tenant organizations.

MCB Camp Lejeune holds and annually renews permits from the NCWRC and USFWS that enable the BASH program to control problematic airstrike species, as directed by ASO 3710.40C. Migratory Bird Depredation permits from the USFWS and Special Airport Depredation permits from the NCWRC authorize the dispersal or removal of deer, birds, and other wildlife that pose a threat to aircraft safety (Figure 4-37). The Base also maintains an Eagle Depredation permit from the USFWS that authorizes Base wildlife staff to disperse bald eagles in situations where their presence poses a significant threat to aircraft and human safety. See Section 4.5 for more information about migratory bird management and Section 4.1, Protected Species, for further details on bald eagle protection at MCB Camp Lejeune.

A wildlife hazard assessment for MCAS New River was conducted by WS on-site wildlife biologist in 2005 and updated in 2010. WS plans to conduct wildlife hazard assessments on a 5-year cycle and will re-assess wildlife hazards in 2015 (MCAS New River Wildlife Hazard Assessment, 2010). The USDA also prepares annual BASH reports that detail the latest incidents and trends in BASH species strikes and hazard reduction measures for MCAS New River. The assessments and annual reports identify a number of hazards and offer recommendations regarding habitat and wildlife population management to mitigate BASH. The BASH program also conducts periodic surveys at the north and south runways in GSRA to monitor wildlife populations and trends.

There is considerable overlap in wildlife damage control and management actions as they relate to game and non-game management programs, particularly in an airfield setting. This environment sometimes necessitates more intense, routine control actions that require a baseline of information on wildlife populations and seasonal patterns of wildlife use. Such information is critical to the development and implementation of a coordinated BASH program and coordination with nuisance wildlife and pest management programs on the Installation.



Figure 4-37. Collision with red-tailed hawk on 22-Oct-2012, resulting in destroyed lower intake panel and \$29,100 in repair costs

4.6.2 Bird/Animal Aircraft Strike Hazard Focal Species

The MCAS New River fleet is composed primarily of rotary wing aircraft that require constant low-level, night-time training missions. Low-level flight paths place aircraft in high-risk strike zones because of high bird densities along creeks, rivers, woodlands, and various agricultural operations. Key components of the BASH program include identification of these potential strike zones, as well as identification of problematic strike species and seasonal occurrences of bird/animal aircraft strikes. Within the local operational area of MCAS New River, BASH threats are increased because of geographic location and proximity to major watercourses, estuaries, and coastal marine waters. Species posing the highest strike hazards include various gulls and shorebirds, Canada geese, vultures, and white-tailed deer.

WS specialists harass or disperse approximately 30,000 animals per year on MCAS New River. In 2013, the BASH program conducted over 400 patrols, which resulted in the harassment of

thousands of birds, the majority of which included gulls, mourning doves, shorebirds, and waterfowl. The rate of bird strikes tends to be highest during spring and fall migration, with the greatest number of strikes occurring in the fall when more juvenile birds are in flight.

Gulls and Canada geese thrive in urban environments, leading to expanded populations of both species in the local area and across the state. Gulls overwintering in the area typically roost on the New River and forage daily in the surrounding area. More than 18,000 gulls were harassed at MCAS New River in 2013, making the species one of the largest BASH threats at the air station (Figure 4-38). Canada geese are problematic because of their large size, flocking characteristics, adaptability, and tendency to fly at low levels. Over 500 Canada geese were harassed from Camp Geiger, New River Air Station, and Camp Johnson in 2013.



Figure 4-38. Ring-billed gulls over the New River with V 22 Osprey

Vultures are of concern to the BASH program due to their large size and propensity to fly at altitudes in excess of 3,000 ft, aligning them with MCAS New River flight paths. Vultures are attracted to waste areas at MCB Camp Lejeune and may collide with aircraft while in route to those areas, resulting in extensive damage to aircraft and potential human injury.

The BASH program conducts bimonthly, night-time surveys and monitoring of wildlife in the AOA. As a result of such efforts, approximately 300 deer were observed and eight were harassed off the MCAS New River airfield in 2013. MCB Camp Lejeune's hunting program helps facilitate deer reduction base-wide by allowing permitted hunters to remove deer in designated areas. The BASH program also provides opportunities for Base hunters to familiarize themselves with preferred deer habitat and movement patterns on the air station. See Section 4.4, Fish and Wildlife Management, for more information about the hunting program at MCB Camp Lejeune.

4.6.3 BASH Conservation Goals and Measures

GOAL: MCAS New River manages the BASH program in efforts to increase human health and safety and to minimize the loss of mission-related training and potential property damage due to bird/animal aircraft strikes.

OBJECTIVE BAS1: Implement BASH Plan per MCAS ASO 3710.40C.

- **Action 4.6-01:** *Continue wildlife management programs, including survey, harassment, relocation, and depredation of BASH species as well as maintenance of permits for Migratory Bird Depredation, Special Airport Depredation, and Bald Eagle Depredation, and other permits.*
- **Action 4.6-02:** *Manage habitat on and around air fields and landing zones in a manner that minimizes bird-animal strike hazards.*

4.7 WETLAND PROTECTION AND MANAGEMENT

4.7.1 Federal, State & Other Regulations

In their natural condition, wetlands provide many benefits including food and habitat for fish and wildlife, water quality improvement, flood protection, shoreline erosion control, natural products for human use and opportunities for outdoor recreational and aesthetic appreciation. MCB Camp Lejeune recognizes the ecologic and economic value of these unique environments and ensures that operations, activities, and projects comply with the national policy to minimize the loss of wetlands and preserve their natural functions and associated values.



Figure 4-39. Black gum and white water lily in Holover Creek

The total amount of wetlands on MCB Camp Lejeune is estimated to be approximately 55,000 acres, about 44 percent of the Base's land area. Many types of wetlands can be found on Base. They are generally forested palustrine and coastal estuarine systems. Dominant wetland communities include wet pine flatwoods, blackwater bottomland hardwoods (Figure 4-39), pocosins, ephemeral pools and small depression ponds, and coastal salt marshes.

Section 404 of the CWA establishes the major federal program that regulates and permits activities in wetlands. A Section 401 CWA, Water Quality Certification is required whenever a Section 404 permit is required. Management and protection of these areas also requires compliance with Section 10 of the Rivers and Harbors Act, Executive Order, 11990 Protection of Wetlands, the Coastal Zone Management Act, and Marine Corps Order P5090.2A Environmental Compliance and Protection Manual.

In order to comply with regulations for activities in wetlands and waters of the US, MCB Camp Lejeune will take actions necessary to minimize the destruction or degradation of wetlands, and will avoid undertaking new construction located in wetlands to the practicable extent possible. MCB Camp Lejeune will also obtain Section 10 and Section 404 permits from the USACE for structures, work, or discharges of dredged or fill material into waters of the US and wetlands. MCB Camp Lejeune's intent is to preserve the natural and beneficial value of wetlands when conducting activities and implementing programs affecting land use whenever possible.

4.7.2 Wetland Buffer Rules

MCB Camp Lejeune is located in the White Oak River Basin. No specific guidance for riparian buffer systems has been established for the White Oak River Basin. There are currently a number of "buffer zone requirements" in North Carolina (listed below) associated with development intended to protect waterways from surrounding land uses (both during and after construction).

- The North Carolina Division of Coastal Management has development regulations that apply to all lands within 75 ft of the normal high water level of estuarine waters, all lands within 30 ft of the normal high water level of inland waters, and 575 ft from designated Outstanding Resource Waters. This rule implies that development activities within those distances to waterways and wetlands require special attention to prevent adverse impacts to coastal waters.
- The NC Sedimentation Pollution Control Act requires that all land disturbing activities must retain a buffer zone of sufficient width along a lake or natural watercourse to confine visible siltation by natural or artificial means within the 25 percent of that portion of the buffer zone nearest to the land disturbing activity. This requires careful site selection and sediment erosion control planning to be effective.
- The NC Forest Practices Guidelines (FPG) Related to Water Quality and the Best Management Practices (BMP) Manual details specific tools and methods that can be used during forestry operations to protect riparian areas. The North Carolina Forestry Best Management Practices Manual states streamside management zones (SMZ) "Shall be of sufficient width to confine within the SMZ any visible sediment resulting from accelerated erosion." The general recommendation for SMZ width is 50 ft along each

side of intermittent, perennial streams and perennial water bodies. It is recognized that SMZ widths vary according to the purpose for the SMZ and the site's conditions.

While primarily intended to protect water quality impacts associated with nutrient loading, well-maintained riparian buffers provide a host of other beneficial uses including wildlife movement corridors; habitat connections that mitigate the effects of fragmentation by development; preservation of aesthetic viewsheds; and visual and physical boundaries between residential, industrial, and commercial areas.

MCB Camp Lejeune incorporated a base-wide requirement in 2010 requiring a 50 ft construction/clearing limit set back from jurisdictional wetland boundaries as a standard practice for all proposed projects. This extra precaution ensures compliance with development activities and protects riparian wetlands and waters during construction. Site designs where wetland buffers of less than 50 ft are unavoidable are approved only after all reasonable alternatives have been considered.

Wetlands Protection

Wetlands protection is required by Executive Order 11990, Protection of Wetlands. The greatest threat to wetlands on MCB Camp Lejeune is the impact of off-road maneuver military training with tracked and wheeled vehicles. Off-road vehicle movement can damage vegetation, leaving bare soil that is subject to erosion. Over time, erosion results in barren areas, deep ruts, large holes and gullies that restrict foot and vehicle movement. Wetlands are distributed throughout MCB Camp Lejeune and, as a result, there are very few areas large enough to allow sizeable off-road maneuver training where wetlands can be entirely avoided. Many live-fire ranges, helicopter landing zones, parachute drop zones, runway clear zones, and other mission-support openings also include wetlands. In these areas, managing vegetation without causing significant amounts of soil disturbance can become a challenge. As a result, specific land management practices must be implemented to minimize impacts on these wetlands.

MCB Camp Lejeune has established standard operating procedures for off-road vehicle movement to minimize impacts to wetlands. Currently:

- Tracked vehicles cross hard-surfaced roads and railroads tracks only at designated tank crossing sites/tanks pads,
- Tracked vehicles remain on the tank trails when transiting to/from designated training areas (i.e., tactical landing zones accessible by tank trails, tracked vehicle training areas),
- Units must grade or level out all rutted and disturbed areas,
- Units must respect barricades, fences, gates, and signs at areas posted as off-limits,
- Units must keep all vehicles at least fifty meters from fresh water fishponds, and
- Units must keep off the road shoulders of paved highways.

Best Management Practices are used to assist in minimizing impacts on the wetlands when maintaining vegetation on live-fire ranges, helicopter landing zones, parachute drop zones, runway clear zones, and other mission-support openings. The work is limited to the cutting and/or removal of vegetation above the ground, using chain saws, mowers, rotary cutters, or similar equipment to cut above the ground surface to avoid soil disturbance leaving the soils and roots intact. All equipment used for vegetation management in wetlands is designed especially for use in these types of sensitive areas. Some specialized equipment has been equipped with extra wide tracks or high flotation rubber tires to minimize soil disturbance.

4.7.3 Wetland Surveys

Jurisdictional wetland delineation and mapping of the base is performed in support of plans to improve facilities, or ranges. Such plans must consider the ecological consequences of wetland impacts when proposing new ranges, facilities or activities that may adversely affect wetlands. Wetland delineations will be performed on sections of the base identified by trainers and facility planners in cooperation with the Base Environmental Conservation Branch to ensure those priority areas most likely considered for development are delineated. Wetlands will be defined using the Routine On-Site Determination method as described in the 1987 "Corps of Engineers Wetlands Delineation Manual" and Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region (Version 2.0).

All wetland delineations are field verified and approved by the USACE. Once approved, digital files of the official delineation are then processed and integrated into MCB Camp Lejeune's Integrated Geographic Information Repository (IGIR).

4.7.4 Proposed Off-road Maneuver Range Development

The training priority for this INRMP period is to increase off-road maneuver capability, especially for tracked vehicles. This will require siting and planning maneuver areas that do not conflict with other mission requirements while complying with natural resources management and other regulatory requirements. Some priority areas will be considered exclusively for range development and training. The CC Road corridor is one of the few areas identified on GSRA where tactical vehicle maneuver capabilities are not severely constrained by very poorly drained wetland soils.

The planning and design of the GSRA TVMC and BCTMC will provide sustainable off-road maneuver space on both the west and east side of the installation. Technical assistance will be provided as needed to support the development of the TVMC and BCTMC range management and maintenance plans.

Range Sustainability

Long-term sustainable use of the GSRA TVMC and BCTMC is essential to achieve maximum training flexibility. Sustainable range management planning will require the development and implementation of such actions that include:

- BMPs for mechanized maneuver operations in wetlands,
- Guidelines for seasonality and frequency of use according to specific upland and wetland soil types,
- Procedures for vegetation and soil monitoring,
- Identification of triggers for cessation of training and implementation of remedial actions,
- Appropriate re-vegetation and soil erosion control procedures.

Management and maintenance plans will be developed during the TVMC EA process and a follow-on study by the USACE Engineer Research and Development Center (ERDC). Procedures will be developed in order to monitor the condition of the maneuver areas. It will be necessary to coordinate the programming, planning, designing, and execution of restoration plans for maneuver areas in need of land rehabilitation and maintenance.

Section 404 CWA Compliance

All potential compensatory wetland mitigation opportunities (e.g., State in-lieu fee program, private mitigation banks, and restoration/enhancement sites) on MCB Camp Lejeune will be explored during the planning and design process for range development projects such as the TVMC and BCTMC.

4.7.5 Greater Sandy Run Wetland Mitigation Bank

Background

A wetland mitigation bank (Wetlands Mitigation Bank Instrument) totaling 1,250.5 acres was established in GSRA on MCB Camp Lejeune in November 2000. The goal of the mitigation bank is to restore, enhance, and preserve pocosin, pine flat, and bottomland hardwood wetland systems and their functions and values to compensate for unavoidable, non-tidal, freshwater wetland impacts. The bank was created to mitigate impacts authorized by CWA Permits issued for range and infrastructure development in GSRA. GSRA was once owned by the International Paper Company. Large tracts of the GSRA wetlands were ditched and drained to facilitate intensive timber management practices of the time. MCB Camp Lejeune identified drained wetlands suitable for restoration and implemented plans to establish the GSRA Mitigation Bank (Figure 4-40) and restore and enhance wetlands in these areas. The Bank is divided into three main areas: (1) Pocosin Area, (2) Big Shakey Swamp, and (3) Burned Pine Plantation.

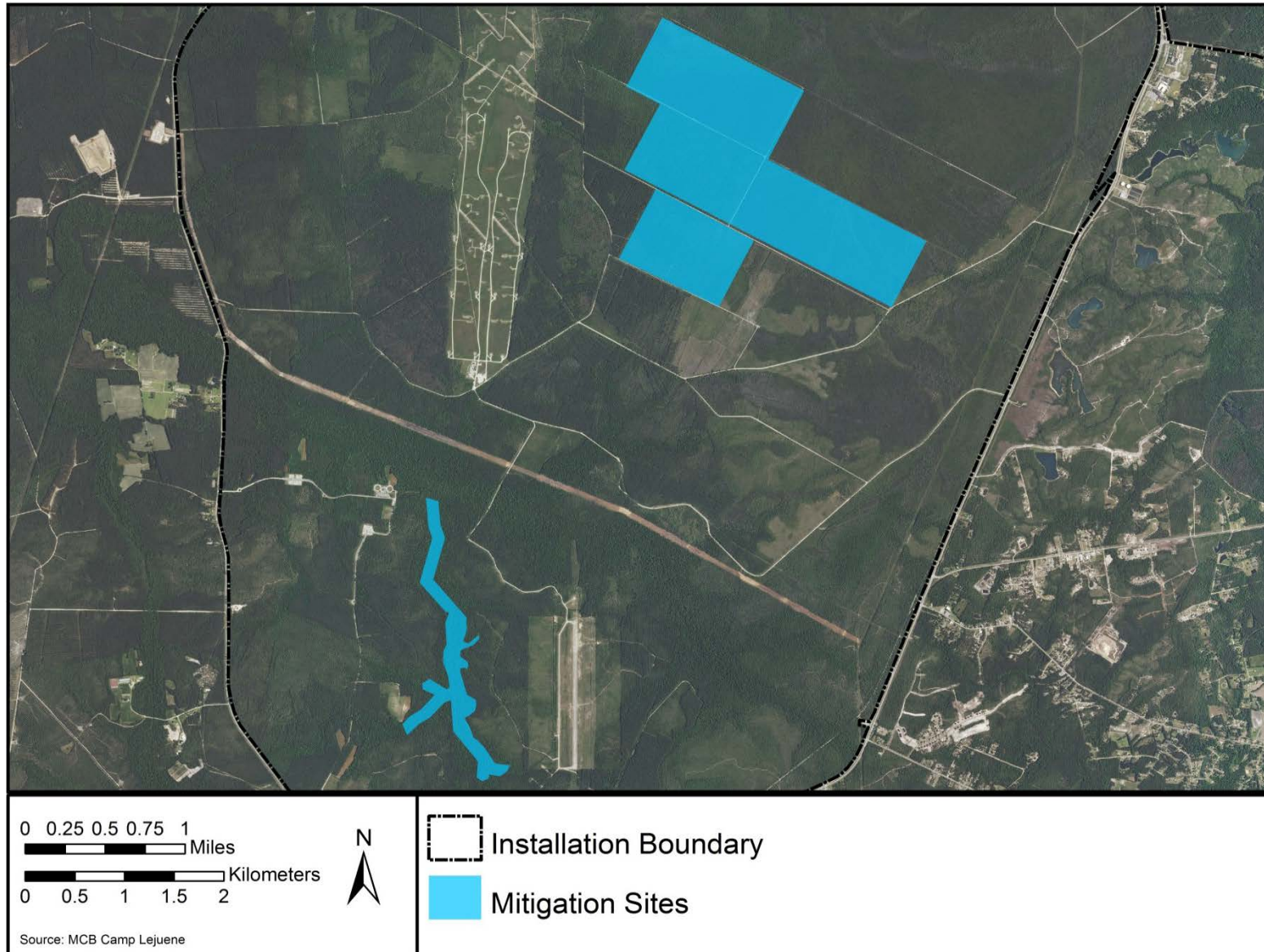


Figure 4-40. The Greater Sandy Run Mitigation Bank

4.7.5.1 Pocosin Area

The pocosin area was restored by plugging ditches at key points throughout the extensive drained network (Figure 4-41). The plugs elevate the groundwater back to levels experienced prior to silvicultural drainage activities. The 886.8-acre pocosin restoration area also receives surface water from the burned pine plantation.

4.7.5.2 Big Shakey Swamp

Big Shakey Swamp had been previously channelized to promote drainage of surrounding wetland forests. It was enhanced by placing timber dams (Figure 4-42) at 400 ft intervals within the existing channel. These dams allow the system to retain water and realize overbank, flooding conditions of the 143.4-acre area, similar to the historical, natural state.



Figure 4-41. (Left) Ditch Plug in the Pocosin Area. Figure 4-42. (Right) Timber check dam in Big Shakey Swamp

4.7.5.3 Burned Pine Plantation

The burned pine plantation was enhanced by plugging the existing ditches at key locations and by the placement of water control structures that allow surface water to flow into adjacent pocosin areas of the mitigation bank. The burned pine plantation was also planted with cypress and various oak and pine species. The planting plan called for a bottomland hardwood area surrounded by a pond pine and longleaf pine forest. The burn pine plantation includes 135.5 acres of pine flatwoods and 84.8 acres of bottomland hardwoods.

4.7.5.4 Monitoring

Hydrology and vegetation monitoring of the GSRA Mitigation Bank was conducted annually each growing season from 1994 through 2006. Monitoring was performed to determine if the bank supported planted-tree survival densities and document changes in plant communities as they responded to hydrological changes associated with the restoration effort. Monitoring efforts

were completed when they revealed that conditions on the site met performance criteria for hydrology and vegetation restoration established by the Mitigation Bank Review Team (MBRT).

4.7.5.5 Summary

In June 2007, the Mitigation Bank Review Team and the USACE concurred with our determination in the 2006 growing season report that the GSRA Mitigation Bank had conclusively and successfully met performance criteria as established in the approved 2002 Mitigation Banking Instrument, and that additional monitoring, both for hydrology and vegetation, was no longer required. Furthermore, all remaining credits are available for use. Inspections of the bank and maintenance of access roads and water control structures are performed annually. Established accounting procedures are used to maintain accurate records of debits made from the bank. The number of mitigation credits used by MCB Camp Lejeune for all approved permitted projects is 895.817 (749.197 pocosin credits and 146.620 bottomland hardwood credits) (Table 4-5). The total number of unused available credits is 354.683 (81.580 bottomland hardwood credits and 273.103 pocosin/pine flatwoods credits) (Table 4-6).

Table 4-5. June 15, 2012 Approved Projects and Authorized GSRA Mitigation Bank Debits

MILCON/Project Number	USACE ACTION ID	Pocosin Pine Flat Credits Used	Bottomland Hardwood Credits Used	Total Credits Used	Pocosin Pine Flat Impacts	Bottomland Hardwood Impacts	Total Project Impacts
P-949	199400693	25.880	0.000	25.880	17.250	0.000	17.250
P-933	199505124	100.470	22.470	122.940	66.980	7.490	74.470
P-028	199701178	14.270	0.000	14.270	9.510	0.000	9.510
P-934	199707554	18.620	14.690	33.310	12.410	4.900	17.310
P-062	199901380	18.450	11.490	29.940	12.300	3.830	16.130
P-935	200001559	37.240	20.910	58.150	24.830	6.970	31.800
HWY 17	NCDOT	141.000	58.000	199.000	94.000	19.300	113.300
SR-7 Targets	200400940	0.627	0.000	0.627	0.418	0.000	0.418
P-034	200600815	129.050	0.000	129.050	86.030	0.000	86.030
MARSOC	2007 286 067	5.700	0.000	5.700	3.800	0.000	3.800
Wallace Creek - 1	2007 3406	0.000	0.780	0.780	0.000	0.260	0.260
P-1135 K2Range	2007 3423	21.700	0.000	21.700	14.470	0.000	14.470
MCASNR Gate - 2	2009 391	0.735	0.000	0.735	0.497	0.000	0.497
P-031B	2009-00827	3.420	0.000	3.420	3.420	0.000	3.420
P-031	2007-03235	121.000	0.000	121.000	71.600	0.000	71.600
Birch St. Extensn.	2010-00596	0.000	1.440	1.440	0.000	0.480	0.480
Base Entry Road	2010-00436	2.540	7.180	9.720	1.270	4.250	(non-riparian) 5.520
Suspect Cargo	2010-01129	0.000	9.660	9.660	0.000	4.830	4.830
IPBC P032	2011-00257	107.480	0.000	107.480	71.650	0.000	71.65
SB Connector Rd	2007-00286	0.130	0.000	0.130	0.089	0.000	0.089
Base Entry Mod	2010-00436	0.885	0.000	0.885	0.590	0.000	0.590
TOTALS		785.197	146.620	895.817	491.114	52.310	543.424

Table 4-6. June 15, 2012 GSRA Wetland Mitigation Bank Accounting Summary

Mitigation Area/Credit Type	Mitigation Credits Established In Bank *(All credits in bank approved by MBRT)	Used Mitigation Credits In Bank	Unused Mitigation Credits In Bank *
Pocosin Area, Pocosin/Pine Flatwoods	886.800	749.197	137.603
Big Shakey, Bottomland Hardwoods	143.400	143.400	0.000
Burned Pine Plantation, Pocosin/Pine Flatwoods	135.500	0.000	135.500
Burned Pine Plantation, Bottomland Hardwoods	84.800	3.220	81.580
TOTALS	1250.500	895.817	354.683

Note: The Wilmington District, USACE and the Mitigation Bank Review Team have concluded that all remaining credits are available for use as of 26 June 07.

4.7.6 Wetland Conservation Goals and Measures

GOAL: Preserve and enhance the natural and beneficial values of wetlands while conducting activities that support the military mission.

OBJECTIVE WET1: Integrate wetland conservation into MCB Camp Lejeune’s facility and range development process.

- **Action 4.7-01:** *Delineate wetlands and update MCB Camp Lejeune’s GIS wetland layer.*
- **Action 4.7-02:** *Comply with Section 404 CWA permits issued by the USACE for DoD action on MCB Camp Lejeune*
- **Action 4.7-03:** *Perform Annual Inspections of the GSRA Mitigation Bank.*

OBJECTIVE WET2: Conserve wetlands so that training lands remain available for military training.

- **Action 4.7-04:** *Implement standard operating procedures for off-road vehicle movement to minimize impacts to wetlands. Monitor sensitive wetland areas to ensure impacts are minimized/mitigated.*
- **Action 4.7-05:** *Use Best Management Practices when maintaining vegetation on live-fire ranges, helicopter landing zones, parachute drop zones, runway clear zones, and other mission-support openings.*

4.8 COASTAL AREA MANAGEMENT

4.8.1 Federal, State, and Other Regulations

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 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 necessary to effectively manage 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 Coastal Area Management Act (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 land use plan 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, and is administered by the North Carolina Division of Coastal Management. MCB Camp Lejeune is located within one of North Carolina's Coastal Zone counties.

The NC Fisheries Reform Act of 1997 (G.S. 143B-279.8) establishes a process for preparation of coastal fisheries and habitat management plans for North Carolina, and states "the goal of the plans shall be to ensure the long-term viability of the State's commercially and recreationally significant species or fisheries". Through these plans rules are developed that manage fisheries and protect critical fish and shellfish habitat. Of particular relevance to this plan are the Oyster and Clam Fishery Management Plans and the Coastal Habitat Protection Plan.

The North Carolina Division of Marine Fisheries (DMF) is responsible for the stewardship of the state's marine and estuarine resources, including oversight for preparation of coastal fisheries and habitat management plans. The DMF's jurisdiction encompasses all coastal waters and extends to 3 miles offshore. The estuaries, brackish swamps and mud flats that serve as nursery areas for shrimp, crabs, finfish, and shellfish in the waters that surround MCB Camp Lejeune support an important commercial fishing industry and are enjoyed by an ever-increasing recreational angler population. The DMF is dedicated to ensuring sustainable marine and estuarine fisheries and habitats for the citizens of North Carolina.

4.8.1.1 Federal Consistency Review

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 licenses, permits, funding, or other federal 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 the coastal zone, 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, 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.

4.8.1.2 Areas of Environmental Concern

NCDENR Division of Coastal Management has established Areas of Environmental Concern (AECs) that are defined as areas of natural importance. Areas that may qualify as an AEC include areas that are susceptible to erosion, 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 systems, ocean hazard systems, 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, 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 North Carolina Administrative Code (NCAC) 7H. Some of the key points provided in this guidance include:

- Project activities should not weaken or eliminate natural barriers to erosion, and
- 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 percent of the

AECs of the lot, except along the shoreline of an Outstanding Resource Water (ORW) where the built-upon limit is 25 percent of the AECs.

4.8.1.3 Protection of Nursery Areas

The NC Marine Fisheries Commission (NCMFC) adopted regulations in August 1977 to protect estuarine areas, known as nursery areas. Nursery areas are defined in rule 15 NCAC 3I .0101(b)(20)(E) as: "...Those areas in which for reasons such as food, cover, bottom type, salinity, temperature, and other factors, young finfish and crustaceans spend the major portion of their initial growing season." In the original 1977 rule (3B .1404) that described the Scope and Purpose of Nursery areas, the following language was included: "Nursery areas are necessary for the early growth and development of virtually all of North Carolina's important seafood species. Nursery areas need to be maintained, as much as possible, in their natural state, and the populations within them must be permitted to develop in a normal manner with as little interference from man as possible."

The NCDMF recognizes two types of nursery areas: Primary Nursery Areas (PNA) and Secondary Nursery Areas (SNA):

- **Primary Nursery Areas (PNAs)** are defined by rule 15 NCAC 3I .0101(b)(20)(E) as: "... those areas in the estuarine system where initial post-larval development takes place. These areas are usually located in the uppermost sections of a system where populations are uniformly very early juveniles." Populations of economically important species in these areas are composed almost uniformly of early juveniles during the spring recruitment period from March to June. Rules protecting PNAs were created with the establishment of CAMA. CAMA provided rules for coastal development, such as prohibiting new dredging of channels, canals, and boat basins in primary nursery areas, and extending the area of rule application from 75 ft landward from the shoreline to 575 ft landward of the shoreline. Construction of marinas that require dredging is also prohibited in PNAs.
- **Secondary Nursery Areas (SNAs)** are defined by rule 15 NCAC 3N .0102(c) as: "... those areas in the estuarine system where later juvenile development takes place. Populations are usually composed of developing sub –adults of similar size that have migrated from an upstream primary nursery area to the secondary nursery area located in the middle portion of the estuarine system." These areas are located adjacent to PNAs, are generally deeper and contain mixed populations of large juveniles, sub-adults, and adults. Areas delineated as Special Secondary Nursery Areas (SSNAs) may be opened to shrimp and crab trawling at designated times of the year.

The DMF is responsible for preserving, protecting and developing PNAs for commercially important finfish and shellfish. The protection of designated PNAs, SNAs, Special SNAs, and

anadromous fish spawning areas in the upper reaches of the NRE is a priority for DMF. MCB Camp Lejeune will consider any activities that could directly or indirectly impact coastal areas, including designated AECs and PNAs. In ecosystem terms, a reasonable level of consciousness will be exhibited by MCB Camp Lejeune concerning contribution to regional drainage basins, such as the White Oak River Basin, especially the NRE. Location of MCB Camp Lejeune properties on the coast necessitates close cooperation and coordination with representatives from the NCDMF and other State and local agencies responsible for coastal zone management and protection of nursery areas.

4.8.2 Geographic Areas of Concern

4.8.2.1 Coastal Barrier Islands

Onslow Beach and Brown's Island are coastal barrier islands that support unique maritime communities but are also a critical component of military training on the base. Beachfront training areas on Onslow Beach support specialized amphibious operations that can be performed on a scale not feasible anywhere else on the east coast. Brown's Island is identified as the N1/BT-3 impact area and is critical for live fire operations including surface-to-air missile launches and naval-gunfire exercises. Coastal range initiatives including efforts to stabilize the AIWW/New River splash points and reactivate Brown's Island impact area will be assessed to determine adverse effects of proposed actions in coastal training areas.

The coastal barrier island ecosystem lies between the continental shelf in the ocean and the protected NRE behind it. This ecosystem encompasses the shoreface, the tidal inlet, backshore beach, barrier dunes, maritime communities, and overwash sand flat habitats. These habitats are defined by intrinsic ecological processes, but are linked together by sediment transport, nutrient exchange, and biological uses, each of which undergoes substantial changes over multiple time scales. Maritime communities include Dune Grass, Maritime Shrub, Salt Marsh, and Upper Beach. Logger head sea turtle, piping plovers, and seabeach amaranth are federally protected and are some of the many species that inhabit this area.

Coastal barrier dunes are formed by wave and wind action. Waves bring sand to shore where it is transported landward by onshore winds. Obstacles, such as driftwood, a sand fence, or vegetation, reduce wind speed, causing sand to accumulate. As sand accumulates, plants adapted to the beach environment emerge, stabilizing the surface and promoting further dune formation. Intense and continuous use of the training beach area for amphibious training has the potential to accelerate natural erosion. Intensive beach use increases the need to restore, construct, protect, and manage dunes to prevent loss of maritime communities that could limit military training and other compatible uses including recreation. Primary coastal dunes are stabilized and protected by implementing seasonal beach driving restrictions, replanting dune grasses, and installing sand

fences to encourage new dune formation. Coastal dune stabilization is performed annually on designated portions of the beach-dune system that make up the training beach.

4.8.2.2 Coastal Wetlands and Marshes

Coastal wetlands are defined as the vegetated and non-vegetated intertidal habitats in salt and brackish waters and include marshes and adjacent mudflats, sandflats, and tidal creeks. Salt marshes within the MCB Camp Lejeune region occur in the lower NRE and along both shores of the AIWW. These marshes are typically dominated by smooth cordgrass and black needle rush. The distribution of dominant plant species in NRE shoreline habitats illustrates the transition from smooth cordgrass-dominated salt marshes in the AIWW and lower NRE to brackish marshes with a mixture of black needle rush and big cordgrass (*Spartina cynosuroides*) further up in the estuary. Common reed, an invasive marsh species, was documented at several locations along NRE shoreline, mostly between Stones Bay and Wallace Creek. The total area of coastal wetlands on MCB Camp Lejeune is approximately 1,090 ha (2,690 ac).

Coastal marshes are also the only wetlands on MCB Camp Lejeune that adjoin and occasionally intercept amphibious military training exercises and play a critical role in barrier island stabilization. Training areas on MCB Camp Lejeune south of the Mile Hammock Bay anchorage basin include salt marsh that has become increasingly fragmented over the last 50 years, per results from DCERP Research (Currin, personal communication, 2014). A number of factors have likely contributed to this fragmentation, including rising sea level, storm events, and salt marsh dieback. Recent research on marsh geomorphology has demonstrated that once open water areas are created in a salt marsh, wind driven waves exacerbate the opening and begin a transformation from marsh to open water.

Increased fragmentation of this area could adversely impact MCB Camp Lejeune training activities, alter inlet dynamics, and increase maintenance dredging to maintain the AIWW and the Mile Hammock Bay boat basin. Research suggests that thin-layer applications (10-20 cm) of dredged sediment from the coastal inlets or the AIWW to ponded areas within the Mile Hammock Bay salt marsh, and subsequent plantings of smooth cordgrass (Figure 4-43) to stabilize the sediments will promote barrier island stabilization and sustain Onslow Beach for



Figure 4-43. Conservation staff planting cordgrass along coastal, estuarine shorelines

military training. MCB Camp Lejeune proposes to evaluate the feasibility of a “Thin Layer Disposal Project” to restore saltmarsh and promote barrier island stabilization.

4.8.2.3 Estuarine Areas/ Estuarine Shorelines

North Carolina has the largest estuarine system of any state on the Atlantic coast — approximately 2 million acres of sounds, tributaries, marshes, and wetlands. The NRE in Onslow County is surrounded by MCB Camp Lejeune with the City of Jacksonville at the upper part of the estuary, near the vicinity of Wilson Bay. It is a shallow system with more than half of the estuary being less than 2-m deep. Portions of the NRE support aquatic grass beds, also known as submerged aquatic vegetation (SAV). SAV is a marine fish habitat dominated by one or more species of underwater vascular plants such as eelgrass (*Zostera marina*), shoalgrass (*Halodule wrightii*), and widgeon grass (*Ruppia maritima*). These vegetation beds may occur in isolated patches or cover extensive areas. In either case, the bed is defined by the presence of above-ground leaves or the below-ground rhizomes and propagules together with the sediment on which the plants grow. Shallow estuaries such as the NRE and SAV beds are vulnerable to man-made disturbances, including inputs of nutrients (e.g., nitrogen, phosphorus) and sediments, and natural disturbances due to episodic storms.

Shellfish are found in most coastal waters of the state. The NRE also supports areas that have been identified by NCDMF as important for shellfish production. The NCDMF has found that more oysters and clams can be produced by creating more habitat.

During the summer months, the NCDMF “plants” oyster shell and limestone rock (called cultch) in designated oyster management areas to provide additional habitat for larval oysters and clams. Large vessels transport the cultch out to a designated site, and the shells are either dumped off with a front end loader or sprayed off with a high-powered hose (Figure 4-44). Several hundred thousand bushels of cultch material are planted annually, depending on availability.



Figure 4-44. Large vessels transport and dump oyster shells that provide habitat and protect small marine organisms (photo by NCDMF).

Not only are these planting sites beneficial to oysters, they also provide habitat and protection for clams, juvenile finfish, crabs, and small marine organisms. Larger fish tend to congregate around these sites, feeding on the smaller fish and marine life. Planting sites are located in the lower reaches of the New River from Little Creek south to Chadwick Bay to provide additional shellfishing opportunities for both commercial and recreational fishermen.

MCB Camp Lejeune supports this effort by offering NCDMF permission to use staging areas at the Mile Hammock Bay anchorage basin for the purpose of oyster cultch material storage and loading to facilitate transportation of cultch to New River oyster management locations.

MCB Camp Lejeune also recognizes the need to support DMF plans (whenever possible and consistent with the military mission) to protect and enhance strategic habitat areas, identified in habitat assessments completed in the White Oak river basin, including the New River tributary.

The NRE within the boundaries of MCB Camp Lejeune is divided into several training sectors that are used for numerous military training exercises ranging from amphibious vehicle operations, small boat training, waterborne refueling, etc. Forty-one splash points have been established for amphibious vehicles to enter or leave the water along the shoreline throughout the NRE. Monitoring and evaluation of the areas subjected to high military use is essential. The implementation of corrective actions may be required to preserve their military and ecosystem value and support long-term, sustainable use of splash points located along the AIWW and shoreline throughout the NRE.

4.8.3 Coastal Area Conservation Goals & Measures

GOAL/OBJECTIVE COA1: Manage, protect, and preserve coastal resources.

- **Action 4.8-01:** *Support oyster management in the NRE by providing NCDMF access to store oyster shell (at Mile Hammock Bay) used for oyster cultch planting in sites at selected locations in the NRE and support public access to existing DMF Shellfish Management Areas for shellfishing and fishing consistent with the military mission.*
- **Action 4.8-02:** *Implement living shoreline stabilization projects along the New River where site conditions support shoreline protection and habitat restoration designs.*
- **Action 4.8-03:** *Stabilize, enhance, protect, and restore coastal dunes using native vegetation and other approved methods within the training section of the beach.*
- **Action 4.8-04:** *Implement and monitor seasonal beach driving restrictions.*
- **Action 4.8-05:** *Participate in the planning process for range development projects in the coastal zone to help avoid and minimize impacts to coastal resources.*
- **Action 4.8-06:** *Develop a monitoring program for the purpose of evaluating the effect of “splash points” on the surrounding wetlands and develop measures to counter those effects.*
- **Action 4.8-07:** *Evaluate the feasibility of a “Thin Layer Disposal Project” to restore saltmarsh and promote barrier island stabilization.*

4.9 SOIL CONSERVATION

MCB Camp Lejeune 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 installation master plans and supported by the INRMP, Integrated Cultural Resources Management Plan, and other local directives. This planning integration ensures the sustainability of MCB Camp Lejeune for future generations. Efforts to restore and maintain lands to full training support capability include identifying maintenance requirements and implementing restoration activities on eroded training lands before the areas are degraded to the extent that they can no longer sustain the military mission.

4.9.1 Soil Conservation Areas of Concern

Increasing operational tempo, continuing to add mission requirements, and introduction of advanced weapon systems now, more than ever, requires long-range planning in order to ensure training area lands are maintained and managed for compatible uses. Areas of concern include training areas and mission support openings, roads and tank trails, and hardened sites/splashpoints.

4.9.1.1 Training Areas and Mission Support Openings

Constant use of the land for military training, especially mission support openings (tactical landing zones, artillery gun positions, and engineer/heavy equipment training areas) combined with intermittent, significant weather-related events, can result in erosion problems that affect the quality of training and reduce the land's ability to recover naturally. Repeated use can result in large areas with compacted soils that are denuded of vegetation (Figure 4-45). These areas significantly contribute to increased sedimentation and if unchecked, result in costly grading and vegetation reestablishment. Neglect of such areas will (1) allow eroded sediment to escape into adjacent streams and wetlands, (2) create impassable roads used for training and natural resources management, and (3) force trainers to abandon unsuitable areas, causing them to exceed the training capacity of other lands, which leads to new erosion



Figure 4-45. V-22 Osprey landing in TLZ Albatross. Repeated use of landing zones can cause erosion in large areas.

problems. The Range Maintenance Officer is responsible for the inspection, maintenance, and management of training areas and mission support openings.

Roads and Tank Trails Management

Since roads and trails on MCB Camp Lejeune were first used for military training, they have improved in number and length. Continual improvement is essential, as unimproved roads and trails contribute to soil erosion and sedimentation by reducing infiltration and concentrating runoff. Over time, improved graveled roads can become degraded and need significant repair. Eroded maneuver trails (the network of unpaved trails within a training area that is used by tactical vehicles and equipment for light or heavy maneuver training) can be improved with regular grading, maintenance of roadside ditches, and culvert maintenance and repair. Primary tank trails are maintained by the Public Works Office. Forest access roads used to support natural resources management are maintained as needed.

4.9.1.2 Hardened Sites/Splashpoints, Shorelines

Specialized training areas that support amphibious training activities include amphibious vehicle splash points, boat launches, bridge sites, and floating barge on/off-loading areas. Many of these sites on MCB Camp Lejeune are used repeatedly for training purposes. Such areas may not be easily rehabilitated in a cost effective manner to a sustainable state that can continue to support heavy use, but they often can be hardened using layers of suitable stone, concrete pads, or interlocking engineered concrete blocks to facilitate military use and reduce soil erosion and associated sedimentation along the shorelines where they are located.

4.9.2 Soil Conservation Practices & Strategies

MCB Camp Lejeune has expended substantial time, effort and funds in an attempt to adequately address land management/erosion problems base-wide. The process includes programming, planning, designing, scheduling, and executing restoration and maintenance projects based on requirements and priorities identified by military trainers and natural resources staff. The intent of these efforts is to:

- Align training land management priorities with the training needs and readiness priorities on MCB Camp Lejeune,
- Facilitate training to current military standards while advocating tactically responsible conservation and land management practices,
- Achieve optimal sustained use of lands for the execution of realistic training, and
- Support a management and decision-making process that integrates training and other mission requirements for land use with sound natural resource management.

These efforts directly benefit training and natural resources by: (1) recovering training areas previously not suited for training due to erosion (i.e., tactical landing and parachute drop zones with unsafe, eroded surfaces); (2) reducing soil erosion and subsequent sedimentation in sensitive riparian habitats, streams, and estuaries; and (3) providing enhanced vegetative recovery on site. To the extent practicable, seeding or plantings of eroded areas will utilize native species including warm season grasses. Mowing schedules are evaluated to determine whether any seasonal adjustments need to be made to provide maximum benefit to both training and conservation objectives. The temporary placement of some areas in a limited use or closed status during rehabilitation and maintenance projects may be required to provide the time and means to perform land rehabilitation and land maintenance operations in heavily degraded areas.

4.9.3 Regulatory Permits and Best Management Practices

Soil conservation/erosion control projects often require coordination with other installations, state, and federal organizations. NEPA review is generally required for any federal action that has the potential to impact humans and/or the environment. Prior to any construction activities that create any soil disturbance, NEPA review and an archaeological clearance is obtained. Projects that affect wildlife, wildlife habitat, and similar activities also require coordination with NEPA.

US Army Corps of Engineers

There may be instances where soil conservation/erosion control projects are planned in or near areas recognized by the USACE as being wetlands or Waters of the United States, as identified in Section 404 of the CWA. The CWA limits non-point sources of pollution such as soil and debris from entering waterways resulting from sedimentation. Any construction activities proposed in wetlands or Waters of the United States is coordinated with the USACE in Wilmington, North Carolina, to determine if a 404 permit is necessary prior to construction. If a permit is required, it is processed prior to construction activities.

North Carolina State Permits

The North Carolina Sedimentation Pollution Control Act of 1973 requires landowners to plan and implement sufficient control measures to prevent accelerated erosion and sedimentation. The State of North Carolina requires an approved sedimentation and erosion control plan for projects that disturb over one acre, including projects to correct erosion. Sedimentation and erosion control plans must be submitted and approved prior to construction. Required information is submitted to the NCDENR Division of Land Quality. A project-specific stormwater management permit from the NCDENR Division of Water Quality may also be required prior to commencing work.

Erosion and sedimentation control permitting is not required for routine military training operations. MCB Camp Lejeune has established standard operating procedures for implementing best management practices for off-road vehicle movement to minimize impacts that result in erosion. Currently:

- Amphibious vehicles use only designated splash points,
- Units must grade or level out all rutted and disturbed areas, and
- Units must respect barricades, fences, gates, and signs at areas posted as off-limits during implementation of land rehabilitation and erosion maintenance/repair projects.

4.9.4 Soil Conservation Goals and Measures

GOAL: The following objective and actions have been established to support planning and informed scheduling, and to support the development and implementation of erosion prevention and restoration on MCB Camp Lejeune training lands.

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

- **Action 4.9-01:** *Monitor training effects on inland soils and in coastal areas, and use results to provide recommendations for restoration of eroded sites/soil conservation.*
- **Action 4.9-02:** *Place selected eroded sites in a closed or limited use status during restoration/rehabilitation and maintenance repair projects.*
- **Action 4.9-03:** *Use an interdisciplinary approach to review proposed actions at MCB Camp Lejeune for all land-disturbing projects that will impact 1 acre or more of land.*
- **Action 4.9-04:** *Improve the maneuver trails network including splashpoints and other hardened sites to facilitate mechanized training requirements.*

4.10 INVASIVE SPECIES MANAGEMENT

Invasive species are any species that are not native to a given ecosystem and whose introduction causes or is likely to cause economic or environmental harm and/or harm to human health (EO 13112 on Invasive Species, February 1999). Many invasive species displace or otherwise harm native species and can alter ecosystem processes affecting both aquatic and terrestrial habitats. For these reasons, invasive species are recognized as a significant threat to threatened and endangered species, biodiversity, and natural ecosystems. The control of invasive species is critical for maintaining ecosystem health and integrity and ensuring effective stewardship and sustainability of the land for current and future military missions.

The control of invasive species is recognized as a priority of federal and state governments nationwide with a number of regulations and statutes authorizing their control. DoDI 4715.03 – Natural Resources Conservation Program, directs that DoD shall identify, prioritize, monitor, and control invasive and noxious species and feral animals on its installations whenever feasible. The DoD Pest Management Program (DoDI, 4150.7) further states that it is DoD policy to prevent or control pests that may adversely impact readiness or military operations by affecting the health of personnel, or by damaging structures, materiel, or property. EO 13112 specifically addresses the control of invasive, non-native species on federal lands and requires federal facilities, to the extent practicable and permitted by law, to:

- Prevent the introduction of invasive species,
- Detect, respond rapidly to, and control populations of such species in a cost-effective and environmentally sound manner,
- Accurately monitor invasive species populations,
- Provide for restoration of native species and habitats that have been invaded,
- Conduct research on invasive species to prevent their introduction and provide for environmentally sound control,
- Promote public education on invasive species, and
- Not to authorize, fund, or carry out actions that it believes are likely to cause or promote the introduction or spread of invasive species.

The Federal Noxious Weed Act of 1974 (7 USC §2814) provides for the control of noxious plants on lands under the control or jurisdiction of the federal government. Section 15 of the Act requires federal land management agencies to develop and establish a management program for control of undesirable plants that are classified under federal or state law as undesirable, noxious, harmful, injurious, or poisonous where similar programs are being implemented on state and private lands in the same area. The North Carolina Noxious Weeds Regulations control the movement of specified weeds in the state.

4.10.1 Invasive Plant Species Surveys

An invasive plant species survey was conducted between March and December 2008 and a management plan developed for MCB Camp Lejeune in 2009 (Geo-Marine, Inc. 2009). The survey consisted of a combination of walking the forest edges and interiors, marshes, and drainage areas and driving the installation roads to detect the presence of invasive plants. Survey efforts were concentrated in the managed forested areas of the Main Base and GSRA. Additional aquatic surveys were conducted in the New River and its tributaries via boat. Cantonment and impact areas were not included in this survey effort.

A total of 87 training areas were surveyed during the 2008 invasive plant species survey, 78 of which were identified as having invasive plant infestations. In each training area, constraints that require extra precautions in treatment of invasive plant infestations were identified. Such constraints include wetlands, streams, and other open water; rare, threatened, and endangered species; and schools, recreation areas, and other areas of public concentration. Additionally, military training facilities, including firing ranges, gun positions, and tactical landing zones, which may present a safety issue for survey, monitoring, and control efforts, were also identified.

4.10.2 Invasive Species of Concern

At least 25 invasive plant species were identified and mapped at MCB Camp Lejeune, totaling nearly 600 acres. Japanese stiltgrass (*Microstegium vimineum*), Chinese wisteria (*Wisteria sinensis* [Figure 4-46]), common reed, privet (*Ligustrum* spp.), and kudzu (*Pueraria montana* [Figure 4-47]) were the most abundant species; however, mimosa (*Abizia julibrissin*) also occurred very frequently.



Figure 4-46. (Left) Chinese wisteria vine infestations were documented in over 100 acres of forested compartments at MCB Camp Lejeune. Figure 4-47. (Right) Like Chinese wisteria, kudzu can outcompete and blanket native vegetation if left unchecked.

In order to better coordinate with state and local priorities for invasive species control, the North Carolina noxious weed list and state ranks as described by the North Carolina Native Plant Society were consulted for each species documented. Florida betony (*Stachys floridana*) and dodder (*Cuscuta* spp.) were the only noxious weeds observed. Non-native dodder is classified as a federal and state Class A noxious weed, whereas Florida betony is a state Class B noxious weed (NC Department of Agriculture and Consumer Services, 2014).

Table 4-7. MCB Camp Lejeune Invasive Plant Species Summary

Scientific Name	Common Names	Estimated Acres
HIGH PRIORITY SPECIES		
<i>Alternanthera philoxeroides</i>	Alligator Weed	0.5
<i>Hedera helix</i>	English Ivy	≥0.1
<i>Lygodium japonicum</i>	Japanese Climbing Fern	≥0.1
<i>Phyllostachys aurea</i>	Golden Bamboo	0.6
<i>Pueraria montana</i>	Kudzu	44
<i>Rosa multiflora</i>	Multiflora Rose/other non-native roses	0.5
<i>Stachys floridana</i>	Florida Betony	≥0.1
<i>Wisteria sinensis</i>	Chinese Wisteria	110
MEDIUM PRIORITY SPECIES		
<i>Elaeagnus pungens</i>	Thorny Olive, Silverthorn	0.1
<i>Elaeagnus umbellata</i>	Autumn Olive	0.3
<i>Ligustrum</i> spp.	Privet	59
<i>Melia azedarach</i>	Chinaberry Tree	0.1
<i>Microstegium vimineum</i>	Japanese Stiltgrass, Nepalese Browntop	262
<i>Phragmites australis</i>	Common Reed	115
<i>Pyrus calleryana</i>	Bradford Pear	≥0.1
LOW PRIORITY SPECIES		
<i>Arundo donax</i>	Giant Reed	≥0.1
<i>Cortadaria</i> spp.	Pampas Grass	0.2
<i>Albizia julibrissin</i>	Mimosa, Silktree	3.0
<i>Cuscuta</i> sp.	Dodder	0.2
<i>Lespedeza bi-color</i>	Shrubby Lespedeza	1.9
<i>Lonicera japonica</i>	Japanese Honeysuckle	0.2
<i>Populus alba</i>	White Poplar	0.3
<i>Pyracantha coccinea</i>	Firethorn	≥0.1
<i>Senna obtusifolia</i>	Sicklepod	≥0.1
<i>Sorghum halepense</i>	Johnson Grass	≥0.1
<i>Triadica sebifera</i>	Chinese Tallowtree, Popcorn Tree	≥0.1

Figure 4-48 illustrates the mapped invasive species infestations and Table 4-7 lists the documented species as well as the estimated total of infested area per species.

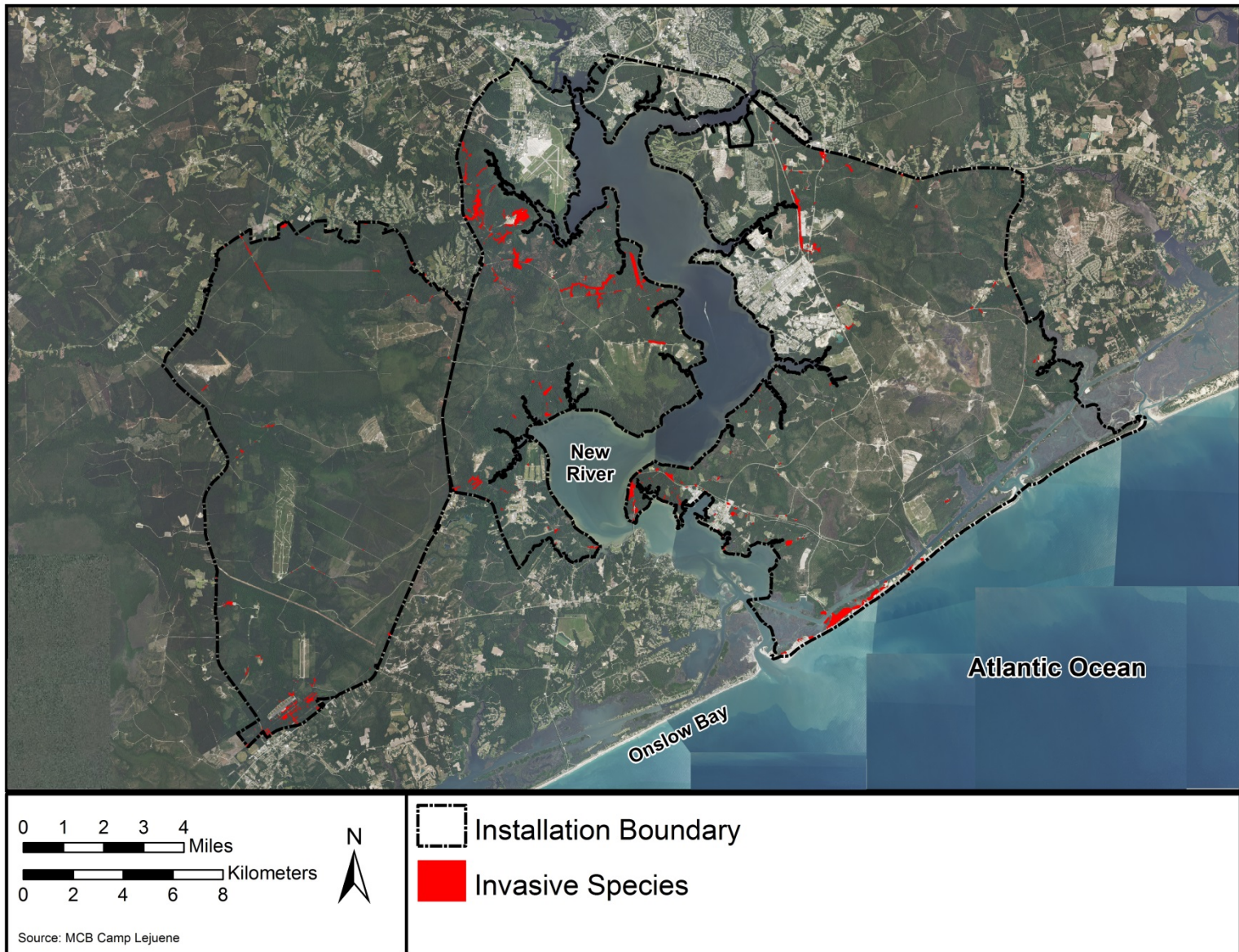


Figure 4-48. MCB Camp Lejeune invasive plant species locations

4.10.3 Invasive Species Management Practices

DoD policy requires invasive species management employ the principles of integrated pest management (IPM) to help minimize use of pesticides. The objective of IPM is to use ecologically, economically, and socially sound strategies to control or keep pests at tolerable levels. In IPM, the full range of pest control options (biological, mechanical, and chemical) are employed after consideration of the pest's biology, infestation severity, and environmental impacts.

4.10.3.1 Prevention

Preventing the introduction of invasive species is considered the first step in their control. Disturbance to an environment is the main avenue for the introduction of invasive species; however, due to areas of nearly continuous, intensive training, disturbance is largely unavoidable at MCB Camp Lejeune. The following methods help prevent or reduce accidental introductions from disturbance:

- Incorporate weed prevention and control into project layout, design, alternative evaluation, and project decisions,
- Avoid or remove sources of weed seed and propagules to prevent new weed infestations and the spread of existing weeds,
- Ensure fill used in construction projects and other materials likely to transport non-native species are as free as possible of non-native species plant propagules,
- Where feasible, control non-native plant species established on neighboring lands before they become established, and
- Where project disturbance creates bare ground, consistent with project objectives, reestablish vegetation to prevent conditions to establish weeds.

It is also important to avoid planting non-native species as landscaping plants unless they are clearly shown to be noninvasive. A lag time generally occurs between the time a new species is introduced and the time it becomes a problematic weed; therefore, avoiding the use of non-native species site-wide is strongly recommended. Any non-native plants included on planting plans may be rejected by the ECON during the review process.

4.10.3.2 Biological Control

Biological controls involve the use of natural enemies that limit the spread of plants or other animals through the use of insects, fungi, or other microorganisms that feed on, parasitize, or cause harm to invasive plant species. Biological controls, however, can also have unintended impacts on native species or ecosystems. Biological control agents are typically non-native

organisms themselves and can become established or introduce additional pathogens. The use of biological controls would require coordination with USDA APHIS, which is responsible for controlling introductions of species brought into the United States for biological control of plants.

4.10.3.3 Mechanical Control

Mechanical controls include pulling, mowing, cutting, girdling, and burning to manage and eradicate invasive species. Small infestations may often be controlled by hand pulling, grubbing with a hoe, or by using a shrub-pulling device. However, such methods cause soil disturbance, which can encourage reinvasion and infestation by other pests. These methods are also generally not effective in eradicating large infestations unless combined with chemical controls. Using a combination of mowing or cutting and a selective application of herbicide on targeted invasive plant species is often the most effective approach.

Prescribed fire is a mechanical control method that can be effective in certain situations. Typically, burning alone will not control invasive plant infestations, but when combined with herbicide or other mechanical treatments, it can be an effective management strategy. Use of prescribed fire as a means of mechanical control should be given careful consideration because of its potential to impact native vegetation, the ecosystem, and training.

In some instances, burning can increase invasive plant infestations by encouraging seed production and resprouting, and by reducing competition from desirable species. Therefore, timing of prescribed fire treatments is critical. Burning is usually most effective just before flowering or seed set. For woody species, burning is most effective when the plant is young, typically at the seedling/sapling stages. Spot-burning can be effective for individuals or small infestations of invasive plants. Some species can be controlled by burning preceded by or followed by herbicide treatment. Repeated burns are often necessary to achieve effective control or eradication.

4.10.3.4 Chemical Control

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

Herbicide Applications

Direct foliar spraying (Figure 4-49) is an effective herbicide application method for treating most types of invasive plants, but should only be used where there is little risk of affecting desirable vegetation. With this method of application, herbicides are mixed with water and a surfactant and are sprayed on the foliage until the entire leaf of the target plant is wetted, but not to the point of dripping. Backpack sprayers are generally used for individual plants and small to mid-sized infestations. Spraying systems mounted to trucks or tractors may be used for large infestations. Foliar sprays are most effective when applied from midsummer to



Figure 4-49. Foliar herbicide treatment of kudzu infestation at MCB Camp Lejeune

late autumn, though other times of the year may be specifically prescribed for certain species. Precautions that reduce damage to non-target species include using drift retardants and spray shields and discontinuing applications during windy conditions. Herbicides that are active in the soil should not be used when non-target plants may be affected by root uptake.

Basal bark application is an appropriate method for controlling invasive plants with woody stems less than 6 inches in diameter and for species with smooth juvenile bark. For basal bark applications, herbicides are mixed with commercially available basal oil, diesel fuel or kerosene, and a penetrant and are sprayed or daubed onto the lower portion of woody stems. Oil soluble herbicides or ready-made mixes are used in basal spray applications. To be effective, the lower 12 to 16 inches of stem must be fully wetted with the herbicide mixture. A backpack sprayer or wick applicator is used for this treatment. Applications are usually made in late winter if the ground is not frozen and early spring so that leaves are less of a hindrance, though summer applications are also effective.

Cut-stump or cut surface treatments are useful for large and small diameter woody invasive species. This method involves cutting the woody stem of trees and shrubs with a chainsaw, brush cutters, or handsaw, and applying an herbicide solution to the cut surface. A backpack sprayer, spray bottle, wick, or paint brush may be used. The herbicide mixture must be applied to the cut-stump immediately after cutting to ensure effectiveness. Herbicide treatments are most effective while the tree is actively growing and translocating nutrients. The herbicide should be applied after the plant has bloomed and prior to dormancy. Cutting the tree outside of this time frame is effective in removing the bulk of the biomass, but the resprouts will need to be treated with chemical the following year in order to kill the plant.

For more mature, thick-barked species, herbicides can be applied to cuts or holes drilled into the bark of the tree that exposes the cambium to contact with the herbicide. Herbicide can also be directly injected into the trunk of a tree using a special injection tool. This method provides efficient use of the chemical with minimal exposure; however, the tool and herbicide pellets can be expensive and difficult to transport into the field (Tu et al. 2001).

Herbicide Use Considerations

Herbicides may be nonselective (broad-spectrum) or selective toward the types of species they control and may act primarily on the leaves, soil, or both. When possible, selective herbicides that target specific species and have minimal residual soil activity should be used. By law, herbicides must be applied according to label instructions. Instructions on the herbicide label pertaining to storage, disposal, safety equipment and precautions, and proper application must be followed for all herbicides. Herbicide application on military installations must be conducted by either DoD certified personnel or contractors with the proper state herbicide applicators certifications or licenses.

Site characteristics are important to consider before applying any chemical controls. The presence of surface water or shallow ground water (as in wetlands) requires the use of an herbicide approved for aquatic situations in order to protect water quality and aquatic resources. Areas adjacent to housing or recreational areas should use herbicides with low residual effects or use a method that reduces drift and non-target contamination.

The weather and biology of the species to be controlled are taken into account when determining the timing of herbicide applications. Herbicide treatments for perennial species are typically conducted in the fall as this is when the plant is transporting nutrients from its vegetative structures to its roots, thereby transporting the herbicide to achieve better control. Each species responds differently; therefore, individual species biology must be considered before herbicide application.

Although a large number of non-native species occur at MCB Camp Lejeune, not all are problematic. Some species, however, pose a greater threat than others and warrant control. Therefore, assessing the extent of damage caused by the presence of invasive species and prioritizing management activities are important steps to ensure the greatest environmental benefit and the success of the invasive species control program. The primary considerations for prioritizing actions are:

- The potential impact of invasive species to the military mission,
- The severity of threat to natural ecosystems and rare, threatened, and endangered species,
- The potential for non-target species damage from treatment, especially to threatened and endangered species,

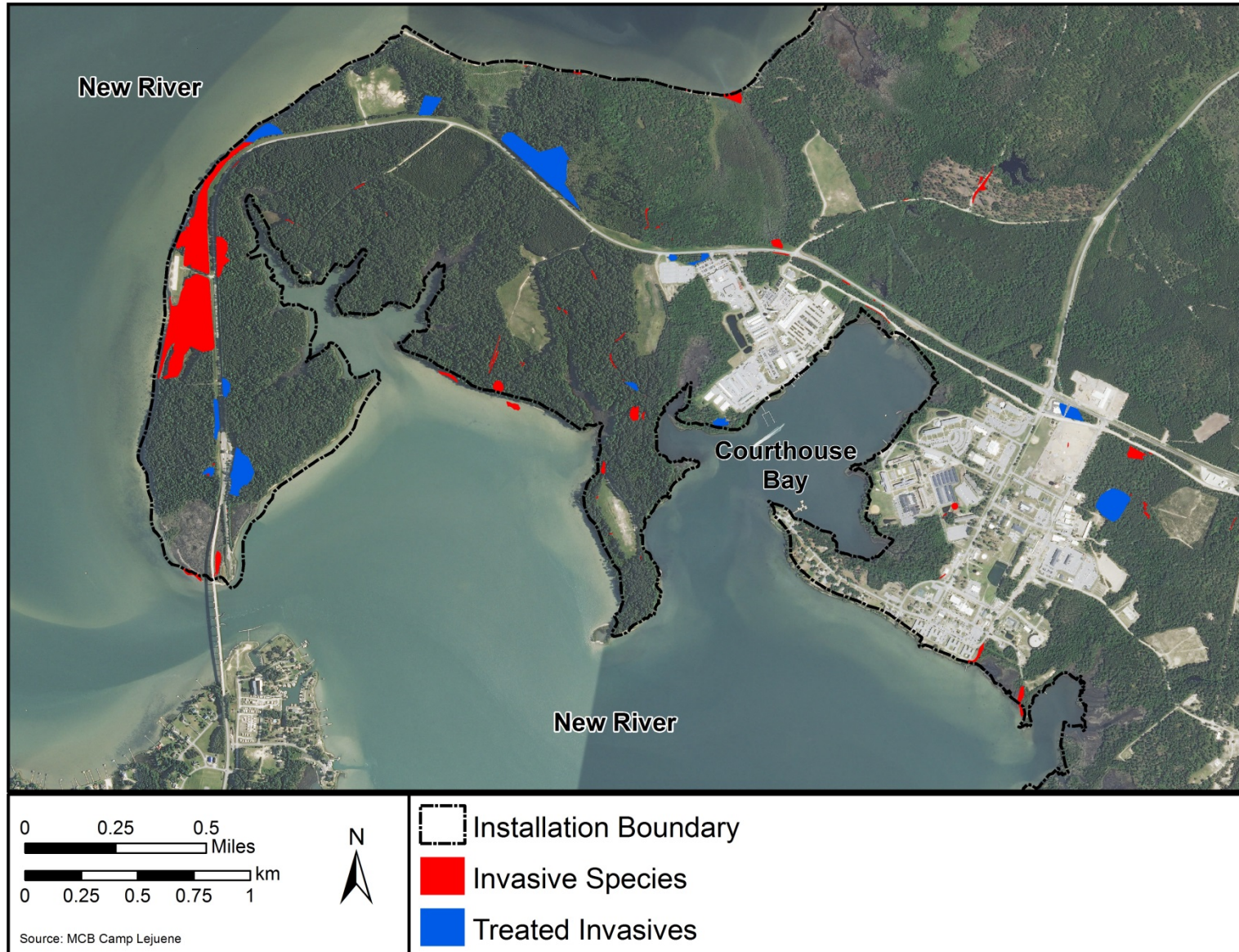


Figure 4-50. Invasive plant infestations treated in 2009

- The potential impact to cultural resource areas, and
- The feasibility of control with limited resources.

In general, treatment priorities should include fast growing vine species such as kudzu, wisteria, Japanese climbing fern (*Lygodium japonicum*) that cause extensive damage to the forest canopy and are relatively easy to control, Florida betony, which is a state noxious weed, and alligatorweed, which clogs waterways and severely degrades natural aquatic systems. Golden bamboo (*Phyllostachys aurea*) and Chinese tallowtree (*Triadica sebifera*) are other species that if left uncontrolled, may soon infest large forested areas making them less suitable for training and degrading their value as wildlife habitat.

Since the development of the invasive species plan in 2009, invasive plant control measures have been conducted on approximately 25 acres of infested training areas including TAs IE, JA, JC, JD, and JE (Figure 4-50). Kudzu and wisteria have been the primary focus of control efforts. Lesser amounts of common reed, privet, mimosa, and other species were also treated. Treatments have been repeated as necessary to ensure the highest rate of control practicable.

ECON will continue to prioritize and treat invasive plant infestations in critical training areas, in areas where rare, threatened, and endangered species may be impacted, and in areas where other significant resources are being threatened.

4.10.4 Conservation Goals and Measures

GOAL/OBJECTIVE INV1: Continue implementation of the Invasive Species Management Plan to survey, control, and monitor invasive species at MCB Camp Lejeune in order to conserve and enhance native flora and fauna and maintain quality habitat for the military training mission.

- **Action 4.10-01:** *Monitor non-native and exotic invasive plant and animal species on MCB Camp Lejeune.*
- **Action 4.10-02:** *Implement necessary control actions on known populations of non-native and exotic infestations of invasive species.*

4.11 OUTDOOR RECREATION AND CONSERVATION OUTREACH

4.11.1 Military and General Public Access and Restrictions

Section 101 of the Sikes Act authorizes military installations to facilitate public access to natural resources, to the extent appropriate, while adhering to public safety and military security requirements. MCB Camp Lejeune is a closed military installation and does not permit access to the general public. Only authorized personnel and their dependents are granted Installation access for natural resource-dependent outdoor recreational activities such as hunting, fishing, trapping, and firewood collection. Authorized personnel include active duty military, retired military, reservists, and civilian employees (defined as civil service and non-appropriated fund employees) of MCB Camp Lejeune. Authorized personnel may sponsor non-affiliated persons as guests. Reservists not on active duty and dependents of military and civilian personnel are granted access, but they are not eligible to sponsor non-affiliated persons. MCIEAST-MCB CAMLEJO 5090.115 describes Installation access requirements and permitting requirements for hunting, fishing, and trapping programs at MCB Camp Lejeune. The Conservation Law Enforcement Office regulates Base access for hunting and fishing activities and ensures consistency with all hunting safety and installation security requirements.

Although access to the Base is typically allowed only for authorized personnel and their sponsored guests, opportunities do exist for the general public to participate in other outdoor recreational activities at MCB Camp Lejeune. Such opportunities include physical fitness competitions such as running events, bicycle races, and concerts, as well as special seasonal events such as the annual 4th of July fireworks celebration. The Marine Corps Community Services (MCCS) program coordinates and manages these special events that are not natural resource-dependent.

4.11.2 Conservation Law Enforcement

The Conservation Law Enforcement Section at MCB Camp Lejeune works closely with resource program managers to enforce conservation laws and administer hunting, fishing, trapping, and off-road recreational vehicle (ORRV) program regulations. The Conservation Law Enforcement Section is authorized to enforce all applicable federal, state, and local conservation laws and regulations. Conservation officers are further allowed enforcement authority within the jurisdiction of the USFWS when accompanied or verbally authorized by a USFWS Resident Agent in Charge (RAC).

NAVMC5090.4a requires that conservation officers hired after 2003 be trained at the Federal Law Enforcement Training Center (FLETC). Officers that have completed Natural Resources Police Training (NRPT) or Land Management Police Training (LMPT) are considered to have

met all training requirements. Furthermore, the 2003 USFWS and the USMC MOA for Cooperative Law Enforcement establish training requirements for USMC conservation officers and commission trained conservation officers as USFWS deputy agents. NAVMC5090.4a defines standards for appropriate firearms and firearm use and, in conjunction with the 2003 USFWS MOA, outlines requirements for firearms training. Conservation officers also receive annual in-service training at various DoD installations as well as specialty environmental law enforcement training by the US Parks Service and US Department of Justice.

Conservation officers are authorized to apprehend and arrest those in violation of natural resource regulatory laws as well as criminal laws such as trespassing, vandalism, and theft of federal property. Violators of conservation laws and regulations on MCB Camp Lejeune are prosecuted by the USFWS Office of Law Enforcement, the Special Assistant United States Attorney in federal magistrate court, or by the Conservation Hearing Officer (Base Magistrate) on the Installation.

4.11.3 Recreation Permits and Licenses

The North Carolina Wildlife Resources Commission offers various types of licenses and permits that are required with regard to the hunting and fishing activities they authorize in North Carolina. All hunters in the state of North Carolina are also required to complete a hunter education course before obtaining a North Carolina hunting license, both of which are required to hunt on military lands. The Sikes Act provides for cooperation by the DoD, along with state fish and wildlife agencies, in planning, development, and maintenance of fish and wildlife resources on military reservations. The Act also authorizes the collection of hunting and fishing fees on military lands and has directed the DoD to expend such fees in furtherance of the purposes of the Act.

MCIEAST-MCB CAMLEJO–5090.115 authorizes conservation officers to coordinate the selling/issuing of permits for access to natural resource-dependent outdoor recreational activities on the Installation. Fees or proceeds from hunting, fishing, trapping licenses, and firewood collection permits are used for funding or for supplementing the funding of fish and wildlife management programs, including fish stocking in freshwater ponds and wildlife food plot plantings as intended by the Act. The fee schedule specific to permits sold on MCB Camp Lejeune is contained in MCIEAST-MCB CAMLEJO–5090.115. Over \$39,000 is generated through the sales of permits for personnel participating in natural resource-dependent outdoor recreational activities each year. Participant numbers fluctuate, but approximately 1200-1600 individual hunting, fishing, trapping, and firewood collection permits are issued annually. Access to boat-ramps and boat launch sites also requires permitting through the conservation office prior to launching on installation property. Authorized personnel may use designated boat ramps/boat launch sites for motorized as well as hand-carried boats. Boat-ramps and launch sites are available (MCB CAMLEJO 5090.115) at the following locations (Figure 4-51): French Creek,

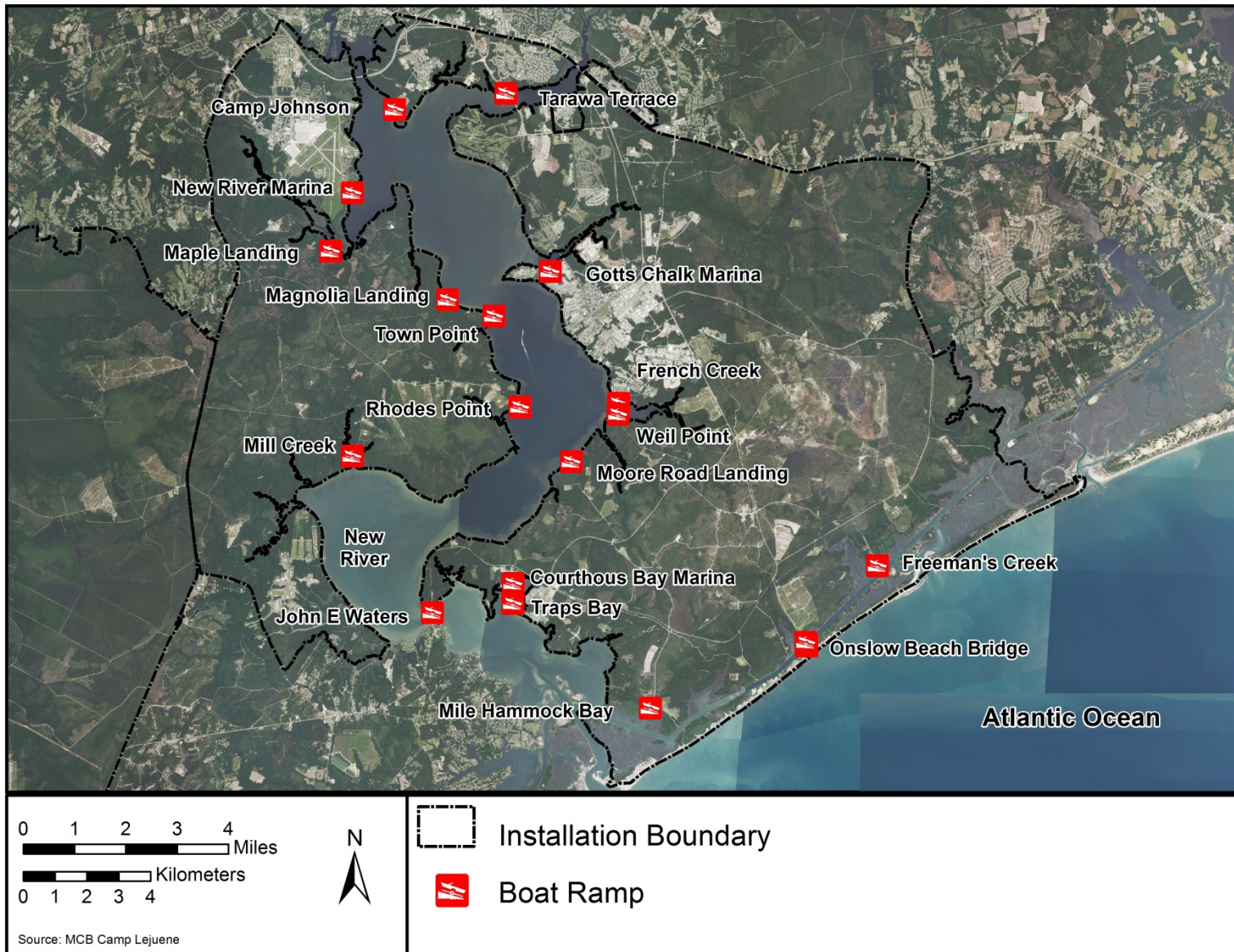


Figure 4-51. Boat launches and ramps on MCB Camp Lejeune that are available to authorized personnel

Freeman's Creek, Maple Landing, Magnolia Landing, Mile Hammock Bay, Traps Bay, Mill Creek, Moore Road Landing, Onslow Beach Bridge, Rhodes Point, John E. Waters Wildlife Viewing Area, Town Point, Weil Point, Tarawa Terrace, and Camp Johnson. Three marinas managed by MCCA are also available for use. They are located at Courthouse Bay (Courthouse Bay Marina), Wallace Creek (Gottschalk Marina), and Southwest Creek (MCAS New River Marina).

4.11.4 Recreational Opportunities

Authorized personnel participating in natural resources-dependent recreational activities at MCB Camp Lejeune, including fishing, hunting, trapping, firewood gathering, and beach driving, must follow installation, state, and federal laws that regulate those activities. Wildlife viewing is an additional outdoor recreational opportunity that does not require a permit. Operational forces training takes precedence over outdoor recreation activities on MCB Camp Lejeune. Outdoor recreational activities are permitted within training areas when those areas are not scheduled for military use or other land management activities, such as prescribed fire, timber harvesting, and natural resource management activities. Outdoor recreational activities may temporarily be postponed or canceled under circumstances when elevated security measures are required or due to inclement/destructive weather conditions.

4.11.4.1 Recreational Hunting Program

From the opening of mourning dove hunting to late season small game hunting, and during spring turkey season, recreational hunting is permitted for big and small game species in season beginning the first week in September until mid-May each year. Hunting dates and season lengths are established and arranged by the NCWRC. White-tailed deer are the most sought after big game animal on the installation, with an average of over 700 deer taken on an annual basis. Authorized personnel are allowed to participate in all manner of hunting for white-tailed deer during both special separate seasons that permit the use of archery equipment and black powder gun, as well as the regular, extended firearms season. Black bear are also taken on the Installation in limited numbers. A spring wild-turkey season that extends from mid-April to mid-May provides additional opportunities for hunting.

The use of dogs for deer hunting is allowed in North Carolina and is a tradition on the Installation. The John A. Lejeune Rod and Gun Club, whose membership includes authorized personnel and their guests, are also allowed the use of dogs for deer hunting on the Installation on scheduled hunts in designated areas. The Rod and Gun Club deer hunting events with dogs are referred to as "Organized Hunts." Organized hunts are scheduled for the Rod and Gun Club by the Land and Wildlife Resources Section and are administered by the Conservation Law Enforcement Section, which has oversight of these hunts. Each year the installation also hosts the Commanding Officer's Invitational Deer Hunts (COIDH) in GSRA. The invitations are offered

to those six hunt clubs (Wildcat, South Creek, Oak Island, Big Horn, Flag Pond, and United) that historically hunted deer with dogs on GSRA before the area was acquired by MCB Camp Lejeune in the early 1990s. Each club must be willing to reciprocally invite servicemen to hunt on hunt club-owned or leased lands. Three separate COIDH hunts are scheduled each year.

Safety and personnel accountability is an important factor in any hunting program, but it is even more so on an active military installation such as MCB Camp Lejeune. Coordination between the Conservation Law Enforcement Office and Range Control is required to schedule and effectively manage hunting and military training exercises. MCB CAMLEJO 5090.115 defines protocols for de-conflicting access to training areas for hunting in order to ensure safety and personnel accountability during hunting seasons.

4.11.4.2 Recreational Fishing Program

MCB Camp Lejeune contains approximately 80 miles of creeks and tidal estuaries, representing approximately 26,000 acres in surface area that connect with New River and the AIWW. Most of this water is salt or brackish in nature and provides excellent opportunities for coastal recreational sport fishing. Surf fishing opportunities are also available at the Onslow Beach Recreation Area. Eligible surf fishermen have access to approximately 1.7 miles of beach. Access by vehicle is controlled by BO 5090.111, which provides use regulations and information related to off-road vehicle access at Onslow Beach. MCIEAST-MCB CAMLEJO 5090.115 contains general fishing regulations for MCB Camp Lejeune.

Four freshwater ponds are designated as managed fishing ponds on MCB Camp Lejeune. Orde Pond, Henderson Pond, Hickory Pond, and the Old Landfill Pond are stocked with largemouth bass, bluegill, and channel catfish on an annual basis. The annual Youth Fishing Day, an event for youth 15 and under, is held each year in June at Orde Pond (Figure 4-52).



Figure 4-52. 2014 Youth Fishing Day event at Orde Pond

4.11.4.3 Firewood Collection

Firewood collection is limited only to non-marketable timber such as downed trees resulting from timber harvest activities, training area maintenance, road construction, power lines, storms, etc. This activity is permitted as a means of providing beneficial use of resources that may be otherwise wasted. No standing trees may be cut. Cutting or removal of standing trees or timber products other than those downed trees described above is prohibited and may constitute

destruction or theft of government property. Firewood collection is allowed for personal use only. Over 260 cords of firewood are collected annually on MCB Camp Lejeune.

4.11.4.4 Trapping

Regulated trapping is an integral component of wildlife conservation programs, as it controls abundant wildlife, removes nuisance animals, aids in restoring native species, and protects habitat, property, and threatened and endangered species. Trapping can also help reduce the exposure of humans and pets to rabies and other diseases. Experts from state fish and wildlife agencies, federal wildlife agencies, and other resource managers that care about the environment, natural resources, and animal welfare have worked together to improve and modernize the technology of trapping.

MCB Camp Lejeune supports the regulated use of trapping as a safe, efficient, and acceptable means of managing and harvesting wildlife to benefit the public, while considering the welfare of trapped animals. Trapping is a highly regulated activity on MCB Camp Lejeune. Anyone who traps must follow strict rules established by state fish and wildlife agencies and enforced by Conservation Law Enforcement Officers. Restrictions on species that may be harvested, harvest seasons, trap types, trapping methods, and areas open to trapping are examples of some of the guidelines and regulations that state agencies regularly review, implement, and enforce.

Trappers are encouraged to use Trapping Best Management Practices (BMPs) developed to ensure consistent, well-regulated trapping programs, taking into consideration animal welfare, efficient tools, and approved techniques. BMPs provide information about traps and trapping systems considered to be state-of-the-art in animal welfare and efficiency. The BMPs explain how some existing traps can be modified (where necessary) to enhance animal welfare. Trappers are encouraged to use traps and trapping methods that are best suited for their purposes.

4.11.4.5 Onslow Beach Recreation Area and Off-road Recreational Vehicle Use

Brown's Island and Onslow Beach cover approximately 11 miles of beachfront, which includes the associated primary and secondary dune systems grading to maritime shrub-scrub and tidal salt marsh along the Atlantic Intracoastal Waterway. Brown's Island is a duded impact area and is strictly off-limits to all personnel. Onslow Beach, separated from Brown's Island by Brown's Inlet, is an extremely dynamic ecosystem with areas designated for recreational use, military training, and conservation activities.

Onslow Beach is divided into four sections, E1, EA, EB, and EC. The EB section has a designated primary use for recreation. This section of the beach is managed by MCCA and includes a recreation area that provides overnight cottage accommodations, recreational vehicle camping, convenience stores, and other facilities that support beach access and use. The remaining sections of the beach have a designated primary use for military training. Onslow

Beach also provides habitat for several species protected under the ESA, in addition to several SOC identified by the state of North Carolina. See Section 4.1, Protected Species Management for more information on designated uses (Figure 4-7) and ESA protected species on Brown's Island and Onslow Beach.

In designated areas only, ORRV use is permitted on Onslow Beach to reach fishing, swimming, sunbathing, or shell collecting destinations. With the increased proportion of 4 x 4 vehicles among the general population and Base personnel, the number of individuals that drive recreationally on Onslow Beach and the Base as a whole has increased significantly. This increase has created a condition of incompatible use as ORRVs transit through designated military training areas and nesting habitats of sensitive, declining, and/or threatened or endangered species. To ensure the future use of MCB Camp Lejeune's military training areas without threat of regulatory closures or significant operational safety concerns, controls on ORRV access have been implemented. ORRV use aboard the Installation is limited to certain sites and uses to ensure compatibility with the training mission, public safety, and conservation of natural resources (see BO 5090.111).

4.11.4.6 Wildlife Viewing

A section of causeway, formerly NC Hwy 172 located on MCB Camp Lejeune, once allowed connection to a turn (swing) bridge that accommodated navigation of the commercial fishing fleet and other large boats on the New River. The old road causeway was constructed across estuarine wetlands along the New River and terminated at the New River shoreline. The section of causeway was abandoned in the early 1990s after construction of a new high-rise bridge over the New River. The turn bridge was demolished and removed after completion of the high-rise bridge, after which the causeway was no longer used. The shoreline along the causeway was littered with debris including deteriorating asphalt pavement, concrete rubble, and miscellaneous shoreline garbage. MCB Camp Lejeune initiated a project in 2007 to restore and enhance the area to create a scenic overlook/wildlife viewing area on the site of the abandoned causeway.

Restoration of this estuarine wetland included removal of portions of the causeway to match the elevation of surrounding wetlands, planting of wetland vegetation, shoreline stabilization, maritime forest habitat creation, and construction of an elevated pier/walkway for wildlife viewing. The project restored coastal estuarine habitat (0.60 acre of coastal low marsh, 0.16 acre of coastal high marsh, and 0.83 acre of maritime forest) on the Installation and created the John E. Waters, Jr. Wildlife Viewing Area, which allows authorized personnel pedestrian access, including Handicapped access, to the New River estuary at Pollock's Point.

The wildlife viewing area serves as a conservation outreach tool for educating the public about New River estuarine habitat and resources. ECON staff encourages scouts, school groups, and other interested parties to visit the area to take advantage of natural resource conversation learning opportunities provided by the wildlife viewing area.

4.11.5 Access for the Disabled

Natural resource recreational opportunities for disabled veterans, military dependents with disabilities, and other persons with disabilities are limited throughout the nation. However, the Disabled Sportsmen's Access Act in 1999 requires that programs be altered to better accommodate disabled persons and that adaptive equipment be made available to assist disabled persons on public owned lands. Disabled/wounded veterans are encouraged to participate in scheduled big game hunts for deer or turkey hosted annually on MCB Camp Lejeune. Volunteers assist mobility impaired hunters during special hunts, including hunts hosted for members of the Wounded Warrior Battalion. Onslow Beach access points and the John E. Waters Wildlife Viewing Area also accommodate persons with disabilities.

4.11.6 Conservation Outreach

4.11.6.1 Conservation Outreach and Education

Conservation officers are one of the most visible elements of the conservation program. In addition to law enforcement duties, officers participate in numerous planned and unplanned opportunities for conservation outreach for military personnel and dependents of all age groups. Conservation officers also provide instructors who teach hunter safety courses. The North Carolina Hunter Education course is a hunter safety course required for all first-time hunting license buyers in North Carolina. Conservation officers taught 3 courses in 2014, graduating 67 students who received certification in hunting safety. The certification is accepted in every state and province in North America. Conservation officers also provide instruction sponsored by the International Bowhunter Education Program (IBEP). While basic hunter education courses include information on archery and bowhunting, the IBEP is an advanced bow hunting course that provides more in-depth information to help archery enthusiasts become safe, responsible, more effective bowhunters. Two separate classes with 22 enrolled students were held in 2014.

Many topics in natural resources management on MCB Camp Lejeune are ideal for educating Base personnel and the local public about integrating wildlife conservation with military training and the role of natural resources managers on a large military base. Natural resource managers at MCB Camp Lejeune provide a variety of opportunities for conservation education, including presentations to MCB Camp Lejeune Dependent Schools, Onslow County Schools, local community colleges, scout troops, and other conservation groups who focus on conservation information, awareness, and education.

4.11.6.2 Conservation Volunteer Program

A conservation volunteer is any person who gives time and talent to advance the mission of MCB Camp Lejeune's natural resources management programs and who receives no salary or wages for the voluntary service. The Conservation Volunteer Program (CVP) at MCB Camp Lejeune officially provides for the utilization of voluntary services to help accomplish the objectives of the natural resources management program. The Program's primary objective is to promote environmental awareness by providing opportunities for approved volunteers to participate in scheduled, organized, conservation-based projects every year. Conservation volunteers have participated in projects including special hunts, wildlife surveys, and vegetation planting and site enhancement (Figure 4-53), as well as annual events such as planting sea oats on Onslow Beach and the Audubon Christmas Bird Counts.



Figure 4-53. Conservation volunteers planting warm season grasses during the 2009 National Public Lands Day site restoration at Pollock's Point

4.11.7 Recreation and Outreach Conservation Goals and Measures

GOAL: MCB Camp Lejeune will continue to coordinate authorized patrons' access to natural resource-dependent outdoor recreational activities in designated seasons and areas, while adhering to all military and natural resource regulations, policies, security, and training requirements.

OBJECTIVE REC1: Coordinate access of authorized personnel, their dependents, and sponsored guests to natural resources-based activities.

- **Action 4.11-01:** *Serve as the permitting agent for the sale/issuance of permits for hunting, fishing, trapping, ORRV use, and firewood collection on the Installation.*

OBJECTIVE REC2: Manage a safe and effective Conservation Law Enforcement program that integrates conservation management objectives with the military mission.

- **Action 4.11-02:** *Ensure conservation law enforcement officers maintain all certifications, licenses, and training necessary to meet MCB Camp Lejeune conservation law enforcement program requirements.*

OBJECTIVE REC3: Provide opportunities for authorized personnel, their dependents, and sponsored guests to take part in natural resource-dependent outdoor recreation.

- **Action 4.11-03:** *Schedule and coordinate organized annual sporting events, including the COIDH and Youth Fishing Day.*

OBJECTIVE REC4: Provide natural resource-dependent outdoor recreation opportunities for persons with disabilities.

- **Action 4.11-04:** *Plan and host special hunts for disabled veterans and other persons with disabilities.*

OBJECTIVE REC5: Promote natural resource conservation awareness and education.

- **Action 4.11-05:** *Continue participation in conservation outreach initiatives through natural resource-based lectures and presentations at MCB Camp Lejeune Dependent Schools, local community schools and colleges, conservation groups, and special events.*
- **Action 4.11-06:** *Provide instruction to authorized personnel on hunter-based educational programs, including hunter safety courses and archery skills training.*
- **Action 4.11-07:** *Continue to support the MCB Camp Lejeune CVP by providing opportunities for volunteers to participate in projects that are consistent with the Installation's INRMP and mission objectives.*

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5.0 IMPLEMENTATION

5.1 INRMP

As discussed in Section 1.0, the purpose of this INRMP is to guide natural resources management for the 5-year period of 2015–2025 in support of the MCB Camp Lejeune military mission. The goal of the revised INRMP is to insure natural resources management is integrated into military operational and training requirements in order to achieve balanced land use and land management on MCB Camp Lejeune. Effective INRMP implementation requires a strong commitment, financial resources, and qualified personnel.

5.2 FUNDING

This INRMP identifies a number of actions and measures of success to meet the natural resource objectives (Appendix 16). These actions include “must-fund” that must be performed to maintain compliance with laws and regulations, and desirable actions, which will be carried out if funding and personnel are available. Some of the actions meet multiple objectives, while others meet a specific objective.

Operations and Maintenance (O&M) environmental funds are the primary source of resources to support reoccurring natural resources projects. Compliance activities are funded with appropriated funds, whereas limited reimbursable funds (i.e., Forestry Reserve Account Funds and Fish & Wildlife Reimbursable Funds from license and permit sales) may be available for stewardship activities. Other special DoD initiatives to fund natural resources projects also may become available on a limited basis. In addition, alternate funding sources for special projects and initiatives may be sought from cooperative grants and partnership programs such as the DoD Legacy Program and National Public Lands Day grants. These grants require a written proposal and often are cost sharing opportunities.

5.3 STAFFING

5.3.1 Staff Support

The Sikes Act requires, to the extent practicable using available resources for natural resources management. MCB Camp Lejeune ensures that sufficient numbers of professionally trained natural resources management personnel and natural resources law enforcement personnel are available and assigned responsibility to perform tasks necessary to carry out natural resources management programs. One or more permanent positions may be vacant at any given time. Staff-support from other federal agencies and contract personnel are also available and used when needed on a case by case basis.

5.3.2 Professional Development & Natural Resources Training

Personnel with natural resources responsibilities must, as a condition of employment, possess the appropriate knowledge, skills, and professional training/education to perform their duties. MCB Camp Lejeune provides natural resources personnel timely and necessary supplemental training to ensure proper and efficient natural resources management. MCB Camp Lejeune also maintains adequate natural resources staffing levels to provide and sustain installation natural resources. MCB Camp Lejeune natural resources personnel participate in required and recommended training opportunities when they are available to ensure that personnel are adequately trained in natural resources management. Staff also participates in annual professional conferences and workshops. All training and conference attendance is based on the availability of funding; and therefore, the completion or attendance of some training may not be feasible.

5.4 COOPERATIVE AGREEMENTS & PARTNERSHIPS

Per DoDI 4715.03, DoD installations may enter into cooperative agreements with states, land-grant universities, local governments, non-governmental organizations, and individuals to provide for the maintenance and improvement of natural resources or conservation research on or off DoD installations. A cooperative agreement is used to acquire goods or services to accomplish a public purpose of support or stimulation authorized by federal statute. Use of a cooperative agreement requires substantial involvement between the federal agency and recipient during performance of the activity. Cooperative agreements authorized by the Sikes Act are not subject to the provisions of the Federal Grant and Cooperative Agreement Act, but must comply with the procedural requirements of the DoD Grant and Cooperative Agreement Regulations. Funds approved for a particular fiscal year may be obligated to cover the costs of goods and services provided under a Cooperative Agreement during any 18-month period beginning in that fiscal year in accordance with the Sikes Act. Cooperative agreements may be executed over a 60-month period. Using cooperative agreements to accomplish projects is an efficient means to implement INRMPs.

5.5 METRICS

Natural Resources Conservation metrics are used to assess the overall health and trends of the MCB Camp Lejeune natural resources program and to identify and correct potential funding and other resource shortfalls. Metrics have been developed to assess INRMP implementation, measure conservation efforts, ensure no net loss of military training lands, understand the conservation program's installation mission support, and indicate the success of partnerships with the USFWS, NCDENR, NCWRC, NCDMF, and NMFS. This evaluation is facilitated by a

web-based metrics reporting tool on the Marine Corps Environmental Management Portal. The Conservation Metrics Portal provides the means to evaluate performance in seven focus areas:

1. **INRMP project implementation.** Evaluate the execution of actions taken to ensure they meet goals/objectives outlined in the INRMP.
2. **Federally listed species and critical habitat.** Evaluate the extent to which federally listed species have been identified and the conservation benefits provided to these species and their habitats.
3. **Ecosystem integrity.** Evaluate the general current condition and trends of managed ecosystems and the extent to which the INRMP benefits each.
4. **Fish and wildlife management and public use.** Evaluate the availability and adequacy of public recreational use opportunities, such as fishing and hunting, and access for handicapped and disabled persons, given security and safety requirements for the installation.
5. **Team adequacy.** Evaluate the adequacy of the natural resources team (natural resources management professional and installation support staff) in accomplishing INRMP goals and objectives for the installation.
6. **Partnerships effectiveness.** Evaluate the degree that USFWS and State Fish and Wildlife Agency partnerships are cooperative and ensuring they result in effective INRMP development and review for operation and effect.
7. **INRMP impact on the installation mission.** Evaluate the level to which the existing natural resources program supports the installation's ability to sustain the current operational mission ensuring no net loss of mission capability.

Additionally, MCB Camp Lejeune produces an annual report from data derived from the annual metrics review to meet in-house requirements as well to provide reports to headquarters who make information available for Congressional review.

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6.0 SUMMARY

6.1 INRMP PROVIDES ADEQUATE MANAGEMENT OF SPECIES

MCB Camp Lejeune has a well-established record of providing measurable and important benefits to species, including implementation of endangered species recovery plans, managing sustainable forests to promote establishment of the longleaf pine ecosystem and continued monitoring of plant and wildlife species to evaluate ecosystem integrity. This INRMP builds on decades of sound stewardship and benefits to natural resources that have been provided as a result of MCB Camp Lejeune's comprehensive natural resource program.

The USFWS and NMFS 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 Onslow Beach for protected sea turtle and shorebird species, as well as management and restoration of MCB Camp Lejeune's longleaf pine habitats for red-cockaded woodpeckers.
2. **The plan provides certainty that the management plan will be implemented.**
3. **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. MCB Camp Lejeune's conservation program is adequately funded and has a well-trained staff of biologists, foresters, enforcement personnel, technicians, and contractor support to ensure plan implementation.
4. **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 and effectiveness 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, this revised INRMP provides the necessary objectives, monitoring, measurable standards for success, and provisions for future reporting to ensure effectiveness of the conservation effort for federally-listed species on MCB Camp Lejeune.

6.2 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, 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 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 USFWS and NMFS, and provides many benefits to listed species including protection, monitoring and habitat management and restoration for federally-listed species.
2. **The plan provides assurances that the conservation management strategies will be implemented.** MCB Camp Lejeune’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.** MCB Camp Lejeune and USFWS, and NMFS have been working closely on endangered and threatened species issues. The management programs described in this INRMP and in MCB Camp Lejeune’s directives avoid and minimize impacts to the species, and are consistent with current and ongoing Section 7 consultations. MCB Camp Lejeune’s monitoring, adaptive management approach and ongoing cooperative relationship with FWS, 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 MCB Camp Lejeune’s.

As described in the previous sections of this INRMP, this revised INRMP meets the “Provides a Benefit” for all federally-listed species known to occur at MCB Camp Lejeune.

6.3 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 2015-2020 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.

6.4 INRMP BENEFITS ON A BROADER SCALE

Environmental Benefits

The actions in this INRMP provide a clear benefit to natural resources entrusted to MCB Camp Lejeune’s care for the INRMP period of 2015–2020. These include actions that provide protection for federally listed species known to occur at MCB Camp Lejeune. A complete list of actions that will promote conservation, restoration, and management of MCB Camp Lejeune’s natural resources are provided in Appendix 16, and include actions to protect and manage at-risk species, migratory birds, forests, coastal areas, 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.

Military Mission Benefits

Integration of natural resources management with mission support and training requirements and responsibilities will help ensure MCB Camp Lejeune meets the challenges of ensuring military readiness 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 MCB Camp Lejeune’s military mission. The INRMP benefits military actions in at least five ways:

1. It facilitates compliance with environmental laws and regulations such as Sikes Act, CWA, and ESA, and obviates the need for federal critical habitat designation through consultation regarding potential impacts to federally listed species.
2. It provides actions that support training activities, while still providing protection to the environment and threatened and endangered species (e.g., RCW, sea turtle and shorebird

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 wildland fire management program).

3. It provides programs to address wildlife damage and BASH.
4. It provides for increased education 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 MCB Camp Lejeune.
5. It provides for regional conservation initiatives (i.e., RASP) to reduce current or prevent future mission restrictions.

Cooperative Benefits

This INRMP provides continual support for MCB Camp Lejeune's community relations. It includes specific actions to continue recreational and educational activities, such as participation in disabled sportsman hunts, continued stocking of fish in the managed freshwater ponds, promoting an annual Youth Fishing Day, 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 MCB Camp Lejeune 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, NCDMF, and the NCDENR.

6.5 CONCLUSION

This updated INRMP reflects MCB Camp Lejeune'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 Sikes Act, 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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Appendix 1:

List of Acronyms and Abbreviations

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Appendix 1: List of Acronyms

AAV	Amphibious Assault Vehicle
AEC	Areas of Environmental Concern
AIWW	Atlantic Intracoastal Waterway
AOA	Airfield Operational Area
APHIS	Animal Health Inspection Service
ASO	Air Station Order
ASPP	Annual Silvicultural Plan
BTWG	Base Training Working Group
BASH	Bird/animal Aircraft Strike Hazard
BCC	Birds of Conservation Concern
BCTMC	Beach to Combat Town Maneuver Capability
BEB	Bridge Erection Boats
BGEPA	Bald and Golden Eagle Protection Act
BMP	Best Management Practices
BO	Base Order
CAAAC	Combined Arms Amphibious Assault Capability
CAMA	Coastal Area Management Act
CAMLEJ	Camp Lejeune
CCAR	Climate Change Adaptation Roadmap
CFR	Code of Federal Regulations
C-IED	Counter-Improvised Explosive Device
CNCPC	Coastal North Carolina Primary Core
COIDH	Commanding Officer's Invitational Deer Hunts
CS	Candidate Species
CVP	Conservation Volunteer Program
CWA	Clean Water Act
CWG	Conservation Working Group
CZMA	Coastal Zone Management Act

DCERP	Defense Coastal/Estuarine Research Program
DBH	Diameter at Breast Height
DoD	Department of Defense
DoDI	Department of Defense Instruction
DoDM	Department of Defense Manual
DOI	Department of Interior
E	Endangered
EA	Environmental Assessment
ECON	Environmental Conservation Branch
EIWG	Environmental Impact Working Group
EMD	Environmental Management Division
EO	Executive Order
EPA	Environmental Protection Agency
ESA	Endangered Species Act
ESB	Engineer Support Battalion
°F	Degrees Fahrenheit
FPG	Forest Practices Guidelines
ft	Feet
GCE	Ground Combat Element
GIS	Geographic Information System
GPS	Global Positioning System
GSRA	Greater Sandy Run Area
IBEP	International Bowhunter Education Program
INRMP	Integrated Natural Resource Management Plan
IPM	Integrated Pest Management
IUCN	International Union for Conservation of Nature
IWG	INRMP Working Group
LCAC	Landing Craft Air Cushioned
LCE	Logistics Combat Elements

LCU	Landing Craft Utility
LT	Land Type
LTA	Land Type Association
LTP	Land Type Phase
m	Meter
MAGTF	Marine Air Ground Task Force
MARSOC	Marine Special Operations Command
MAW	Marine Air Wing
MBRT	Mitigation Bank Review Team
MBTA	Migratory Bird Treaty Act
MCAS	Marine Corps Air Station
MCB	Marine Corps Base
MCCS	Marine Corps Community Services
MCES	Marine Corps Engineer School
MCIEAST	Marine Corps Installations East
MCO	Marine Corps Order
MCOLF	Marine Corps Outlying Field
MEB	Marine Expeditionary Brigade
MEF	Marine Expeditionary Force
MEU	Marine Expeditionary Unit
MMPA	Marine Mammals Protection Act
MOU	Memorandum of Understanding
MOUT	Military Operations in Urban Terrain
msl	Mean Sea Level
NC	North Carolina
NCAC	North Carolina Administrative Code
NCDENR	North Carolina Department of Environment and Natural Resources
NCDMF	North Carolina Division of Marine Fisheries
NCDOT	North Carolina Department of Transportation

NCESA	North Carolina Endangered Species Act
NCNHP	North Carolina Natural Heritage Program
NCOBCF	North Carolina Onslow Bight Conservation Forum
NCPCPA	North Carolina Plant Protection and Conservation Act
NCSU	North Carolina State University
NCWAP	North Carolina Wildlife Action Plan
NCWRC	North Carolina Wildlife Resources Commission
NEPA	National Environmental Policy Act
NFWF	National Fish and Wildlife Foundation
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NRCS	Natural Resources Conservation Service
NRE	New River Estuary
NRHP	National Register of Historic Places
OBCF	Onslow Bight Conservation Forum
OM&T	Operational Messages and Themes
ORRV	Off-road Recreational Vehicle
ORW	Outstanding Resource Water
P	Proposed
PIF	Partners in Flight
PNA	Primary Nursery Area
RASP	RCW Recovery and Sustainment Plan
RCW	Red-cockaded Woodpecker
REPI	Readiness and Environment Protection Initiative
SAR	Species At Risk
SAV	submerged aquatic vegetation
SE CSC	Southeastern Climate Science Center
SERCC	Southeast Regional Climate Center
SERDP	Strategic Environmental Research and Development Program

SMTC	Special Missions Training Center
SMZ	Streamside Management Zone
SNA	Secondary Nursery Area
SOC	Species of Concern
SOCC	Species of Conservation Concern
SOP	Standard Operating Procedure
sp	Species
spp	More than one unspecified species
SPB	Southern Pine Beetle
T	Threatened
T(S/A)	Threatened due to similarity of appearance
TA	Training Area
TLZ	Tactical Landing Zone
TVMC	Tactical Vehicle Maneuver Capability
US	United States
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USMC	U.S. Marine Corps
USSOCOM	U.S. Special Operations Command
UXO	Unexploded Ordinance
WFMP	Wildland Fire Management Plan
WS	Wildlife Services

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Appendix 2:

Natural Resources Management Drivers

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Appendix 2: Natural Resources Management Drivers

Marine Corps Order (MCO) P5090.2A (Environmental Compliance and Protection Manual) directs all Marine Corps installations to comply with all federal statutes and Executive Orders (EOs) governing natural resources management and environmental protection on military lands. Compliance is vital to ensure that the Marine Corps has continued and minimally constrained access to installation lands for realistic training. In accordance with MCO P5090.2A, the following statutes and EOs drive natural resources management on Marine Corps installations:

- **Bald Eagle Protection Act** of 1940, as Amended (16 U.S.C. 688 *et seq.*). The act prohibits taking, possessing, and transporting bald eagles and golden eagles and importing and exporting their parts, nests, or eggs. The definition of “take” includes pursue, shoot, shoot at, poison, wound, capture, trap, collect, molest, or disturb. The act also provides for penalties of up to \$5,000 for possessing eagles or eagle parts taken from birds after June 1940. Regulations implementing the act are found at 50 CFR Part 22.
- **Clean Water Act (CWA)** of 1977, as Amended (Public Law 95-217, 33 U.S.C. 1251 *et seq.*). The CWA, in part, requires Federal agency consistency with state nonpoint source pollution management plans. The CWA and its implementing regulations also require permits for controlling wastewater discharges and placing fill materials into waters of the United States, including wetlands. These permits are required before initiating proposed actions.
- **Coastal Zone Management Act (CZMA)** of 1972 (16 U.S.C. 1451 *et seq.*). The CZMA requires that, to the maximum extent practicable, Federal actions affecting any land/water use or coastal zone natural resource be implemented consistent with the enforceable policies of an approved state coastal management program. The CZMA also authorizes states to administer approved coastal nonpoint source pollution programs. Advance concurrence from the state Coastal Commission is required before taking an action affecting the use of land, water, or natural resources of the coastal zone. Excluded from the coastal zone are lands solely subject to or held in trust by the Federal Government, its officers, or its agents.
- **Conservation Programs on Military Reservations (Sikes Act)** of 1960, as Amended (16 U.S.C. 670(a) *et seq.*). The Sikes Act requires each military installation to manage natural resources for multipurpose uses and public access appropriate for those uses, as

well as ensuring no net loss to training, testing or other defined missions of the installation. Management of these resources is accomplished through development and implementation of an INRMP. Each INRMP must be prepared in consultation with the USFWS and the cognizant state fish and wildlife agency. The public must be afforded an opportunity to review and comment on INRMPs prior to their finalization. The Sikes Act also requires, to the extent practicable using available resources, sufficient numbers of professionally-trained natural resource management personnel and natural resources law enforcement personnel, be available and assigned responsibility to perform tasks necessary to carry out Title I of the Sikes Act, including preparing and implementing INRMPs.

- **Emergency Wetlands Resources Act** of 1986 (16 U.S.C. 3901-3932). The act promotes wetlands conservation for the public benefit and helps fulfill various migratory bird treaty obligations.
- **Endangered Species Act (ESA)** of 1973 (16 U.S.C. 1531 *et seq.*). Implemented by 50 CFR 402 and 50 CFR 17, the ESA requires Federal agencies to carry out programs to conserve Federally-listed endangered and threatened plants and wildlife. Development and implementation of these programs must be carried out with the consultation and assistance of the Departments of the Interior (DOI) and Commerce. Preparation of a biological assessment may be required to determine whether formal consultation with the FWS/National Oceanic and Atmospheric Administration – Fisheries (NOAA Fisheries) is necessary and/or may serve as a basis for a FWS/NOAA Fisheries biological opinion.
- **Estuarine Areas Act (16 USC 1221-1226)**. The act provides for a Federal study and inventory of estuaries and authorizes their management and development through Federal and state agreements.
- **Plant Protection Act (7 USC 7701 *et seq.*)**. Consolidates and modernizes all major statutes pertaining to plant protection and quarantine.
- **Strengthening Federal Environmental, Energy, and Transportation Management (E.O. 13423, 24 January 2007)**. Sections 2(d) and 3(a) of this E.O. require the use of sustainable environmental practices and energy efficiency, GHG emissions avoidance or reduction, and renewable energy.

- **Marine Mammal Protection Act (MMPA)** of 1972, as Amended (16 U.S.C. 1361 *et seq.*). Implemented by 50 CFR 18, 215, and 228, the MMPA mandates a moratorium on the killing, capturing, harming, and importing of marine mammals and marine mammal products. The MMPA also prohibits the taking of any marine mammal by any person, vessel, or conveyance subject to the jurisdiction of the United States on the high seas or the taking of any marine mammal by a person, vessel, or conveyance in waters or lands under the jurisdiction of the United States. “Taking” means to harass, hunt, capture, collect, or kill any marine mammal, and the term includes, without limitation, any of the following: collection of dead animals or their parts, restraint or detention of a marine mammal, tagging a marine mammal, the negligent or intentional operation of an aircraft or vessel, or doing of any other negligent or intentional act that results in the disturbing or molesting of a marine mammal.
- **Marine Protection, Research, and Sanctuaries Act (MPRSA)** of 1972, as Amended (33 U.S.C. 1401 *et seq.* and 16 U.S.C. 1431 *et seq.*). The MPRSA establishes regulations relating to dumping specific materials into open waters and establishes a program for designating and regulating national marine sanctuaries.
- **Migratory Bird Treaty Act (MBTA)** of 1918, as Amended (16 U.S.C. 703 *et seq.*). The MBTA protects migratory birds (listed in 50 CFR 10.13) and their nests and eggs and establishes a permitting process for the taking of migratory birds.
- **Military Reservation and Facilities: Hunting, Fishing and Trapping Act** of 1958 (Public Law 85-337, 10 U.S.C. 2671). The act requires all hunting, fishing, and trapping on each military installation be in accordance with the state fish and game laws where the installation is located. Appropriate state licenses must be obtained for these activities on the installation, but the act permits an installation commander to exempt active duty military personnel from state licenses to hunt, fish, and trap on a military installation if the state does not permit them to obtain a resident license.
- **Sale of Certain Interests In Lands; Logs** (10 U.S.C. 2665). This law establishes requirements for installation sale of forest products.

- **Leases: Non-Excess Property of Military Departments** (10 U.S.C. 2667). This law permits installations to lease real or personal government property, including land leased for agricultural purposes.

- **National Environmental Policy Act (NEPA)** of 1969 (42 U.S.C. 4321 *et seq.*). The NEPA requires consideration of environmental concerns during project planning and execution. The NEPA and the Council on Environmental Quality (CEQ) implementing regulations (40 CFR Part 1500) require Federal agencies to prepare an Environmental Assessment or Environmental Impact Statement for Federal actions with the potential to significantly affect the quality of the human environment, including natural and cultural resources.

- **Fish and Wildlife Conservation Act (FWCA)** of 1980 (16 U.S.C. 2901 *et seq.*). The FWCA promotes state programs for conserving nongame fish and wildlife, their habitats, and their use.

- **Plant Quarantine Act (7 U.S.C. 151-167)**. The act regulates the importation and movement of nursery stock and other plants and plant products the United States to control injurious plant and pest transportation.

- **Protection of Wetlands** (E.O. 11990, 24 May 1977). This E.O. addresses Federal agency actions required to identify and protect wetlands, minimize the risk of wetlands destruction or modification, and preserve and enhance the natural and beneficial values of wetlands.

- **Floodplain Management** (E.O. 11988, 24 May 1977). This E.O., in part, requires each Federal agency to evaluate potential effects of actions that it may take in a floodplain and ensure that its planning programs and budget requests reflect consideration of flood hazards and floodplain management.

- **Outdoor Recreation - Federal/State Program Act** (16 U.S.C. 460(L) *et seq.*). The act encourages consultation with the United States National Park Service regarding outdoor recreation management.

- **Rivers and Harbors Act** (33 U.S.C 401). The act, in part, prohibits the construction of any bridge, dam, dike, or causeway over or in navigable waters of the United States without Congressional approval.
- **Soil Conservation Act** (16 U.S.C. 590a *et seq.*). To control and prevent soil erosion, the act ensures that programs administered by the Secretary of Agriculture for the conservation of soil are responsive to the long-term needs of the United States.
- **Watershed Protection and Flood Prevention Act** (16 U.S.C. 1001-1009). To preserve and improve land and water resources and the quality of the environment, the act authorizes Federal assistance to local organizations for flood prevention and the planning and completion of projects in watershed areas for conservation and land and water use.
- **Exotic Organisms** (E.O. 11987, 24 May 1977). This E.O., in part, requires Executive agencies, to the extent permitted by law, to restrict the introduction of exotic species into the natural ecosystems on lands and waters they own, lease, or hold.
- **Invasive Species** (E.O. 13112, 3 February 1999). This E.O.'s purpose is to prevent the introduction of invasive species, provide for their control, and minimize the economic, ecological, and human health impacts that invasive species cause.
- **Farmland Protection Policy Act** (7 U.S.C. 4201-4209). The act encourages Federal agencies to take steps to ensure their actions do not cause United States farmland to be irreversibly converted to nonagricultural uses.
- **Responsibilities of Federal Agencies to Protect Migratory Birds** (E.O. 13186, 10 January 2001). This E.O., in part, requires each Federal agency taking actions that have, or are likely to have, a measurable negative effect on migratory bird populations to develop and implement, within two years, a MOU with FWS that shall promote the conservation of migratory bird populations.

- **Use of Off-Road Vehicles on the Public Lands** (E.O. 11644, 9 February 1972). This E.O., in part, establishes policies and provides for procedures for ensuring off-road vehicle use on public lands will be controlled and directed to protect natural resources.
- **Superfund Implementation** (E.O. 12580, 23 January 1987), as amended by E.O. 12777 (18 October 1991). This E.O. delegates to various Federal officials the responsibilities vested in the President for implementing CERCLA

Appendix 3:

Memorandum of Understanding for a Cooperative Integrated Natural Resources Management Program on Military Installations

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**MEMORANDUM OF UNDERSTANDING
BETWEEN
THE U.S. DEPARTMENT OF DEFENSE
AND
THE U.S. FISH AND WILDLIFE SERVICE
AND
THE ASSOCIATION OF FISH AND WILDLIFE AGENCIES
FOR A
COOPERATIVE INTEGRATED NATURAL RESOURCE MANAGEMENT PROGRAM
ON MILITARY INSTALLATIONS**

A. PURPOSE

The purpose of this Memorandum of Understanding (MOU) is to further a cooperative relationship between the U.S. Department of Defense (DoD), U.S. Department of the Interior – Fish and Wildlife Service (FWS), and state fish and wildlife agencies (states) acting through the Association of Fish and Wildlife Agencies (AFWA) (hereafter referred to as the Parties) in preparing, reviewing, revising, updating and implementing Integrated Natural Resource Management Plans (INRMPs) for military installations.

B. BACKGROUND

In recognition that military lands have significant natural resources, Congress enacted the Sikes Act in 1960 to address wildlife conservation and public access on military installations. The 1997 amendments to the Sikes Act require the DoD to develop and implement an INRMP for each military installation with significant natural resources. A 2012 amendment to the Sikes Act now authorizes the preparation of INRMPs for state-owned National Guard installations used for training pursuant to chapter 5 of title 32 of the United States Code. DoD must prepare all INRMPs in cooperation with the FWS and states. Each INRMP must reflect the mutual agreement of the Parties concerning conservation, protection, and management of fish, wildlife, plants and their habitats on military lands.

INRMPs provide for the management of natural resources, including fish and wildlife and their habitats. To the maximum extent practicable, they incorporate ecosystem management principles, and describe procedures and projects that manage and maintain the landscapes necessary to sustain military-controlled lands for mission purposes. INRMPs also allow for multipurpose uses of resources, including public access appropriate for those uses, provided such access does not conflict with military land use, security requirements, safety, or ecosystem needs, including the needs of fish and wildlife resources. Effective communications and coordination among the Parties, initiated early in the planning process at national, regional, and the military installation levels, is essential to developing, reviewing, and implementing comprehensive INRMPs. When such partnering involves the participation and coordination of all Parties regarding existing FWS and state natural resources management plans or initiatives, such as threatened and endangered species recovery plans or State Wildlife Action Plans, the mutual agreement of all Parties is achieved more easily. INRMPs provide for the conservation

and rehabilitation of natural resources on military lands in ways that help ensure the readiness of the Armed Forces. Thus, a clear understanding of land use objectives for military lands should enable the Parties to have a common understanding of DoD's land management requirements.

This MOU addresses the responsibilities of the Parties to facilitate optimum management of natural resources on military installations. It replaces a DoD-FWS-AFWA MOU for *Cooperative Integrated Natural Resources Management Program on Military Installations* dated January 31, 2006, which expired January 31, 2011.

C. AUTHORITIES

This MOU is established under the authority of the Sikes Act, as amended, 16 U.S.C. 670a-670f, which requires the Secretary of Defense to carry out a program to provide for the conservation and rehabilitation of natural resources on military installations in cooperation with the FWS and states. The DoD's primary mission is national defense. DoD manages approximately 28 million acres of land and waters under the Sikes Act to support sustained military activities while conserving and protecting biological resources.

The FWS manages approximately 150 million acres of the National Wildlife Refuge System, and administers numerous fish and wildlife conservation and management statutes and authorities, including the: Fish and Wildlife Coordination Act, Migratory Bird Treaty Act of 1918, Endangered Species Act, Marine Mammal Protection Act, Bald and Golden Eagle Protection Act, Anadromous Fish Conservation Act, Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990, Federal Noxious Weed Act, Alien Species Prevention Enforcement Act of 1992, North American Wetland Conservation Act, and Coastal Barrier Resources Act.

The states in general possess broad trustee and police powers over fish and wildlife within their borders, including – absent a clear expression of Congressional intent to the contrary – fish and wildlife on federal lands within their borders. Where Congress has given federal agencies certain conservation responsibilities, such as for migratory birds or species listed as threatened or endangered under the Endangered Species Act, the states, in most cases, have cooperative management responsibilities.

The Sikes Act (16 U.S.C. 670c-1) allows the Secretary of a military department to enter into cooperative agreements with the states, local governments, Indian tribes, nongovernmental organizations, and individuals to provide for the maintenance and improvement of natural resources, or to benefit natural and historic research, both on and off DoD installations.

The Sikes Act (16 U.S.C. 670a(d)(2)) also encourages the Secretary of Defense, to the greatest extent practicable, to enter into agreements to use the services, personnel, equipment, and facilities, with or without reimbursement, of the Secretary of the Interior or states in carrying out the provisions of this section.

The Economy Act (31 U.S.C. 1535 and 1536) allows a federal agency to enter into an agreement with another federal agency for services, when those services can be rendered in a more

convenient or cost effective manner by another federal agency.

D. RESPONSIBILITIES

The Parties to this agreement hereby enter into a cooperative program of INRMP development, review, and implementation with mutually agreed-upon fish and wildlife conservation objectives to satisfy Sikes Act goals.

1. The DoD, the FWS and AFWA (Parties) mutually agree:

- a. To meet at least annually at the headquarters' level to discuss implementation of this MOU. The DoD and FWS will alternate responsibilities for coordinating this annual meeting and any other meetings related to this MOU. Proposed amendments to the MOU should be presented in writing to the parties at least 15 days prior to the annual meeting. The terms of this MOU and any proposed amendments may be reviewed at the annual meeting. The meeting may also review mutual Sikes Act research and technology needs, accomplishments, and other emerging issues.
- b. To participate in a Sikes Act Tripartite Core Group consisting of representatives from the Parties. This Core Group will meet at least quarterly, coordinated by the DoD, to discuss and develop projects and guidance to help prepare and implement INRMPs and to discuss Sikes Act issues of national importance.
- c. To engage in sound management practices for natural resource protection and management pursuant to this MOU with full consideration for military readiness; native fish and wildlife; threatened, endangered and at-risk species; and the environment.
- d. To promote the sustainable multipurpose use of natural resources on military installations – including hunting, fishing, trapping, and non-consumptive uses such as wildlife viewing, boating, and camping – in ways that are consistent with DoD's primary military mission and to the extent reasonably practicable.
- e. To develop and implement supplemental Sikes Act MOUs or other agreements, as needed, at the regional and/or state level.
- f. To recognize the most current DoD and FWS Sikes Act Guidance as the guidance for communication and cooperation of the Parties represented by this MOU.
- g. To post current DoD, FWS, and state Sikes Act guidance documents within 14 days of completion on the following sites:
 - i. For DoD: <https://www.denix.osd.mil/nr>
 - ii. For FWS: http://www.fws.gov/habitatconservation/sikes_act.html
 - iii. For the states: <http://www.fishwildlife.org>

- h. To cooperatively prepare and conduct full reviews of all new INRMPs in a timely manner.
- i. To require the DoD Components and appropriate FWS and state offices to conduct a review for operation and effect of each INRMP no less often than every five years, as required by the Sikes Act, and to document these reviews. As a means of facilitating and streamlining this statutory requirement, use the annual progress review of each INRMP as conducted by each DoD Component per DoD policy.
- j. To encourage collaboration in annual progress reviews between representatives from each military installation with an INRMP and appropriate representatives from the other Parties.
 - i. The Parties shall discuss the performance of each military installation in meeting relevant DoD Natural Resources Focus Area metrics, and potential improvements to INRMP implementation, such as new projects or management practices.
 - ii. Meetings may be in person or by another mutually acceptable means.
 - iii. The Parties shall discuss methods and projects that the FWS and states can implement that support INRMP goals and objectives.
- k. To streamline and expedite the review of INRMP updates or revisions, and to effectively address review for critical habitat exclusions based on the INRMP conservation benefit, when feasible:
 - i. DoD and the FWS will develop and implement a streamlined review process within six months of signature of this MOU that will allow for expedited review and approval (new signatures) of updated sections of each INRMP.
 - ii. DoD will provide a means of easily identifying all changes to each updated or revised INRMP when forwarding it for review.
 - iii. FWS will focus review on those parts of updated INRMPs that reflect changes from the previously reviewed version.
 - iv. FWS and the appropriate states will review all INRMPs with major revisions (e.g., changes required by mission realignments, the listing of new species or other significant action that has the potential to affect military operations or readiness).
 - v. DoD, FWS, and the states (acting through AFWA) will continue to seek opportunities to make INRMP review processes more efficient while sustaining and enhancing INRMP conservation effectiveness.
 - vi. The DoD Components may submit to the USFWS, a priority INRMP list

to address those installations seeking critical habitat exclusions to facilitate coordination with USFWS Endangered Species office.

vii. To ensure consistency, the Parties accept the following definitions:

- a) **Compliant INRMP:** An INRMP that has been both approved in writing, and reviewed, within the past five years, as to operation and effect, by authorized officials of DoD, DOI, and each appropriate state fish and wildlife agency.
- b) **Review for operation and effect:** A comprehensive, joint review by the parties to the INRMP, conducted no less often than every five years, to determine whether the plan needs an update or revision to continue to address adequately Sikes Act purposes and requirements.
- c) **INRMP update:** Any change to an INRMP that, if implemented, is not expected to result in consequences materially different from those in the existing INRMP and analyzed in an existing NEPA document. Such changes will not result in a significant environmental impact, and installations are not required to invite the public to review or to comment on the decision to continue implementing the updated INRMP.
- d) **INRMP revision:** Any change to an INRMP that, if implemented, may result in a significant environmental impact, including those not anticipated by the parties to the INRMP when the plan was last approved and/or reviewed as to operation and effect. All such revisions require approval by all parties to the INRMP, and will require a new or supplemental NEPA analysis.

l. That none of the Parties to the MOU is relinquishing any authority, responsibility, or duty established by law, regulation, policy, or directive.

m. To designate the officials listed below, or their delegates to participate in the activities pursuant to this MOU.

- i. DoD: Deputy Director, Natural Resources Conservation Compliance, ODUSD (I&E) ESOH
- ii. FWS: National Sikes Act Coordinator, Fish and Aquatic Conservation
- iii. AFWA: Director, Government Affairs

2. DoD agrees to:

- a. Communicate the establishment of this MOU to all DoD Components.
- b. Take the lead in developing policies and guidance related to INRMP development, updates, revisions, and implementation, and to ensure the involvement, as appropriate, in these processes of the FWS and state fish and wildlife agencies.

- c. Ensure distribution of the DoD and FWS Sikes Act Guidance to all appropriate DoD Components.
- d. Encourage DoD Components to invite appropriate FWS and state fish and wildlife agency offices to participate in annual INRMP reviews. All such invitations should be extended at least 15 business days in advance of the scheduled review to facilitate meaningful participation by all three Parties. Meetings may be in person or by other mutually agreed upon means.
- e. Encourage DoD Components to take full advantage of FWS and state fish and wildlife agency natural resources expertise through the use of Economy Act transfers and cooperative agreements. Encourage DoD Components and FWS to explore the use of the Fish and Wildlife Coordination Act for technical assistance, fish stocking, and other conservation projects. Priority should be given to projects that:
 - i. Sustain the military mission.
 - ii. Effectively apply ecosystem management principles.
 - iii. Consider the strategic planning priorities of the FWS and the state fish and wildlife agency.
- f. Encourage DoD Components to give priority to INRMP requirements that:
 - i. Sustain military mission activities while ensuring conservation of natural resources.
 - ii. Provide adequate staffing with the appropriate expertise for updating, revising, and implementing each INRMP within the scope of DoD Component responsibilities, mission, and funding constraints.
- g. Encourage DoD Components to discuss with the FWS and state fish and wildlife agencies all issues of mutual interest related to the protection, conservation, and management of fish and wildlife resources on DoD installations.
- h. Subject to mission, safety, security, and ecosystem requirements, provide public access to military installations to facilitate the sustainable multipurpose use of its natural resources.
- i. Identify natural resource research needs, and develop research proposals with input from the Parties.
- j. Identify opportunities to work with the DoD Components to facilitate:
 - i. Cooperative regional and local natural resource conservation partnerships and initiatives with FWS and state fish and wildlife agency offices.
 - ii. Natural resources conservation technology transfer and training initiatives

between the DoD Components, federal land management agencies, and state fish and wildlife agencies.

- k. Provide law enforcement support to protect fish, wildlife, and plant resources on military installations consistent with jurisdiction and authority.

3. FWS agrees to:

- a. Communicate the establishment of this MOU to each FWS Regional Office and appropriate field offices in close proximity to military installations.
- b. Distribute the DoD and FWS Sikes Act Guidelines to each FWS Regional Office and appropriate field office in close proximity to military installations.
- c. Designate regional and field office FWS liaisons to develop partnerships and help DoD implement joint management of ecosystem-based natural resource management programs, and provide a list of those liaisons to the DoD as needed.
- d. Provide technical assistance with the appropriate expertise to the DoD in managing its resources within the scope of FWS responsibilities and funding constraints.
- e. Encourage field offices to coordinate current and proposed FWS natural resource initiatives and research efforts with those that may relate to DoD installations, and to provide applicable installations with new and relevant information pertaining to distribution and/or research regarding listed and candidate species and species at-risk.
- f. Inform DoD Components and affected installations regarding upcoming and reasonably foreseeable proposed listing and critical habitat designations that may potentially affect military installations in a timely manner before publication of such proposals in the Federal Register.
- g. Encourage regional and field offices to expedite pending INRMP reviews that may affect foreseeable proposed listing of threatened and endangered species and critical habitat designations.
- h. Provide law enforcement support as appropriate to protect fish, wildlife, and plant resources on military installations within the jurisdiction of the FWS.
- i. Identify FWS refuges and other potential federal management areas in close proximity to military installations, and, where appropriate, participate in the joint management of ecosystem-based natural resource management projects that support INRMP and other planning goals, objectives, and implementation.

4. AFWA agrees to:

- a. Communicate the establishment of this MOU to each state fish and wildlife agency director and appropriate personnel.

- b. Distribute the DoD and FWS Sikes Act Guidelines to each state fish and wildlife agency director and appropriate staff.
- c. Facilitate and coordinate with the states to encourage them to:
 - i. Participate in developing, reviewing, updating, revising, approving and, as appropriate implementing INRMPs in a timely way upon request by military installation personnel.
 - ii. Designate state liaisons to help develop partnerships and to help DoD installation staff implement natural resource conservation and management programs.
 - iii. Identify state wildlife management areas in close proximity to military installations and, where appropriate, participate in the joint management of ecosystem-based natural resources projects that support INRMP goals, objectives, and implementation.
 - iv. Provide technical assistance to DoD installation staff in adaptively managing natural resources within the scope of state responsibilities, funding constraints, and expertise.
 - v. Identify state personnel needs to develop, review, update/revise, approve, and implement INRMPs, and facilitate the identification of funding opportunities to address the fulfillment of state priorities.
 - vi. Coordinate current and proposed state natural resources research efforts with those that may relate to DoD installations.
 - vii. Coordinate with DoD installations to develop new, and implement existing, conservation plans and strategies, including, but not limited to State Wildlife Action Plans; the National Fish, Wildlife and Plants Climate Adaptation Strategy; goals or initiatives of the North American Bird Conservation Initiative (NABCI) and/or Partners in Amphibian and Reptile Conservation (PARC); and the National Fish Habitat Action Plan.

E. STATEMENT OF NO FINANCIAL OBLIGATION

This MOU does not impose any financial obligation on the part of any signatory.

F. ESTABLISHMENT OF COOPERATIVE AGREEMENTS

The Parties are encouraged to enter into cooperative or interagency agreements to coordinate and implement natural resource management on military installations. If fiscal resources are required, the Parties must develop a separately funded cooperative or interagency agreement.

Such cooperative or interagency agreements may also be entered into under the authority of the Sikes Act (16 U.S.C. 670c-1). Interagency agreements may be entered into under the authority of the Economy Act (31 U.S.C. 1535 and 1536). The Parties should also explore opportunities to utilize the Fish and Wildlife Coordination Act, as amended (16 U.S.C. 661-666c) to facilitate agreements for FWS technical assistance, fish stocking, and other conservation activities. Each funded cooperative or interagency agreement shall include a work plan and a financial plan that identify goals, objectives, and a budget and payment schedule. A cooperative or interagency agreement to accomplish a study or research also will include a study design and methodology in the work plan. It is understood and agreed that any funds allocated via these cooperative or interagency agreements shall be expended in accordance with its terms and in the manner prescribed by the fiscal regulations and/or administrative policies of the party making the funds available.

G. AMENDMENTS

This MOU may be amended at any time by mutual written agreement of the Parties.

H. TERMINATION

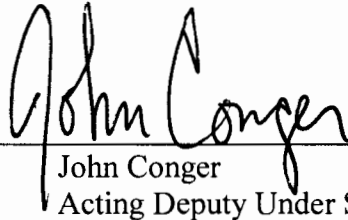
Any party to this MOU may remove itself upon sixty (60) days written notice to the other parties.

I. EFFECTIVE DATE AND DURATION

This MOU will be in effect upon date of final signature, and will continue for ten years from date of final signature. The parties will meet six (6) months prior to the expiration of this MOU to discuss potential modifications and renewal terms.

7-29-13

Date



John Conger
Acting Deputy Under Secretary of Defense
(Installations and Environment)
U.S. Department of Defense

6.24.13

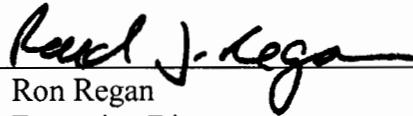
Date



Dan Ashe
Director
Fish and Wildlife Service
U.S. Department of Interior

7-15/2013

Date



Ron Regan
Executive Director
Association of Fish and Wildlife Agencies

Appendix 4:

Memorandum of Understanding for the North Carolina Onslow Bight Conservation Forum

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**NORTH CAROLINA ONSLOW BIGHT CONSERVATION
FORUM**

MEMORANDUM OF UNDERSTANDING AMONG:

**NORTH CAROLINA CHAPTER OF THE NATURE CONSERVANCY
NORTH CAROLINA WILDLIFE RESOURCES COMMISSION
NORTH CAROLINA DEPARTMENT OF ENVIRONMENT AND NATURAL
RESOURCES
U.S. MARINE CORPS BASE CAMP LEJEUNE
U.S. FISH AND WILDLIFE SERVICE
U.S. MARINE CORPS AIR STATION CHERRY POINT
U.S.D.A. FOREST SERVICE
ENDANGERED SPECIES COALITION
NORTH CAROLINA COASTAL FEDERATION
NORTH CAROLINA COASTAL LAND TRUST
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
NATURAL RESOURCES CONSERVATION SERVICE
DUCKS UNLIMITED**

BACKGROUND

The Onslow Bight Landscape area of eastern North Carolina bounded approximately on the north by Cape Lookout and to the south by Cape Fear, (see Appendix A) contains a unique landform of saltwater marshes, riverine wetlands, pocosins, longleaf pine savannahs and other coastal ecosystems. The site supports nationally significant occurrences of animal and plant communities. The rural character of the area, coupled with the flora and fauna and supporting geophysical landform have created a natural environment with abundant opportunities to enjoy fishing, hunting, camping, hiking, canoeing, and other resource based outdoor recreational opportunities. Many residents, permanent and seasonal, have chosen the area because of the many amenities afforded by the natural environment.

However, rapid population growth is fueling urbanization, changing the area's rural character, and threatening its natural resources. Thus, the impetus for the MOU.

STATEMENT OF MUTUAL BENEFIT AND INTEREST

The participating organizations represent a broad spectrum of land managers and land conservation advocates with differing missions. Some are custodians of large areas of public land held primarily for resource conservation and utilization or national security. Some modify the resource base by their own construction activities, and some are conservation advocates with little or no land base of their own. All are dedicated to sustainable natural resource management, providing for human needs while retaining our natural heritage. Towards this end, the participating organizations will attempt to foresee potential resource conflicts and conservation opportunities and, within their authority and consonant with their missions, work to maintain and protect ecologically viable areas.

PURPOSE

This Memorandum of Understanding (MOU) is entered into for the purpose of enhancing cooperation and communication regarding regional conservation issues within the Onslow Bight landscape by establishing the North Carolina Onslow Bight Conservation Forum (NCOBCF). The mission of the NCOBCF is:

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.

The participating organizations and agencies recognize the following goals of the NCOBCF:

- 1) to promote the conservation, restoration, health and sustainable use of the landscape and the native terrestrial and aquatic communities that depend, in whole or in part, on the lands and waters of the Onslow Bight area;
- 2) to encourage public/private partnerships among participating governmental agencies, community and non-governmental organizations, academic institutions, corporations, and private landowners to leverage resources and achieve land conservation results on a large landscape scale;
- 3) to enhance coordination among participants concerning current and future initiatives such that participants will be able to take better advantage of the work already being done by others, as well as identify opportunities for working together to undertake more ambitious projects than any single agency's resources would otherwise permit;
- 4) to encourage an on-going regional dialogue among participants about sustainable land management and native biodiversity;
- 5) to promote the establishment of landscape corridors and buffers, between and adjacent to existing public and private conservation lands to enhance long-term wildlife population viability and genetic exchange and to ensure land management flexibility, respectively;
- 6) to promote the education of interested private individual and corporate landowners and local government agencies on conservation land management through demonstrations, workshops and field trips; and
- 7) to promote the sustainability of the military mission in the Onslow Bight Landscape by preserving land uses suitable to military training on existing military lands, and promoting land uses compatible with military training on those lands that surround existing military lands.

To achieve these goals, the NCOBCF will provide a communicative forum to identify opportunities for collaborative action among the participants. Although it is not the intent to provide NCOBCF with the authority to carry out any specific project in furtherance of its stated objective and goals participants, will, to the extent authorized under a participant's regulatory and statutory authority, applicable regulations, and in consonance with the participant's primary mission:

- promote a vigorous and broadly inclusive public discourse on the precepts underlying sustainable land use;
- assess opportunities and work cooperatively to enhance, protect, conserve, and restore the sensitive and unique flora and fauna of the Onslow Bight area by identifying priority conservation lands and pursuing conservation options;

- encourage projects that focus on protecting, conserving, and restoring the integrity of the landscape and waters and their natural communities;
- serve as an educational resource to private landowners, institutions and organizations, and the general public on land conservation and management tools and opportunities;
- facilitate collaborative efforts and joint land management activities among members to achieve common conservation objectives across jurisdictional and ownership boundaries; and
- recognize and promote the vital role science must play in responsible sustainable land use.

LIABILITY

The participants hereto agree that they shall each be responsible for their own individual, direct liabilities and not for any other stakeholder actions, omissions or liabilities, unless otherwise provided by law and the specific consent of a member.

AMENDMENTS AND REVIEW

This MOU is subject to revision and can be amended, extended, or modified by the mutual written consent, signed and dated, by all of the participating organizations, prior to any changes being performed.

New participating organizations may be added to the MOU by consensus, written or otherwise, of the current participants.

OTHER PROVISIONS

Nothing herein is intended to or has the effect of extending any legal authority or responsibilities of any of the members herein nor is any provision herein intended or has the effect of modifying, restricting, enhancing or changing the legal authorities, obligations, restrictions, liabilities or requirements of any of its members. This MOU is intended only to provide the basis for a voluntary cooperative relationship among the signatories and is not intended to, nor does it create any right, entitlement, or benefit, substantive or procedural, or trust responsibility, enforceable at law or equity, by any individual, organization, private or governmental third party, participant party or any member thereof against any party to this agreement or the United States, its agencies, its officers, or any person. This MOU shall not be construed to create any right to judicial review involving the compliance or noncompliance with the terms of this MOU by any signatory or the

United States, its agencies, its officers, or any other person. To the extent that any provision of this MOU conflicts with current directives, or applicable regulations or laws of any of the parties of this agreement, the provisions of this MOU will have no effect.

Any information furnished to the Forest Service under this instrument is subject to the Freedom of Information Act (5 U.S.C. 552).

The forum in no way substitutes for the decision-making process that each participating agency is required to follow by regulation, directive, or law. The forum helps to facilitate discussion among the participants, without making decisions for those agencies. The forum is not considered a “nonfederal entity” for purposes of the Joint Ethics Regulations as its stated purpose is merely to provide a venue for communication among participants sharing similar interests; is not self-sustaining as it has no internal budgetary provisions or authority; has no decision-making authority or legal status; and cannot bind the action of any agency or organization.

Should disagreement arise about the interpretation of the provisions of this MOU, or amendments or revisions thereto, that cannot be resolved to the mutual satisfaction of all the members to this MOU, those provisions shall have no effect.

Principal points of contact for each agency are listed on the attached addendum and shall be updated periodically as appropriate.

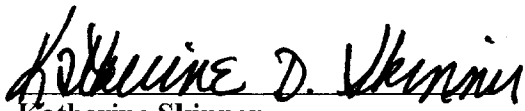
TERMS OF THE MOU

The terms of this MOU shall become effective upon the last date of signature of all approving officials of the respective participating organizations entering into this agreement. This agreement shall remain in effect until terminated by (1) mutual written agreement, (2) written notice by any party at least thirty (30) days in advance, or (3) completion of this agreement.

NON-FUND OBLIGATING DOCUMENT

This MOU is not a procurement instrument and does not commit any party to fund, obligate funds, request appropriations or commit a member’s resources in support of the NCOBF. Any funding activities associated with the NCOBF shall be subject to availability of funding and carried out in accordance with applicable authorities and legal requirements, including those for government procurement and printing, of the participating organizations. Such endeavors will be outlined in separate agreements that shall be made in writing by representatives of the parties and shall be independently authorized by appropriate statutory authority. Specifically this instrument does not establish authority for noncompetitive award to the cooperator of any contract or other agreement. Any contract or agreement for training or other services must fully comply with all applicable requirements for competition.

**SIGNATORY FOR THE NORTH CAROLINA CHAPTER OF THE NATURE
CONSERVANCY:**



**Katherine Skinner
Executive Director
North Carolina Chapter of
The Nature Conservancy**

3-25-03

Date

The mission of the **North Carolina Chapter of The Nature Conservancy** is to preserve the plants, animals and plant communities that represent the diversity of North Carolina by protecting the land and water they need to survive.

SIGNATORY FOR THE NORTH CAROLINA WILDLIFE RESOURCES COMMISSION:

Charles R Fullwood

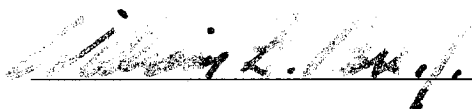
3-18-03

Charles R. Fullwood Jr.
Director
North Carolina Wildlife Resources Commission

Date

The mission of the **North Carolina Wildlife Resources Commission** is to manage, restore, develop, cultivate, conserve, protect and regulate North Carolina's wildlife resources.

**SIGNATORY FOR THE NORTH CAROLINA DEPARTMENT OF ENVIRONMENT
AND NATURAL RESOURCES:**



William G. Ross Jr
Secretary
North Carolina Department of Environment
and Natural Resources

Date

The mission statement of the **North Carolina Department of Environment and Natural Resources** is: "Together, with innovation, teamwork and partnerships, making progress toward: a cleaner environment, healthier lives, a stronger economy, more effective conservation of our land and water, and greater understanding and respect for the resources of nature."

SIGNATORY FOR MARINE CORPS BASE CAMP LEJEUNE:



Major General D. M. Mize
Commanding General
Marine Corps Base Camp Lejeune

25 MAR 2003

Date

The mission of **Marine Corps Base Camp Lejeune** is to maintain combat-ready units for deployment with the II Marine Expeditionary Force. Camp Lejeune is home to the largest single concentration of Marines in the world. Camp Lejeune supports the world's most complete amphibious training program and is the east coast's "Home of Marine Expeditionary Forces in Readiness."

**SIGNATORY FOR THE U.S.FISH AND WILDLIFE SERVICE, RALEIGH
ECOLOGICAL SERVICES UNIT:**



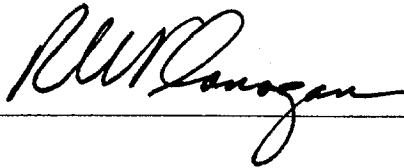
4-16-03

**Garland Pardue
Field Supervisor,
Raleigh Ecological Services Field Office
U.S. Fish and Wildlife Service**

Date

The mission of the **U.S. Fish and Wildlife Service** is, working with others, to conserve, protect and enhance fish, wildlife, and plants and their habitats for the continuing benefit of the American people. Central to this mission, the Fish and Wildlife Service, along with state natural resource agencies, private lands partners, and other stakeholders, is dedicated to providing and protecting a healthy environment for fish and wildlife and people. In the North Carolina Onslow Bight Landscape, the Service's priority is to implement the principles of ecosystem management to promote the recovery of the red-cockaded woodpecker, and other endangered, threatened and federal species of concern.

SIGNATORY FOR MARINE CORPS AIR STATION CHERRY POINT:



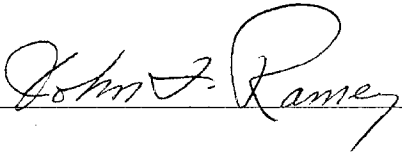
11 April 03

**Major General Robert Flanagan
Commanding General
Marine Corps Air Station Cherry Point**

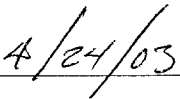
Date

The primary mission of **Marine Corps Air Station Cherry Point** is to maintain and operate facilities and provide services to support the operations of the 2nd Marine Aircraft Wing. The MCAS Cherry Point Complex is comprised of widely dispersed properties in eastern North Carolina. In addition to MCAS Cherry Point, other major facilities include Marine Corps Auxiliary Landing Field (MCALF) Bogue, Marine Corps Outlying Field (MCOFL) Atlantic, and the Piney Island Bombing Range (BT-11) in Carteret County, and Marine Corps Outlying Field (MCOFL) Oak Grove in Jones County.

SIGNATORY FOR THE U.S.D.A. FOREST SERVICE, REGION 8:



Handwritten signature of John F. Ramey over a horizontal line.



Handwritten date 4/24/03 over a horizontal line.

John F. Ramey
Forest Supervisor
National Forest in North Carolina
U.S.D.A. Forest Service

Date

The mission of the **U.S.D.A. Forest Service, Region 8** is caring for the land and serving people. As set forth in law, the mission is to achieve quality land management under the sustainable multiple-use management concept to meet the diverse needs of people. To accomplish this the Forest Service protects and manages the natural resources on National Forest System lands in the southeastern U.S. and Puerto Rico; conducts research on the utilization of forest resources, and all aspects of managing forests and rangelands; and provides assistance to communities, state and local governments, forest industries and private landowners in protecting and managing non-Federal forests. Partnerships are key to achieving shared goals both locally, nationally, and internationally.

SIGNATORY FOR THE ENDANGERED SPECIES COALITION:

Brock Evans

May 16, 2003

**Brock Evans
Executive Director
Endangered Species Coalition**

Date

The **Endangered Species Coalition** exists not only to defend and protect the ESA, but also to ensure that its vision becomes a reality. We are the only organization that devotes all of its time, every day, to endangered species and related biodiversity issues across the United States. We defend it from attacks periodically mounted against it by development interests; we seek to strengthen it by incorporating better scientific knowledge; we are committed to ensure that the implementation of the law results in real protection for, and recovery of, all at-risk species now a part of our country's rich biological heritage.

Our tools are public education, scientific information and public participation in all decisions affecting the fate of threatened and endangered species. Through extensive grassroots work, education, collaboration, discussions with lawmakers and the dissemination of information, we hope to ensure that the Act itself, as well as the species it protects, can be passed on safely into the future.

SIGNATORY FOR THE NORTH CAROLINA COASTAL FEDERATION:



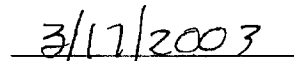
Todd Miller
Executive Director
North Carolina Coastal Federation

Date

The **North Carolina Coastal Federation** is the largest nonprofit environmental group in North Carolina that is focused entirely on the protection and restoration of coastal resources. Founded in 1982, the federation has 7,800 members and a staff of 13 based in Carteret, Dare and New Hanover counties. NCCF advocates for effective coastal management laws and regulations, monitors implementation and enforcement of existing programs, restores and protects sensitive lands important to coastal water quality and fisheries habitat, and conducts extensive environmental education outreach programs.

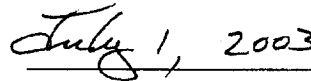
SIGNATORY FOR THE NORTH CAROLINA COASTAL LAND TRUST:


Camilla M. Herlevich
Executive Director
North Carolina Coastal Land Trust


Date

North Carolina Coastal Land Trust's mission is "to enrich the coastal communities of our state through acquisition of open spaces and natural areas, conservation education, and the promotion of good land stewardship."

SIGNATORY FOR THE NORTH CAROLINA DEPARTMENT OF TRANSPORTATION:



Lyndo Tippett
Secretary of Transportation
North Carolina Department of Transportation

Date

The mission of the **North Carolina Department of Transportation** is to provide an integrated transportation system that enhances the state's well being. Our goal is to provide a safe and well-maintained transportation system that meets the needs of our customers and supports the development of sustainable, vibrant communities. In so doing, we are committed to planning, designing, constructing, maintaining and managing an interconnected transportation system while striving to preserve and enhance our natural and cultural resources. Environmental stewardship encompasses these responsibilities and is reflected in our day-to-day operations by:

Safeguarding the public's health by conducting our business in an environmentally responsible manner

Demonstrating our care for and commitment to the environment

Recognizing that our customers expect us to provide mobility and a quality of life that includes the protection of the natural resources and the cultural and social values of their community.

Each employee is responsible for incorporating these principles of safety, environmental stewardship and customer focus into their daily activities.

SIGNATORY FOR THE NATURAL RESOURCES CONSERVATION SERVICE:

Mary K. Combs

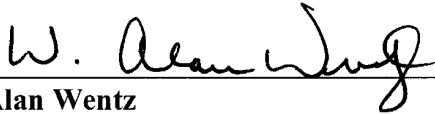
3/20/03

**Mary K. Combs
North Carolina State Conservationist
Natural Resources Conservation Service**

Date

The **Natural Resources Conservation Service** provides leadership in a partnership effort to help people conserve, maintain, and improve our natural resources and environment.

SIGNATORY FOR DUCKS UNLIMITED, INC.:



W. Alan Wentz
Senior Group Manager
Ducks Unlimited, Inc.

JAN 26 2006

Date

Ducks Unlimited conserves, restores, and manages wetlands and associated habitats for North America's waterfowl. These habitats also benefit other wildlife and people.

**Addendum
To
North Carolina Onslow Bight Conservation Forum MOU**

PRINCIPAL CONTACTS

The principal contacts for this instrument are:

TNC – Fred Annand or Hervey McIver Mailing Address: Nature Conservancy One University Place	PHONE: 919-403-8558 4705 University Drive Suite 290	FAX: 919-403-0379 Durham, NC 27707
NCDENR-NHP – Scott Pohlman Mailing Address:	PHONE: 919-715-8696 1601 Mail Service Center	FAX: 919-715-3085 Raleigh, NC 24699
NCDENR-DCM – Mike Christenbury Mailing Address:	PHONE: 252-808-2808 151-B Hwy 24, Heston Plaza II	FAX: 252-247-3330 Morehead City, NC 28557
NCWRC – Tommy Hughes Mailing Address:	PHONE: 252-514-4738 961 Perrytown Road	FAX: N/A New Bern, NC 28562
MCB, Camp Lejeune – John Townson Mailing Address:	PHONE: 910-451-9384 PSC BOC 20004	FAX: 910-451-1787 Camp Lejeune, NC 28542
USFWS – Peter Benjamin Mailing Address:	PHONE: 919-856-4520 P.O. Box 33726	FAX: 919-856-4556 Raleigh, NC 27636-3726
MCAS, Cherry Point – Bill Rogers Mailing Address:	PHONE: 252-466-5870 PSC BOX 8006 MCAS	FAX: 252-466-2000 Cherry Point, NC 25883
USFS – Lauren Hillman Mailing Address: National Forests in NC	PHONE: (252) 638-5628 P.O. BOX 2750	FAX: 252-637-9113 Ashville, NC 28801
ECS – Liz Godfrey Mailing Address:	PHONE: 505-438-4245 P.O. Box 65195	FAX: Washington, D.C. 22035
NC Coastal Federation – Todd Miller Mailing Address:	PHONE: 252-393-8185 P.O. BOX HWY 24	FAX: 252-393-7508 Newport, NC 28570
NC Coastal Land Trust – Janice Allen Mailing Address:	PHONE: 252-634-1927 P.O. BOX 15451	FAX: 252-514-0051 New Bern, NC 28561
NCDOT – Leilani Paugh Mailing Address:	PHONE: 919-715-1457 1568 Mail Service Road	FAX: 919-715-1501 Raleigh, NC 27611

NRCS – Vontice F. Jackson
Mailing Address:

PHONE: 252-455-4472
4028 Richlands Hwy

FAX:
Jacksonville, NC 28542

DU – Craig LeSchack
Mailing Address: Duck's Unlimited, Inc.

PHONE: 843-745-9110
3896 Leeds Ave.

FAX:
Charleston, SC 29405

Appendix 5:

Ecological Classification System

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Appendix 5: Ecological Classification System

The national ecological classification, mapping, and inventory system describes and maps ecosystems at different scales. This type of multi-scale system is tied to the National Hierarchical Framework of Ecological Units, "a regionalization, classification, and mapping system for stratifying the Earth into progressively smaller areas of increasingly uniform ecological potential" (Ecomap 1993). It provides a framework for implementing ecosystem management across physiographic regions, subregions, and local landscapes. Individual ecosystem units can be compared with adjacent units and their patterns and relationships recognized at the landscape and land unit scales.

The United States is divided into four broad domains based on large ecological climate zones identified by Köppen (1931). Except for the southern tip of Florida, almost all of the eastern United States belongs in the Humid Temperate Domain. This domain is differentiated into six divisions according to the importance of winter frost (Bailey 1995), and these Divisions are differentiated into three provinces according to geomorphology (McNab and Avers 1994). MCB Camp Lejeune is located in the Outer Coastal Plain Mixed Forest Province within the Subtropical Division.

At the subregional scale, ecological units termed sections and subsections further subdivide the land. The Outer Coastal Plain Mixed Forest Province is differentiated into seven sections according to important differences in potential natural vegetation, soil orders, and disturbance regimes. The Atlantic Coastal Flatlands Section, in which MCB Camp Lejeune belongs, is differentiated into 55 Subsections according to important differences in local climate, landform, geological formation, and potential natural vegetation types (Keys et. al. 1995). MCB Camp Lejeune is in the Lower Terraces Subsection. Its place in the National Hierarchy of Ecological Units is therefore:

- DOMAIN 200: Humid Temperate
- DIVISION 230: Subtropical
- PROVINCE 232: Outer Coastal Plain Mixed Forest
- SECTION 232C: Atlantic Coastal Flatlands
- SUBSECTION 232Cb: Lower Terraces

These subdivisions have proven useful for strategic planning and assessment of ecosystems at the national, regional, and state level. They may not be useful for addressing management issues such as fire, silviculture, native diversity, and wildlife habitat needs at the local scale. Below the subsection level, ecosystems can be further subdivided into Landtype Associations (LTAs) which are identified and mapped based on similarities and patterns of soil types, stream types, lakes, wetlands, and plant associations or potential natural vegetation. At the land unit scale, LTAs can then be subdivided into Landtypes (LTs) and Landtype Phases (LTPs), the smallest ecological units. These units identify land having different potential natural vegetation (PNV), landform, soil drainage, and site productivity. The following describes the ecological classification of MCB Camp Lejeune.



Figure 1. Aerial view of marsh lands aboard MCB Camp Lejeune

ECOLOGICAL CLASSIFICATION METHODS ON MCB CAMP LEJEUNE

The Ecological Classification System (ECS) developed for MCB Camp Lejeune is a synthesis of available information on local climate, geology, soils, current vegetation, potential natural vegetation, fire regimes, and rare species occurrences. Basic sources of information include:

- Ecological Units for the Eastern United States (Keys et. al. 1995),
- Classification of the Natural Communities of North Carolina (Schafale and Weakley 1984), Inventory of the Rare Species, Natural Communities, and Critical Areas on MCB Camp Lejeune (LeBlond 1997),
- Ecological Classification on the Croatan National Forest (USFS1999),
- Pre-settlement Vegetation and Natural Fire Regimes on the Croatan National Forest (Frost 2001),
- Pre-settlement Vegetation Community Types of MCB Camp Lejeune (Frost 2001),
- Onslow County Soil Survey (1992)(IGIR 2000),
- Soil Survey for MCB Camp Lejeune (1984), (IGIR 2000),
- USFS Forest Inventory Plots (archived data 1990),
- Forest Inventory Report (Carter 2000),
- Element Occurrence Records (NC Natural Heritage 1999),
- Timber Stands / Compartments (IGIR 2000),
- RCW Cavity Tree Cluster/Buffer (IGIR 2000),
- RCW Foraging Circles (IGIR 2000), and
- Proposed Natural Area (IGIR 2000).

An initial list of the ecological types for MCB Camp Lejeune was derived from several sources: the “Classification of Natural Communities of North Carolina” (Schafale and Weakley 1990), the “Inventory of the Rare Species, Natural Communities, and Critical Areas on MCB Camp Lejeune”, and the “Pre-settlement Vegetation and Natural Fire Regimes on

the Croatan National Forest.” The organization of these ecological types (the concepts), into ecological LTs (the units of land), followed the classification scheme developed for the Croatan National Forest, a landscape in close proximity to MCB Camp Lejeune. These two areas have similar environmental conditions and soil types because they are in the same ecological Subsection. Landtypes were chosen to “crosswalk” these two areas because they should be the closest match of ecological conditions at a similar scale and because they are intermediate in size between LTAs and LTPs, the largest and smallest ecosystems respectively that could be defined for both areas

A preliminary map of the distribution of LTs on MCB Camp Lejeune was developed from known relationships between potential natural vegetation, soil types, natural fire regimes, and potential natural vegetation maps (Frost 1996, 2000) in the Atlantic Coastal Flatwoods Section, Lower Terraces Subsection. The GIS coverage (IGIR 2000) for the 1992 Onslow County Soil Classification was used to produce hardcopy maps at 1:40,000 scale of the initial ecological LT classification units for the Base. This map was then used as the starting point to define LTPs and LTAs on MCB Camp Lejeune; essentially the “top down” and “bottom up” approach described in ECOMAP (1993). Potential Natural Vegetation maps, soil surveys, and current vegetation, timber productivity, and species diversity data, were then used to refine, validate, and delineate the ecological units on MCB Camp Lejeune. For a full reporting of this process, see “Ecological Classification, Mapping, and Inventory for MCB Camp Lejeune,” prepared by Steve Simon of the USDA Forest Service in Asheville, NC.

There are 5 LTAs, 15 LTs, and 31 LTPs identified on MCB Camp Lejeune (Figure 2, Figure 4, and Table 1). Three of the Landtypes and six of the LTPs describe altered land such as urban areas.

LANDTYPE ASSOCIATIONS

On MCB Camp Lejeune the following LTAs were described:

- LTA 232Cb03 – **Stella-White Oak Dissected Lowlands**
- LTA 232Cb04 - **Bogue-Topsail Coastal Sandridge**
- LTA 232Cb09 - **Onslow Maritime Zone**
- LTA 232Cb12 - **New River Dissected Uplands**
- LTA 232Cb13 - **Great Sandy Run Pocosin**

Table 1 describes the primary characteristics of these LTAs. Figure 2 shows LTAs on MCB Camp Lejeune and Figure 3 shows a regional map of LTAs.

LANDTYPES AND LANDTYPE PHASES DESCRIPTIONS

Landtype descriptions include a discussion of the major landforms, moisture regimes, and potential natural vegetation dominants, all phases defined for the type and the size of the LT on MCB Camp Lejeune and in Onslow County. In addition, landscape/landform pattern, disturbance factors, pre-settlement vegetation, existing vegetation, and management considerations for each LT are described. Landtype Phase descriptions include a photograph

of a typical stand; number of map units, their range in size, total extent, primary associates, and location; soil series, drainage, texture, and productivity for major pine species; and pre-settlement vegetation type, composition and condition with a comparison to existing dominant species.

Table 2 summarizes the LTs and LTPs aboard MCB Camp Lejeune. The following pages also contain these tables relating to ecological classification on MCB Camp Lejeune:

- Composition of LTAs in Onslow County and on MCB Camp Lejeune,
- Dominant Tree Species Occurring in LTP on Main Base, MCB Camp Lejeune,
- Dominant Tree Species Occurring in LTP on GSRA, MCB Camp Lejeune,
- Crosswalk Between LTs and Frost's (2000) PNV Community Type Groups,
- Relative Site Index Class for Important Pine Species on MCB Camp Lejeune, and
- Natural Areas, Rare Species, and Natural Communities on MCB Camp Lejeune.

USE OF THE ECOLOGICAL CLASSIFICATION SYSTEM

Like all maps, those produced for the ECS are imperfect representations of the land, and accuracy depends upon the application and scale being used. On MCB Camp Lejeune, LTAs can accurately describe landscape patterns at the broadest scale, which can help to separate land having distinct management opportunities and limitations based on dominant ecological factors such as topography and landform/vegetation diversity. Since the ECS was derived from soil maps, map unit reliability at the finer scales is controlled by the accuracy of the Onslow County and Base soil surveys. As a result, on site investigation is needed to plan for intensive uses in small areas.

USE ON MCB CAMP LEJEUNE

The ECS can be thought of as a snapshot of what the landscape may have looked like at a given moment in history. The Southeastern Coastal Plain is a dynamic system, constantly responding to large-scale disturbances such as hurricanes and fire. Because of the disturbance regime, portions of the landscape would inevitably be in different successional stages of a fire maintained sub-climax ecosystem. This being the case, the ECS cannot be interpreted as an exact representation of a desired future condition.

Table 1. Landtype Associations Located on MCB Camp Lejeune, NC

232Cb03 STELLA WHITE OAK DISSECTED LOWLANDS (LTA 3)

Location: ~200,000 acres in Jones, Onslow, Carteret Co.; ~160,000 acres in Onslow Co., ~400 acres on MCB Camp Lejeune

Distinguishing Features: Dissected landscape w/major streams, aquults and udults; diverse flora; large proportion of mesic longleaf pine, mixed wet pine, swamp forests

Primary design criteria: Topography (dissected and undissected interstream flats w/low relief), stream density (high), diversity and complexity (diverse veg., complex soils)

Associated criteria: soil series associations (Rains-Goldsboro-Lynchburg, Torhunata-Pantego-Rains, Baymeade-Onslow-Lynchburg)

Vegetation: potential communities: dry to wet longleaf pine savannas, mixed wet pine/evergreen shrubs, pond-pine-loblolly bay, cypress-gum swamps, tidal marshes

232Cb04 BOGUE-TOPSAIL COASTAL SANDRIDGE (LTA 4)

Location: ~67,000 acres in Carteret and Onslow Co.; ~29,750 acres in Onslow Co., ~15,000 acres on MCB Camp Lejeune

Distinguishing Features: Highly patterned landscape dom. by broad ridges and swales that reflect old ocean shoreline. Large proportion of deep sandy, very poorly drained soils w/o organic surface horizon but w/a spodic horizon (aquods) and soils on well-sorted sands (psamments). Dom. by pond pine/evergreen shrubs and longleaf pine savannas.

Primary design criteria: Landscape pattern (matrix of pocosin w/patches of pine savanna), extensive ridge and swale network in eastern portion LTA

Associated criteria: soil series associations (Leon-Murville-Mandarin, Wando-Seabrook-Kureb)

Vegetation: potential communities: wet longleaf pine savanna, xeric longleaf pine savanna, dry-mesic longleaf pine savanna, mucky pocosin

232Cb09 ONSLOW MARITIME ZONE (LTA 9)

Location: ~78,000 acres in Onslow, Carteret Co.; ~49,250 acres in Onslow Co., ~16,000 acres on MCB Camp Lejeune

Distinguishing Features: Active beach, barrier islands, sound, coastal rivers. Dominated by deep sands (psamments)

Primary design criteria: Landform (low terrace, ocean and river shorelines, barrier islands). Proximity to ocean and salt influence

Associated criteria: soil series associations (Newhan-Corolla-Duckston, Bohicket-Carteret-Hobucken-Lafitte)

Vegetation: potential communities: salt and oligohaline marsh, Maritime Evergreen Forest, Coastal Fringe Evergreen Forest, live oak and yaupon, longleaf pine savanna

232Cb12 NEW RIVER DISSECTED UPLANDS (LTA 12)

Location: ~173,000 acres in Onslow, Daplin, Pender Co.; ~72,000 acres on MCB Camp Lejeune

Distinguishing Features: Well-drained stream network with large river, extensive urban and urban-woodland areas, broad pine uplands

Primary design criteria: Landform (upland terrace w/numerous small streams and New River). PNV (distinct small stream swamps bordering drainage slopes w/pine-hardwood forests below dry-mesic to mesic pine savannas)

Associated criteria: soil series associations (Baymeade, Onslow, Marvyn). Drainage (mostly well drained and moderately well-drained soils).

Vegetation: potential communities: dry-mesic and mesic longleaf pine/wiregrass savanna, cypress-gum small stream swamps, mixed longleaf pine-oak slopes

232Cb13 GREAT SANDY RUN POCOSIN (LTA 13)

Location: ~70,000+ acres in Onslow and Pender Co.; ~42,000 acres on MCB Camp Lejeune

Distinguishing Features: Large, slightly raised peatland w/parent material consisting almost entirely of decomposed plant material and saturated w/water for 6+ months/yr. Peatlands bordered by very poorly drained mineral soils. In recent past, extensive ditching, drainage, and intensive forestry operations.

Primary design criteria: Topography-soils (mod. deep organics in raised domes). Vegetation (pocosin, pond pine woodlands). Drainage (very poorly-drained and poorly-drained soils).

Associated criteria: soil series associations (Croatan (saprist), Torhunta (aquent), Woodington (aquult), Leon (aquod), and Murville (aquod)).

Vegetation: potential communities: high and low pond pocosin, wet longleaf pine savanna, pond pine woodlands.

Table 2. Landtypes and Landtype Phases on MCB Camp Lejeune, NC

LT #	LTP #	LANDTYPE Landtype Phase	LT extent (acres)	LTP extent (acres)	soil map units
1		INLAND TIDAL MARSHES and TIDAL SWAMPS	1,399		
	101	Very poorly drained, loamy, sandy, or deep organic, inland tidal marsh		319	La, Bo
	102	Very poorly drained, deep organic, tidal cypress-gum swamp		1,080	Da
2		SMALL STREAM SWAMPS and STREAMHEAD POCOSINS	8,686		
	201	Poorly drained, mucky, small stream swamp		8,196	Mk
	202	Poorly drained, sandy muck, stream head pocosin		490	Mk
4		DRAINAGE SLOPES	8,771		
	401	Well-drained, sandy, pine-hardwood slope		8,618	MaC
	402	Moderately well-drained, clayey, hardwood slope		153	CrC
6		INTERSTREAM FLATS	8,462		
	601	Somewhat poorly to poorly drained, sandy, loamy or clayey, mixed pine savanna		1,089	Pa, Ra, Le
	602	Poorly drained, sandy, pond pine and mixed pine savanna		7,373	Wo
7		POCOSIN FRINGES	7,726		
	701	Very poorly drained, mucky and loamy, pond pine woodland		7,726	Pn, To
8		BROAD POCOSINS	16,822		
	801	Very poorly drained, pond pine pocosin, on peat		8,662	Ct
	802	Very poorly drained, sandy muck, pond pine pocosin		8,160	Mu
9		WET-MESIC and WET PINE SAVANNAS	17,826		
	901	Somewhat poorly drained, sandy and loamy, longleaf-mixed pine savanna		4,022	St,Ly
	902	Poorly drained, sandy, longleaf pine savanna		13,804	Ln
10		MESIC PINE SAVANNAS	13,916		
	1001	Well-drained, loamy, longleaf pine and mixed pine savanna		1,280	NoA, NoB
	1002	Moderately well-drained, loamy, longleaf pine and mixed pine savanna		12,636	CrB, GoA, FoA, On
11		XERIC and DRY-MESIC PINE SAVANNAS	24,314		
	1101	Excessively drained, sandy, longleaf pine		6,094	KuB,

		savanna			AnB
	1102	Excessively drained, sandy, dry-mesic, longleaf pine savanna		614	WaB
	1103	Well-drained, sandy, longleaf pine savanna		17,606	BmB
13		MARITIME INFLUENCED WOODLANDS and SAVANNAS	7,400		
	1301	Excessively drained, sandy, maritime influenced pine-oak woodland		3,728	WaB
	1302	Well drained, sandy, maritime influenced longleaf pine savanna		1,009	BmB
	1303	Well drained, sandy, maritime influenced mixed pine-oak slope		1,000	MaC
	1304	Moderately well and somewhat poorly drained, sandy, maritime mixed pine flat		1,663	Pa
14		MARITIME DUNES, SWALES, and MARSHES	3,595		
	1401	Excessively to poorly drained, maritime dunes and swales		1,369	NeE, Co, Dc
	1402	Very poorly drained, loamy, maritime salt marsh		2,226	Bo
16		URBAN AREAS	976		
	1601	Highly developed urban area		976	Ur
17		URBAN-WOODLAND COMPLEX	4,939		
	1701	Urban-woodland complex		4,939	GpB, BaB
18		OTHER ALTERED LANDS	1,658		
	1801	Landfill (udorthents)		46	Ud
	1802	Excessive to somewhat poorly drained, dredged, deposited soil		558	YaA, NfC
	1803	Poorly drained excavated pit		175	Pt
	1804	Main Base perimeter, not mapped		879	ND, NM
30		WATER	18,917		
	3001	Rivers, lakes, ponds		18,917	Water
---- total MCB Camp Lejeune Marine Corps Base area ---			145,406		

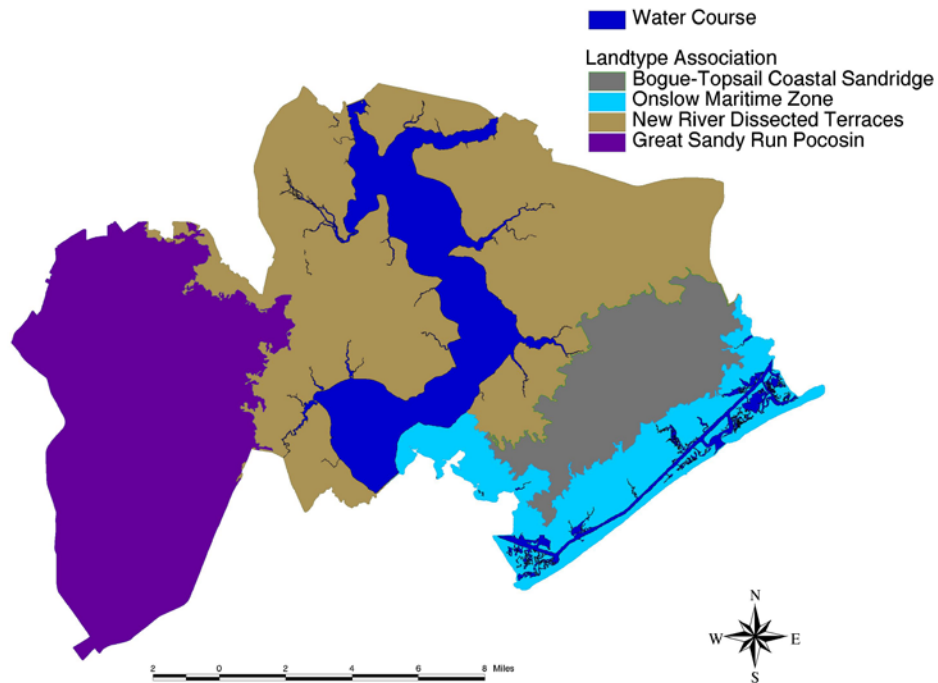


Figure 2. Landtype Associations aboard MCB Camp Lejeune, NC

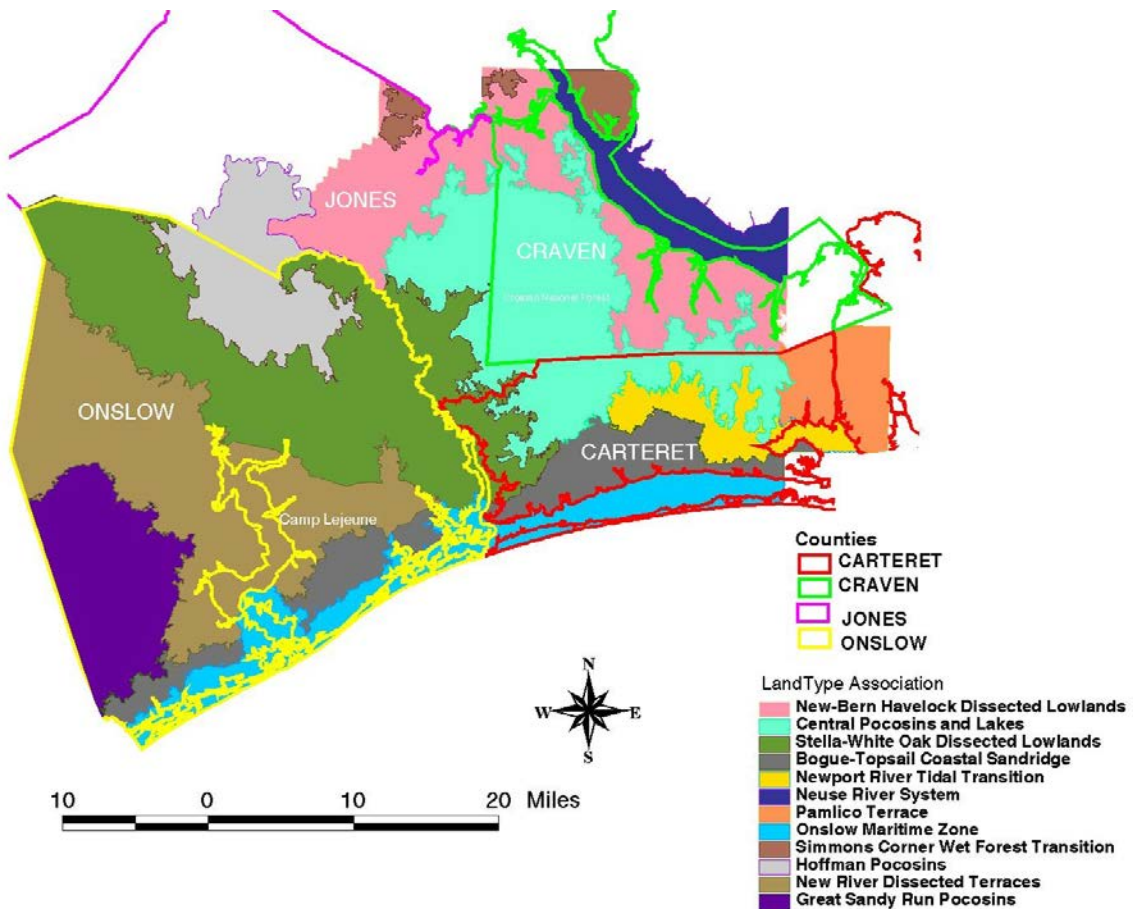


Figure 3. Landtype Associations in Onslow, Jones, Craven, and Carteret Counties, NC

It is neither practical nor possible to develop a management strategy based solely on the ecological potential of the landscape. This would not account for the human component of the ecosystem. The ECS must be interpreted based on information that includes but is not limited to mission requirements, endangered species recovery, recreational opportunities, management constraints, and trends in facilities development. Therefore, on a particular piece of land, the ECS depicts a potential future condition that may or may not be achievable given these other considerations. The ecological potential does provide land managers the necessary information to development short and long-term management strategies on three landscape scales.

MCB Camp Lejeune is comprised of portions of five distinct LTAs. When the LTAs within the boundary of MCB Camp Lejeune are characterized based on land use and current land conditions. Distinctive features suggest that differing management strategies are called for to achieve a balance between ecological potential and land use.

The general management strategy for an LTA can be further defined by examining the Land Types, which are the fundamental components of that land type association. The LTs can be used to identify those land uses and resources that would most benefit from prioritized management of the particular landscape. To effectively manage at a landscape level, it is necessary to be aware of to what larger system the landscape will contribute and what smaller components must be represented in the landscape.

The finest scale of management will be at the level of LTP. The LTP depicts a potential future condition of a discrete area that can be managed to contribute to the landscape goals. Short-term management activities may or may not directly return an area to its depicted ecological potential though management will not move an area away from that potential.

Considering the large scale differences in LTAs, the next step is to consider the component landscapes. For example, the Coastal Ridges LTA includes longleaf pine savannas across all moisture gradients, along with broad pocosins and streamhead swamps. The pine savannas support intense ground training activities as well as a concentration of RCW clusters. Further these vegetative communities and their ecotones support a large diversity of endemic plants. In determining what the management focus should be for this landscape, a desirable approach would: (1) maintain the open character of the pine savannas conducive to training; (2) support continued health of the RCW groups; and (3) conserve and enhances plant diversity. With these broad objectives accounted for, site-specific decisions at the LTP level can be made within a framework developed at the landscape level.

Consider for example two stands within a mesic pine savanna landscape contributing Coastal Ridges LTA. One stand supports 40-year-old loblolly pine that is not currently used for RCW foraging due to a tall midstory and shrubby understory. The other stand, located at the periphery of an RCW foraging area, supports 60-year-old loblolly pine and is known for occasional use as a bivouac site. Because longleaf pine is the native species for this landscape, both stands would be candidates for conversion.

Following the logic of determining priorities based on land use and ecological potential, the easy choice may be to convert the 40-year-old stand since it won't impact RCW nor result in the loss of valuable training location. Perhaps the 60-year-old stand would be thinned now and re-evaluated at the next compartment entry to determine if the shorter longevity of loblolly pine outweighs the temporary loss of a training location and RCW foraging habitat. *Ultimately, the decision would be made based on the current capacity of the landscape to support training requirements and prioritized resource objectives.* A site-specific decision cannot be made on ecological potential alone.

PROJECT LEVEL PLANNING AND ANALYSIS

The ECS can be an important tool at the project level for project planning, design, and analysis of the effects of proposed actions. Landtype Phase map units represent the greatest amount of detail on site and biological factors. Because these map units are derived from soil surveys but combine fire disturbance regimes and vegetation potentials, they can be used to interpret each component separately or together as a unit. The ECS is therefore not just an inventory and evaluation of the soils on MCB Camp Lejeune, but also the biological components and potentials of ecosystems. As with a soil survey, "it can be used to adjust land uses to the limitations and potentials of natural resources and the environment" (USDA 1992).

Information in Table E.3 and the ECS tables can be used to evaluate the feasibility and probable effects of a proposed action in all or part of the Base. Combined with the ecological maps and descriptions, opportunities and limitations are apparent for a variety of proposed actions including timber stand improvement, wildlife habitat manipulation, timber harvest, and the siting of new training facilities.

Although the ECS identifies and describes distinct land units and their biological potential, it does not describe the current vegetation condition. This information is provided in the compartment and stand maps and in Carter's (2000) maps of the Main Base. By combining the ECS and these data, one can map areas of the landscape where current condition differs from potential condition and begin to locate opportunities for change and evaluate the range of options available for individual sites. The ECS presents potential future conditions, not a prescription for management; rather a template condition that is subject to modifications based on management considerations and constraints. Land use decisions will be improved by use of the ECS, but they should not be dictated by it.

RELIABILITY OF MAPPING

Although soils occur in an orderly pattern that is related to geology, landform, relief, climate, and plant associations, soil scientists must determine the boundaries based on an understanding of the soil-landscape relationships. The ECS incorporates this boundary along with an understanding of the relationships between landscape, vegetation, and fire regimes to determine the boundary of ecological units.

Most ECS map units are dominated by one major soil type having the same potential vegetation and fire regime. Inclusions of other soil-vegetation types mostly have properties

and behavior similar to those of the dominant type. However, these differences may be important at the project level and field review and county soil surveys should be consulted to determine how extensive these differences might be.

Additional factors may affect mapping accuracy. Order 2 soil surveys are considered to have an 80% mapping reliability and a minimum map unit size of 5-10 acres. The soil survey for MCB Camp Lejeune is a refinement of the Onslow County Order 2 soil survey and the minimum map unit size is considerably less than 5 acres. There are also some inconsistencies in soil mapping between the Base and the county. Because of these inconsistencies, a buffer called the “Main Base Perimeter” (LTP 1803) was identified to separate the soil surveys from the two areas. This zone may include some important features that were not placed correctly in the ecological classification. In addition, landscapes with complex patterns, such as along river bluffs, other highly dissected topography, or wetlands along streams and rivers, have more inclusions and finer-scale mosaics than have been identified. Soil maps, and consequently the ECS, do not therefore identify all small swampy floodplains, limestone outcrops, marshes, or small drainage slopes. Some of these micro-sites may limit management opportunities. Some may contain rare and unique species and could provide opportunities to add to the overall biological diversity of the Lejeune.

RELIABILITY OF INTERPRETATION

Interpretations of ECS map units were derived from county soil surveys, from Frost's (2000) "Presettlement Vegetation Community Types of MCB Camp Lejeune", the "Vegetation of the fire-dependent pinelands of the North Carolina Coastal Plain" (Peet, R.K. and others 1996), and from overlaying resource maps (rare species, forest inventory, etc.) with the ECS. These interpretations are generally rather broad but still applicable for project level planning. For example, soil scientists can state with a fairly high degree of probability that a given soil will have a high water table within a certain depth in most years, but they cannot assure that a high water table will always be at a specific level in the soils on a specific date (USDA 1992). Likewise, the occurrence of rare species described for ecological units can be used to judge the probability of rare species occurrence within an ecological type but cannot predict with 100 percent accuracy their presence within an individual mapping unit. Similarly, site index derived from both Lejeune stands data and forest inventory plots, can be used to judge the relative productivity of ecological units at the LTP level. However, it is not possible to make a more exact prediction of growth and yield without more intensive field measurements.

Potential natural vegetation types are broad classes of vegetation derived from the pre-settlement vegetation maps. As with soil types, landscape variability and minimum map unit size will affect the reliability of PNV prediction. Furthermore, where past land use has altered site capability especially through erosion, these potentials may no longer exist. The greatest variability in PNV occurs in Interstream Flats (LT 6) and Mesic Pine Savannas (LT 10). These LTs can support longleaf pine and mixed pine communities but their exact composition and placement on the landscape is problematic. This is partly because only small remnants persist of these mixed pine communities to help predict their natural pattern. In addition, they are readily confused with fire-suppressed former longleaf pine communities that have been logged and invaded by other pine species. Their interpretation as distinct

ecological units is therefore less precise than other types. Most LTPs in the Onslow Maritime Zone (LTA 9) also fall into this category.

LANDTYPE AND LANDTYPE PHASE DESCRIPTIONS, AND RELATED TABLES

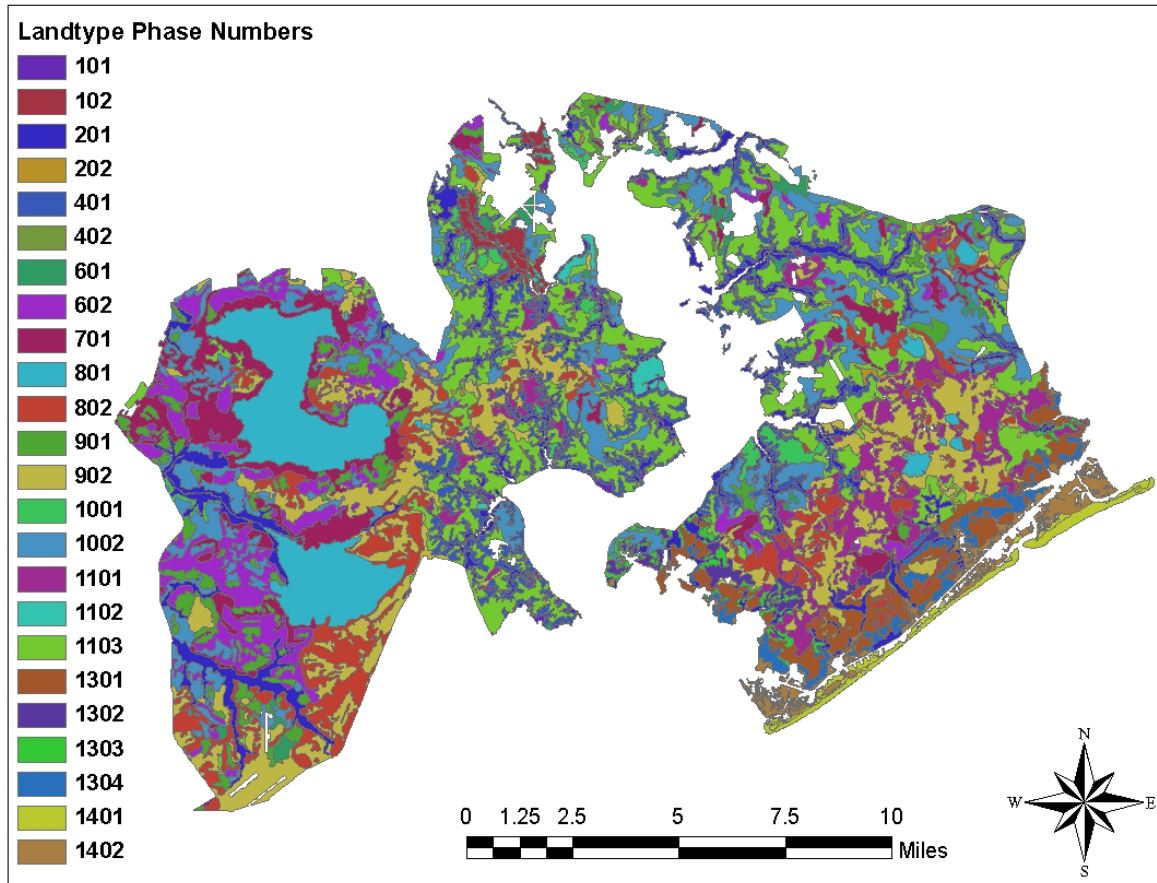


Figure 4. Landtype phases and their occurrence on MCB Camp Lejeune.

INLAND TIDAL MARSHES and TIDAL STREAMS - LT # 01

GENERAL DESCRIPTION – This LT is restricted to the outer southeastern coastal plain on the furthest inland sites influenced by tidal waters. It occurs primarily in low lying floodplains adjacent large rivers and a few major tributary streams. These wetlands are either flooded daily or are flooded frequently and have a water table at or near the surface throughout the year. They are influenced by fresh to slightly brackish water and occur on clay loams and deep muck soil. The potential natural vegetation dominants include both marsh plants such as sawgrass (*Cladium jamicense*), black needlerush (*Juncus roemerianus*), southern cattail (*Typha latifolia*), and swamp forest trees.

There are two phases of this LT: (1) inland tidal marshes on mineral soil, and (2) inland tidal swamps on mucky soils. The marshes occur along major rivers and are flooded daily while the swamps occur along streams and may be flooded less frequently. In Onslow County the LT occurs along the New and White Oak rivers, Queens Creek, and a few major tributary streams. On MCB Camp Lejeune, it covers only 1,400 acres and in Onslow County outside of the Base, it covers about 5,000 acres.

LANDSCAPE/LANDFORM PATTERN - Tidal marshes are small and mostly oval shaped; tidal swamps are long, irregular and broad shaped and follow the pattern of streams.

DISTURBANCE - Flooding is the major disturbance. Tidal waters affect salinity somewhat and influence the distribution of communities and species along a salt tolerance gradient. Frequently flooded swamps along streams are mostly fire-protected except along their margins with fire-prone uplands.

PRESETTLEMENT VEGETATION – Periodic fire in marshland habitat would have been sufficient to reduce woody shrub and trees and these areas would have been dominated by marsh sedges, grasses, and herbaceous species. Under pre-settlement fire regimes marsh areas would have been dominate. Swampland supported baldcypress (*Taxodium distichum*), swamp tupelo (*Nyssa biflora*), sweetbay (*Magnolia virginiana*), swamp redbay (*Persea palustris*), dwarf palmetto (*Sabal minor*), Virginia chainfern (*Woodwardia virginica*), and netted chainfern (*Woodwardia areolata*). There may have been patches of Atlantic white cedar (*Chamaecyparis thyoides*) in fire-influenced upper slope margins.

EXISTING VEGETATION – Lack of fire in all but the black needlerush marshes has led to invasion by various hardwood species from the adjacent uplands. In most swamp areas, cypress has been removed through logging before the end of the 19th century. This led to rapid closure of the canopy by hardwoods, most notably swamp tupelo (*Nyssa biflora*) and water tupelo (*Nyssa aquatica*).

MANAGEMENT CONSIDERATIONS – All sites in this LT experience flooding and are too wet to safely operate logging equipment. Flooding also reduces the probability of cypress regeneration. Management concerns in this LT relate to plant community restoration needs in marshes where fire return intervals have been reduced in the past and dense hardwood vegetation now exists.

LANDTYPE PHASES (LTPs) - This Landtype includes two LTPs separated on differences in landform position and pre-settlement plant community types.

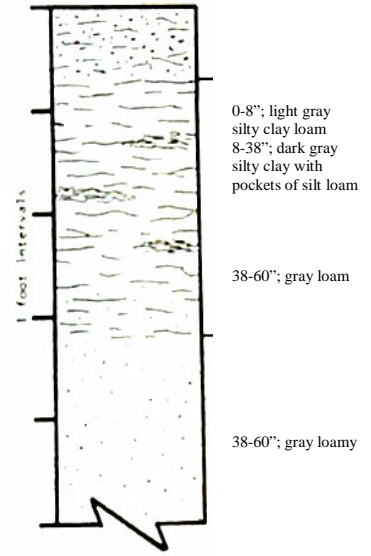
LTP #	soil type	extent (acres)	drainage	surface texture	surface depth	subsurface texture	permeability
101	Lafitte Bohicket	3 316	very drained poorly drained poorly drained	muck silty clay loam	80" 8"	muck silty clay, loamy sand	moderate very slow
102	Dorovan	1,080	very drained poorly drained	muck	80"	sandy loam	moderate

LTP # 0101 -VERY POORLY DRAINED, LOAMY, SANDY, or DEEP ORGANIC, INLAND TIDAL MARSH

This LTP is identified in 22 map units; seven are greater than 20 acres in size. The largest are at Catfish Point, Muddy Creek, and the east fork of Mill Creek. Total extent is about 320 acres distributed along the length of the New River but curiously not on its eastern banks. This LTP occurs only in the New River Dissected Terraces (LTA 12) and is mostly associated with small stream swamps.

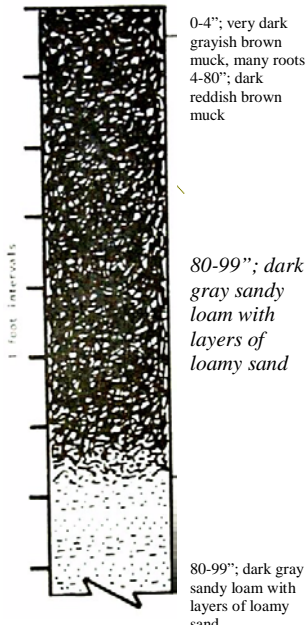
There are two soil series comprising this type. The very poorly drained Lafitte muck is the smallest (less than 3 acres) and is mapped in only two areas, the south end of the runway at the New River Marine Corps Air Station and at the mouth of Stick Creek. This deep mucky soil is more common along the White Oak River at elevations less than 5 feet above sea level. The very poorly drained Bohicket silty clay loam is the most common soil and map units may include areas of the Lafitte muck. Bohicket soils are more common adjacent to the Intracoastal Waterway. Sampled areas are dominated by hardwoods (Table 2).

The Bohicket soil map units are generally inaccessible and observations were not as detailed as in most other map units (Lejeune Soil Survey, 1984). In addition, no detailed vegetation mapping has been completed in these areas. Therefore, caution should be observed when making interpretations based solely on the ecological classification or the Soil Survey.



A typical pedon of Bohicket silty clay loam

LTP # 0102-VERY POORLY DRAINED, DEEP ORGANIC, TIDAL CYPRESS-GUM SWAMP



A typical pedon of Dorovan muck

This LTP is mapped in 12 units and dominates the floodplain along Southwest Creek. It also occurs below Wilson Bay on the west bank of the New River. Total extent is about 1,080 acres. It occurs only in the New River Dissected Terraces (LTA 12) and is always associated with pine-hardwood drainage slopes.

Soils are Dorovan mucks and have a deep organic surface at times exceeding 80 inches in depth. Subsoils are sandy loam. Included with this soil are narrow areas of Muckalee soil near stream banks. The included soils make up about 10 percent of the unit.

Pre-settlement plant communities were dominated by bald cypress (*Taxodium distichum*), swamp tupelo (*Nyssa biflora*) and water tupelo (*Nyssa aquatica*). Forests were multi-layered, with an open cypress canopy, a closed subcanopy of gum (*Nyssa sylvatica*) and red maple (*Acer rubrum*), and an open shrub and sedge understory (Frost 2000). There are no areas in this LTP that contain cypress as either the primary or secondary dominant species (Table 2).

SMALL STREAM SWAMPS AND STREAMHEAD POCOSINS - LT # 02

GENERAL DESCRIPTION – Swamp forests on flood plains occur throughout the southeastern U.S. However, this LT with its gradient from pocosin streamheads to brackish tidal marsh at sea level estuaries is peculiar to the outer southeastern coastal plain. These wetlands are seasonally to semi-permanently flooded, associated with small to moderately large streams, strongly fire-influenced only at their origin and where they empty into marshland, and occur on loamy to mucky loam soils. The potential natural vegetation dominants include Bald cypress (*Taxodium distichum*), Oaks (*Quercus laurifolia*, *Quercus michauxii*), Swamp tupelo (*Nyssa biflora*), giant cane (*Arundinaria gigantea*), and Pines (*Pinus taeda*, *Pinus serotina*).

There are two phases of this LT: (1) poorly drained swamps on mucky soils, and (2) poorly drained streamhead pocosins on sandy muck soils originating in sandhill terrains. These wetlands are commonly referred to as 'swamps' and have a water table mostly at or near the soil surface. Associated streams have variable flow regimes, with floods of short to long duration and periods of very low flow. Water is colored by tannins but relatively clear, mostly very acidic, low in mineral sediment, and low in nutrients.

This LT is located throughout MCB Camp Lejeune but is uncommon on the coastal sandridge. The most extensive small stream swamps and streamhead pocosins occur in Great Sandy Run. Total extent on MCB Camp Lejeune is about 8,700 acres. There are an additional 25,000 acres outside the Base in Onslow County. This LT occurs along all tributaries of the New River, White Oak River, Shelter Swamp Creek, and Juniper Creek.

LANDSCAPE/LANDFORM PATTERN - Swamps appear as meandering linear features with many small tributary branches. On MCB Camp Lejeune, they radiate out from the New River, raised peatlands, and the coastal sandridge. Streamhead pocosins are scattered, rounded patched at the upper ends of these drainages in sandhill landforms.

DISTURBANCE - Low intensity, small-scale disturbances (windthrow, flood erosion) are most common although occasional large-scale hurricanes may effect vegetation more extensively. These normally result in major losses to early successional hardwoods. Except during years of extreme drought, swamp sites are protected from fire due to their wetness or position adjacent other wetlands. Streamhead pocosins are exposed to fire and may burn as often as the adjacent longleaf pine upland.

PRESETTLEMENT VEGETATION - This LT supported a variety of pocosin, swamp, and bottomland forest types, with mixtures of baldcypress (*Taxodium distichum*), swamp tupelo (*Nyssa biflora*), Laurel oak, (*Quercus laurifolia*), Loblolly pine (*Pinus taeda*), and Pond pine (*Pinus serotina*). Stream swamps included sweetbay (*Magnolia virginiana*), swamp redbay (*Persea palustris*), ti-ti (*Cyrilla racemiflora*), fetterbush (*Lyonia lucida*), coastal sweet-pepperbush (*Clethra alnifolia*), American holly (*Ilex opaca*), ironwood (*Carpinus caroliniana*), dwarf palmetto (*Sabal minor*), Virginia chainfern (*Woodwardia virginica*), netted chainfern (*Woodwardia areolata*), and sphagnum moss (*Sphagnum* spp.). Near tidal areas, eastern red cedar (*Juniperus virginiana*), wax myrtle (*Myrica heterophylla*), and giant cane (*Arundinaria gigantea*) dominated patches in the understory.

EXISTING VEGETATION - In most areas, cypress has been removed through logging before the end of the 19th century. This led to rapid closure of the canopy by hardwoods, most notably swamp tupelo (*Nyssa biflora*) and water tupelo (*Nyssa aquatica*). Former pocosin shrubs like loblolly bay (*Gordonia lasianthus*), red bay (*Persea borbonia*), sweetbay (*Magnolia virginiana*), and red maple (*Acer rubrum*) have grown up into trees and the pocosin shrub layer has become dominated by fetterbush (*Lyonia lucida*) and tall gallberry (*Ilex coriaca*).

MANAGEMENT CONSIDERATIONS - Flooding occurs frequently for long periods and reduces the probability of cypress regeneration but also curtails invasion of more shade tolerant species. Stocking levels may be low, and tree height growth increment is generally high for sweetgum and loblolly pine. Management concerns in this LT relate to plant community restoration needs in streamhead pocosins where fire return intervals have been reduced in the past and dense pocosin vegetation now exists.

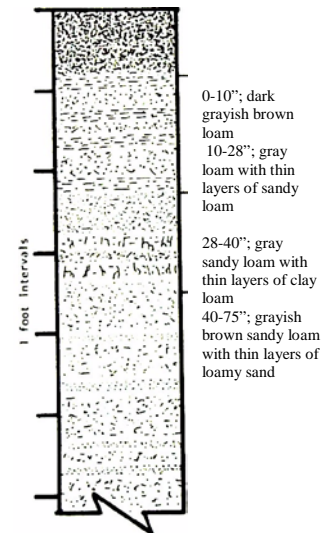
LANDTYPE PHASES - This Landtype includes two LTPs separated on differences in pre-settlement plant community types and the position of sites along a streams elevational gradient.

LTP #	soil type	extent (acres)	drainage	surface texture	surface depth	subsurface texture	permeability
201	Muckalee	8,196	poorly drained	loam	10"	sandy loam, clay	moderate
202	Muckalee	490	poorly drained	loam	10"	sandy loam, clay	moderate

LTP # 0201-POORLY DRAINED, MUCKY, SMALL STREAM SWAMP



Wallace Creek: MCB Camp Lejeune, NC (with red cedar)



A typical pedon of Muckalee loam

This LTP is identified in 140 map units on MCB Camp Lejeune. Only 22 are greater than 100 acres in size; the largest are in Great Sandy Run. Total extent is about 8,200 acres distributed widely across all LTAs except the Bogue-Topsail Coastal Sandridge (LTA 4). This LTP is nearly always associated with pine-oak drainage slopes.

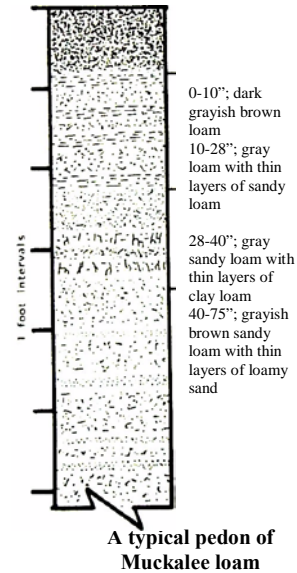
Soils are poorly drained Muckalee loams. They have loamy surface and sandy loam subsurface horizons. The organic matter content in the surface layer varies from high to low (Lejeune Soil Survey 1984). Included with this soil in mapping are small areas of sandier soil near the stream banks and soil with a mucky fine sand surface layer at the foot of side slopes. The included soils make up about 25% of the unit.

Pre-settlement vegetation was predominantly swamp and bottomland types (Frost 2000): Cypress/mixed bottomland hardwoods/ironwood/giant cane-mixed spp., Cypress/laurel oak/giant cane, Mixed bottom land hardwoods/ ironwood/ swamp red bay-waxmyrtle/sedge, Cypress/swamp tupelo-red maple/mixed spp, Mixed bottomland hardwoods/giant cane. Currently, on the Main Base, loblolly pine is the primary dominant species in 69% of these areas while hardwoods are the primary dominant species in 21% of the LTP (Table 2). In Great Sandy Run, the majority of this LTP is dominated by hardwoods (Table 3).

LTP # 0202-POORLY DRAINED, SANDY MUCK, STREAMHEAD POCOSIN



Mile Hammock Bay Road, MCB Camp Lejeune (streamhead pocosin in background)



This LTP has been identified in only 50 map units on MCB Camp Lejeune. Nearly 90% are less than 20 acres in size. Total extent is about 490 acres distributed infrequently across all LTAs. This type is always associated with sandhill terrain, i.e., xeric to dry-mesic longleaf pine savanna.

Soils are poorly drained Muckalee loams. They have loamy surface and sandy loam subsurface horizons. The organic matter content in the surface layer varies from high to low (Lejeune Soil Survey).

Pre-settlement vegetation was predominantly pond pine high pocosin. Schafaly (2000) distinguishes streamhead pocosins from other pocosin communities by topographic position and likely presence of Tulip poplar (*Liriodendron tulipifera*), coastal sweet-pepperbush (*Clethra alnifolia*), and poison sumac (*Toxicodendron vernix*). Currently, loblolly pine is the primary dominant species in 56% of this LTP on the Main Base and pond pine is the primary dominant species in 32% of the LTP (Table 2).

DRAINAGE SLOPES- LT #04

GENERAL DESCRIPTION - This LT occurs on side slopes along small to large streams and rivers, and in drainage headlands. These sites are above floodplains, have good drainage, are partly protected from periodic burning, and occur on soils having loamy or sandy texture. The potential natural vegetation dominants include oaks (*Quercus stelata*, *Quercus falcata*, *Quercus alba*), hickories (*Carya glabra*, *Carya tomentosa*), other hardwoods (*Liriodendron tuplifera*, *Oxydendrum orboreum*, *Carpinus caroliniana*, *Cornus florida*) and Pines (*Pinus palustris*).

There are two phases of this LT: (1) sandy, well-drained pine-hardwoods, and (2) clayey, moderately well-drained hardwoods. These phases are commonly called ‘hardwood slopes’ and are dominated by hardwood, pine, and mixed hardwood-pine forests mostly with a hardwood-dominated understory. The sandy phase is more common on mid and upper slope positions where it is associated with upland dry mesic longleaf pine savanna. The clayey phase is more common on lower slope positions with small stream swamps and is dominated by hardwoods.

This LT is common throughout Onslow and adjacent counties. In Onslow County, outside of MCB Camp Lejeune, it covers over 23,000 acres. Within the base, it extends along all of the small tributaries of the New River on about 8,700 acres. In general, this type occurs anywhere there is a downcutting drainage and sufficient elevation to provide topographic relief.

LANDSCAPE/LANDFORM PATTERN - Although many sites are too small to map, the type is conspicuous from the air and on the ground. It consists of narrow sinuous bands on rolling slopes along drainages in highly dissected topography.

DISTURBANCE - Disturbance regimes include periodic fire, windthrow gaps of one or a few overstory trees, and periodic larger-scale hurricane disturbance. Fires reaching this LT are backing fires originating from the uplands. The steep slopes and moist floodplains below the type restrict fire flow. Some degree of fire protection is afforded by the slopes and this results in small narrow zones of forests transitional between the better protected floodplains and the fire-exposed uplands.

PRESETTLEMENT VEGETATION - In pre-settlement forests, vegetation composition was controlled by landform and slope steepness. Mesic and dry-mesic longleaf pine savannas, similar to those in the adjacent uplands, would have been common in upper and mid slopes where frequent fire occurred. In lower slopes and especially on cooler and wetter north-facing slopes, more mesic hardwoods such as swamp chestnut oak (*Quercus michauxii*), mockernut hickory (*Carya tomentosa*), and beech (*Fagus grandifolia*) could persist. In fact, Frost (2000) believes that the scarcity of such fire refugial hardwoods, despite decades of fire reduction on MCB Camp Lejeune, is evidence of the predominance of fire in the original landscape.

EXISTING VEGETATION – In general, species diversity has decreased on these sites as past timber harvest and fire suppression favored pines over hardwoods. On the Main Base at MCB Camp Lejeune, a majority of this LT is dominated by loblolly pine but longleaf still prevails as the primary dominant on nearly 10% of this landscape (Table 2).

MANAGEMENTS CONSIDERATIONS – This LT may function as important wildlife habitat and travel corridors in addition to providing a unique Marine Corp training area. Little timber harvest has occurred in this LT during the last 50 years although the slopes are relatively gentle and would not restrict equipment use. Many silvicultural systems for managing hardwoods have proven successful elsewhere and could be used to maintain and improve ecological function in this LT. Perhaps the greatest challenge in this LT is restoring pre-settlement vegetation types and fire regimes.

LANDTYPE PHASES - This Landtype includes two LTPs separated on differences in soil drainage and pre-settlement plant community types.

LTP #	soil type	extent (acres)	drainage	surface texture	surface depth	subsurface texture	permeability
401	Marvyn	8,618	well drained	loamy fine sand	8"	sandy loam, sandy clay loam	moderate
402	Craven	153	mod. well-drained	fine sandy loam	8"	clay loam, clay, sandy loam	moderate

LTP # 401-WELL-DRAINED, SANDY, PINE-HARDWOOD SLOPE

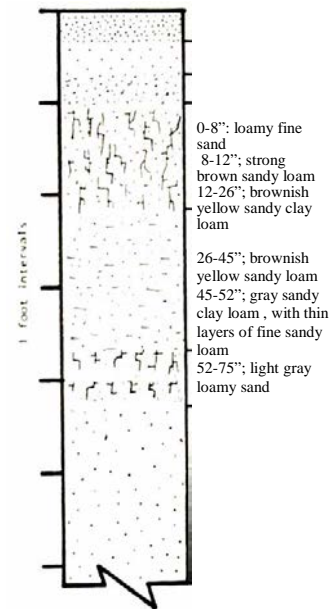


Tributary of Southwest Creek: MCB Camp Lejeune, NC

This LTP occurs in over 200 map units on MCB Camp Lejeune. Nearly 50% are less than 20 acres in size and only 18 are greater than 100 acres in size; the largest are at Mill Run and Whitehorse Creeks. Total extent is about 8,600 acres distributed across the upland terrace predominantly. The type does not occur in the Great Sandy Run Pocosin (LTA 13) or in the Onslow Maritime Zone (LTA 9). This LTP is always associated with small stream swamps and longleaf pine savannas.

Soils are well drained Marvyn loamy fine sands. They have a sandy surface and predominately sandy loam subsurface. Included in the soil mapping are some areas that have short slopes greater than 15% and small areas that are eroded (Lejeune Soil Survey 1984). Height growth increment for loblolly pine is high, and for longleaf and pond pine it is medium (Table 4). These sites can support the highest stocking and growth of dry-mesic and mesic oaks and hickories on the Base.

Pre-settlement vegetation was predominantly mesic or dry-mesic longleaf pine savanna grading to mixed pine-hardwood where oaks increased in importance on the midslope and more mesic hardwoods on the toeslope. This gradient of species composition varied somewhat by site exposure with steeper south-facing slopes supporting canopy oaks, scrub oaks and loblolly pine with scattered longleaf pine. Today many of these sites are dominated by loblolly pine with hardwoods in a subordinate crown position. Loblolly pine is the primary and secondary dominant species in over one-half of this LTP (Table 2).



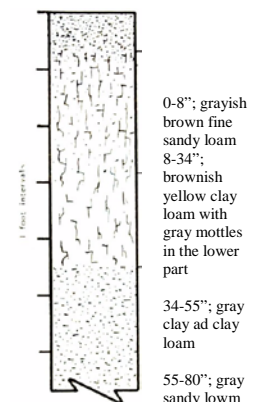
A typical pedon of Marvyn loamy fine sand

LTP # 402- MODERATELY WELL DRAINED, CLAYEY, HARDWOOD SLOPE

This LTP is very limited in size, occupying less than 200 acres on MCB Camp Lejeune but over 3,400 acres outside the Base in Onslow County. It occurs only in the New River Dissected Terrace (LTA 12) and is most extensive north of Camp Johnson associated with mucky small stream swamps and well-drained sandy longleaf pine savannas.

Soils are moderately well-drained Craven silt loams. They have a sandy loam surface and a clay to clay loam subsurface. About 20% of soil map units include other soil types such as Marvyn and Goldsboro (Lejeune Soil Survey 1984).

Pre-settlement vegetation was predominantly mesic hardwoods except on more moderately sloping and fire-exposed sites that supported longleaf pine savanna. In the most fire sheltered areas, these slopes supported mixed mesic hardwood forests with species such as White oak (*Quercus alba*), Southern Red Oak (*Quercus falcata*), Post Oak (*Quercus stellata*), Mockernut Hickory (*Carya tomentosa*), Tulip Poplar (*Liriodendron tulipifera*) and American Beech (*Fagus grandifolia*) (Frost 2000). Today loblolly pine (*Pinus taeda*) is the dominant canopy tree in over three-quarters of this LTP on the Main Base (Table 2).



A typical pedon of Craven fine sandy loam

INTERSTREAM FLATS-LT06

GENERAL DESCRIPTION - This LT occurs throughout the southeastern coastal plain within the upland coastal terrace on broad interfluvus and narrow depressions in slightly convex landforms. These somewhat poorly to poorly drained sites are subject to occasional ponding of surface water in low places, periodic burning, and have loamy to sandy soils. The potential natural vegetation dominants include pond pine (*Pinus serotina*), longleaf pine (*Pinus palustris*), and loblolly pine (*Pinus taeda*) usually growing together in mixed stands.

There are two phases of this LT and they are often found on the same landscapes: (1) somewhat poorly to poorly drained, sandy, loamy or clayey, mixed pine savanna, and (2) poorly drained, sandy, pond pine and mixed pine savanna. These moist to wet sites are often referred to as ‘mixed pine flatwoods’ and have tall pond pine, longleaf pine, and loblolly pine. With fire suppression, dense hardwood and evergreen shrub and small tree understories are common. In Onslow County, outside of MCB Camp Lejeune, it covers over 53,000 acres. On the base it occurs on about 8,500 acres mostly in the Great Sandy Run Pocosin area.

LANDSCAPE/LANDFORM PATTERN – This LT forms small to very large irregularly-shaped patches from fifty to hundreds of acres in size situated between drainages. They are typically not dissected by streams.

DISTURBANCE - Fire was the most common disturbance in this LT and its frequency was variable, ranging from every 5 to 12 years or in more fire exposed situations every 1 to 3 years. Historically, these moist mineral flats, too wet to farm, were logged, planted to loblolly or slash pine, and were fire suppressed. This is the situation for most of this LT in the Great Sandy Run Pocosin. Today, hurricanes may cause extensive damage in overstocked older loblolly stands in this LT.

PRESETTLEMENT VEGETATION - This LT includes the wettest soils that can support longleaf pine. They were typically mixed pine forests that included pond pine, longleaf pine, and loblolly pine. Density ranged from savanna to closed canopy forest. Loblolly pine was present but more common on the margins of drainageways. Understory vegetation often had a considerable amount of giant cane (*Arundinaria gigantea*) but were more commonly rich savanna herbs with wiregrass (*Aristida stricta*) and bluestems (*Andropogon* sp.).

EXISTING VEGETATION – Only small remnants of mixed pine savanna persist today in Onslow and adjacent counties. With fire suppression there is a rapid succession to loblolly pine, sweetgum (*Liquidambar styraciflua*), red maple (*Acer rubrum*), red bay (*Persea borbonia*), sweet bay (*Magnolia virginiana*), Blue huckleberry (*Gaylussacia frondosa*), Coastal Sweet-pepperbush (*Clethra alnifolia*), and Inkberry (*Ilex glabra*). Current vegetation is hard to distinguish from fire-suppressed former longleaf pine communities that have been logged and succeeded to other pine species. Most are dominated by loblolly pine and pond pine with a dense tall shrub and hardwood layer in the understory.

MANAGEMENTS CONSIDERATIONS - Management concerns in this LT relate to site wetness and operability, midstory competition, and hurricane damage. Equipment use may be limited to only the drier months since the somewhat clayey subsoils are prone to compaction. Plant community restoration opportunities may be difficult to achieve in this LTP without considerable site alteration.

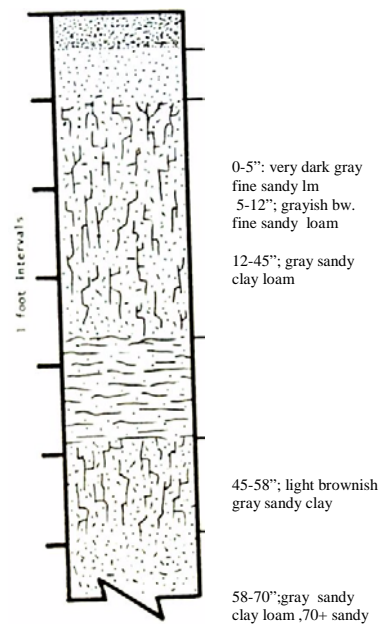
LANDTYPE PHASES (LTPs) - This Landtype includes two LTPs separated on differences in soil drainage, soil texture, and pre-settlement plant community types.

LTP	Soil type	Extent ac.	drainage	surface texture	surface	Subsurface texture	permeability
601	Pactolus	219	mod.well-sw poorly drained	fine sand	30"	fine sand	rapid
	Lenoir	110	somewhat poorly drained	loam, sandy loam	7"	clay, sandy clay loam	slow
	Rains	760	poorly drained	fine sandy loam	12"	s. clay loam, s. clay	moderate
602	Woodington	7,373	poorly drained	loamy fine sand	12"	f. sandy loam, s. loam	mod. rapid

LTP # 0601 SOMEWHAT POORLY TO POORLY DRAINED, SANDY LOAMY, OR CLAYEY MIXED PINE SAVANNA



Billfinger Road, Croatan National Forest



A typical pedon of Rains fine sandy loam

This LTP is identified in 31 map units, only three exceed 100 acres in size: most are less than 50 acres in size. Total extent is about 1,100 acres distributed across the northern portion of the New River Dissected Terraces LTA (12). It occurs only there and in Great Sandy Run Pocosin LTA (13), with the exception of one map unit in LTA 4. It is much more common outside the Base in Onslow and surrounding counties. This LTP is commonly associated with mesic pine savannas and pond pine woodlands.

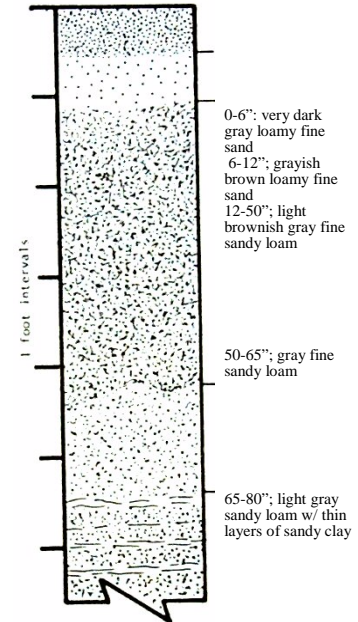
There are three soil series comprising this type. The somewhat poorly drained Lenoir loam is the least common, occupying only about 110 acres on the Base. The most extensive is the very poorly drained Rains fine sandy loam, the wettest loam soil that can support longleaf pine. Height growth increment is only moderate for loblolly pine, longleaf pine, and pond pine (Table 4). Compaction may be a concern in the Lenoir soil. The moderately well to somewhat poorly drained Pactolus fine sand that is mapped on the broad upland terrace is also included in this LTP. It is not very extensive in this LTP and covers only about 220 acres. This soil is much more common seaward below the scarp where it often dominates upland margins adjacent marshes near the Intracoastal waterway. It is placed in LTP 1304 in those situations.

Pre-settlement vegetation in this LTP was predominately mixed pine with longleaf pine more common in drier sites and pond pine more abundant in wetter sites. There are very few examples of this LTP that have not succeeded to loblolly pine and hardwoods. Currently longleaf pine is the primary dominant species in only 4% of the mapped area on the Main Base. Furthermore, in 80-98% of the LTP neither pond pine nor longleaf pine, the two principal trees in pre-settlement forests, are considered the primary or secondary canopy trees and have been replaced by loblolly pine (Tables 2 and 3).

LTP # 0602-POORLY DRAINED, SANDY, POND PINE AND MIXED PINE SAVANNA



Phills Trail Road, Great Sandy Run Pocosin Area, MCB Camp Lejeune, NC



A typical pedon of Woodington loamy fine sand

This LTP is identified in 74 map units, two of which are greater than 1,000 acres in size. Most map units are smaller than this; over three-quarters are less than 100 acres in size and over one-half are less than 50 acres in size. Total extent is about 7,400 acres concentrated mainly in the Great Sandy Run Pocosin LTA (13) along Davis Tram, Dons Trail, and Prince Trail. It occurs in small amounts in both the New River Dissected Terraces (LTA 12) and the Bogue-Topsail Coastal Sandridge (LTA 4). This LTP occurs on broad interfluvus occupying sites in transition between very poorly drained pocosins or poorly drained pond pine woodlands and poorly drained or moderately well-drained longleaf pine savannas.

Soils are poorly drained Woodington loamy fine sands, a deep loam soil that is subject to occasional ponding of surface water in low places. Other soil inclusions occur in about 15% of map unit areas. The Rains is intermingled, the Torhunta is in small, shallow depressions, and the Stallings is on the outer edges of map units near drainageways (Lejeune Soil Survey 1984). This is one of the most productive sites for loblolly pine. Height growth increment is very high for this species, only medium for slash pine, and high for longleaf pine (Table 4).

Woodington soils are one of the wettest series that will support longleaf pine. The pre-settlement communities were likely mixed pine savanna (longleaf and pond pine over diverse wet savanna herbs and grasses). Frost (2000), however, describes this composition as only a variation that occurred in mixed patches and that the most common original vegetation was a two-layered wet pine savanna with pond pine dominant. This is the only significant disagreement between Frost (2000) and the ecological classification for MCB Camp Lejeune. With reduced fire frequency, a dense woody understory has developed on nearly all sites within this LTP on Camp Lejeune. Currently longleaf pine on the Main Base is found as the primary dominant species on only 7% and pond pine on 14% of sampled stands (Table 2). Over 80% of stands have neither species described as primary or secondary dominants; most of these stands are dominated by loblolly pine. Similarly, this is the condition in Great Sandy Run in over 90% of the sampled stands (Table 3).

POCOSIN FRINGES - LT # 07

GENERAL DESCRIPTION - This LT is restricted to the southeastern coastal plain, occurring on very poorly drained soils in peat-mantled uplands, and broad interstream flats. These wetlands have a seasonal high water table at or near the soil surface, water ponding during the winter, periodic burning (under natural fire regimes), and loamy or mucky loam soils. The potential natural vegetation dominants include giant cane (*Arundinaria gigantea*), broadleaf evergreen shrubs and small trees (*Gordonia lasianthus*, *Persea palustris*, *Magnolia virginiana*, *Ilex glabra*, *Lyonia lucida*), and pond pine (*Pinus serotina*).

Only one phase of this LT is found on MCB Camp Lejeune: (1) very poorly drained, mucky and loamy, pond pine woodlands; a second phase, (2) poorly drained, loamy, pond pine woodlands, is common in adjacent Jones and Craven counties. These wetlands are often referred to as “pond pine woodlands”, and have tall pond pine and, with fire suppression, a tall dense evergreen understory.

The LT is most extensive in the Great Sandy Run Pocosin and east of MCB Camp Lejeune at Horse Swamp. On MCB Camp Lejeune the type covers about 7,700 acres and outside the Base about 36,000 acres in Onslow county. It is most often associated with pocosins.

LANDSCAPE/LANDFORM PATTERN - This type forms narrow to wide bands partially to entirely encircling the broader, domed peatlands. In the upland interstream zones in more dissected landforms it is more irregular in shape and appears to be confined by stream courses.

DISTURBANCE - Livestock grazing, and ditching to improve drainage for timber production has significantly altered much of the Pocosin Fringe LT. The larger pond pine in this LT was extensively logged at the turn of the century. Cutover sites were quickly reforested since pond pine regenerates by epicormic and basal sprouts as well as by seed from serotinous cones. Under pre-settlement fire regimes, pond pine forests burned nearly as frequently as the adjacent and often intergrading longleaf pine forest. These forests are considered fire dependent and in the absence of fire may eventually be replaced by hardwoods.

PRESETTLEMENT VEGETATION - This LT once supported a pond pine complex comprising a distinct group of forest and wet savanna communities. Under the original fire regime, pre-settlement vegetation on fire exposed upland flats ranged from tall pond pine forest to open pond pine savanna and zones of canebrake near their margins (Frost 2000). Where frequent fires occurred over a long period, the pond pine forest understory was dominated by giant cane, with few shrubs (Schafaly and Weakley 1990). Remnants of giant cane are relatively common on MCB Camp Lejeune and are evidence that canebrakes may once have been more widespread in the pre-settlement landscape.

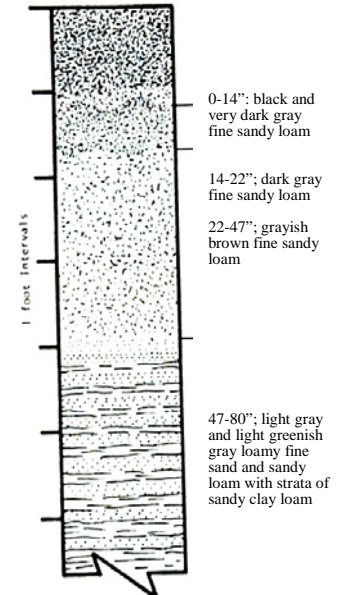
EXISTING VEGETATION - Fire suppression has led to dense forest conditions with a thick tree and shrub midstory on these wet sites. Most pond pine forests in this LT have a nearly closed tree canopy, sometimes codominant with loblolly bay. The shrub layer is tall and very dense. Many pond pine woodlands have succeeded to pine-hardwoods, dense tall pocosin, and bay forest. Herbs are generally of low cover or absent.

MANAGEMENTS CONSIDERATIONS - Management concerns in this LT relate to plant community restoration needs, site wetness and operability for forestry operations, and midstory competition. These wet mineral soils can support different vegetation types depending upon differences in moisture and degree of protection from fire. However, there are seasonally severe equipment limitations due to extreme site wetness. On MCB Camp Lejeune, sites in this LT offer the best opportunities for restoring canebrakes and the rare species that these communities could support. These species include Saint Francis' satyr (*Neonympha mitchellii francisci*), Swainson's Warbler (*Limnothlypis swainsonii*), Rough-leaf loosestrife (*Lysimachia asperulifolia*) and Golden sedge (*Carex lutea*).

**LTP # 0701-VERY POORLY DRAINED, MUCKY & LOAMY,
POND PINE WOODLAND**



Rawls Road, Great Sandy Run Pocosin, MCB Camp Lejeune, NC



**A typical pedon of Torhunta
fine sandy loam**

This LTP occurs in 48 map units on MCB Camp Lejeune, one of which is nearly 3,500 acres in size and surrounds the northern pocosin in Great Sandy Run. Over three-quarters of the map units are less than 100 acres in size. Total extent is about 7,700 acres distributed unevenly across three of the four Landtype Associations found on MCB Camp Lejeune. The type is most extensive in the Great Sandy Run Pocosin LTA and does not occur in the Onslow Maritime Zone (LTA 9). This LTP is mostly associated with deep organic pocosins but also occupies the wet end of the gradient associated with wet and wet-mesic mixed pine and longleaf pine savannas.

There are two soil series comprising this type. The very poorly drained Pantego mucky loam is the least common (less than 200 acres) and has a black, mucky surface layer and a sandy clay loam subsoil. It is mapped in only six areas, the largest is within the K-2 Impact area. The very poorly drained Torhunta fine sandy loam is the most common (greater than 7,500 acres) and has a black to very dark gray loamy surface layer and a loamy fine sand and sandy loam subsoil. Pond pine height growth increment is higher on this soil than on all others found on the Base (Table 4). Productivity is only moderate for loblolly pine, and low in both longleaf pine and slash pine.

A recent intensive field survey by Carter (2000) confirmed the generally held opinion that most pond pine woodlands are now dominated by loblolly pine or hardwoods. On the Main Base, loblolly pine is the primary canopy dominant on over 60% of the area sampled in this LT (Table 2). In Great Sandy Run, hardwoods are the primary dominant trees on 58% of this LTP (Table 3).

BROAD POCOSINS - LT # 08

GENERAL DESCRIPTION - This LT is primarily restricted to the southeastern coastal plain from Virginia to Georgia, occurring in broad, shallow basins, in drainage basin heads, and on broad, flat uplands (Wells 1928). These wetlands have long hydroperiods, temporary surface water, periodic burning, and soils of sandy humus, muck or peat. The potential natural vegetation dominants include broadleaf, evergreen shrubs (*Cyrilla racemiflora*, *Lyonia lucida*, *Ilex glabra*, *Myrica heterophylla*, *Smilax laurifolia*) and pines (*Pinus serotina*).

On MCB Camp Lejeune, there are two phases of this LT and they are often found in close proximity: (1) high pocosin on moderately deep organic soils and (2) high pocosin on mineral soils having a mucky surface; a third phase, (3) low pocosin on very deep organic soils, occurs in nearby Craven County. These wetlands are commonly referred to as 'pocosins' and have characteristic dense, often stunted evergreen vegetation. The soils are saturated or shallowly flooded primarily during the cool seasons (Daniels and others 1975). In the deep organic phase, soils are deficient in available nutrients (Richardson and others 1981). In the mucky phase, organic matter and aluminum layers (spodic horizon) tend to make the mineral soils naturally infertile (USDA 1999).

The LT is most extensive in the Great Sandy Run Pocosin, north of MCB Camp Lejeune on the Hoffman Forest, and on the Croatan National Forest. On MCB Camp Lejeune, the type covers 16,800 acres and about 33,000 acres outside the Base in Onslow County. Within larger pocosins, bog expansion caused by the gradual rising of the water table as peat accumulates has proceeded for several thousand years in broad interstream areas in which natural drainage was blocked (Daniel 1981, Richardson and others 1981). Today, on the most well developed peatland areas, on the nearby Croatan National Forest, stunted pond pine occurs with dense, widely spaced, short evergreen shrubs on 2 to 4 feet of white cedar peat overlain with 4 to 5 feet of pocosin peat. This condition is rare on MCB Camp Lejeune.

LANDSCAPE/LANDFORM PATTERN – In Great Sandy Run, pocosins occupy uplands that are slightly elevated above the surrounding landscape and reflect their Algonquian meaning, "swamp-on-a-hill" (Tooker 1899). On the main base of MCB Camp Lejeune, they occur in both upland flats and in irregularly-shaped depressions or more rarely in elongated elliptical depressions on a northwest-southeast axis. These latter landforms are often referred to as Carolina bays.

DISTURBANCE - Historically, vegetation in this LT burned at regular 2-4 year intervals similar to the adjacent uplands. Although the water table is high and the soils may frequently be saturated, pocosins occasionally become dry enough to burn and some of the organic surface may be lost in combustion. Ditching, drainage and conversion to pine plantations has occurred within the Great Sandy Run Pocosin and this can alter peatland hydrology for long periods. Otmar and Bucher (1996) found that organic soils in the zone adjacent to drainage ditches have a greater probability of igniting during wildfire conditions.

PRESETTLEMENT VEGETATION – This LT in the original landscape was occupied by open pocosin vegetation only about .5 to 1 meter tall (Frost 2000). The stature and structure of organic and mucky pocosins were maintained by frequent fire and, to a lesser extent on MCB Camp Lejeune, by extreme scarcity of soil nutrients.

EXISTING VEGETATION - In general, the stature of trees and shrubs in peatlands has increased and obscured the natural pattern of vegetation structure controlled by fire and nutrient gradients in these systems. Low pocosin has been replaced by high pocosin and bay forest, dominated by swamp red bay (*Persea palustris*), loblolly bay (*Gordonia lasianthus*), and sweet bay (*Magnolia virginiana*) has increased. On some of the shallower peats, pond pine has formed closed canopy woodlands that resemble the Pond Pine Forest community type. However, approximately 18% of the mucky pocosins recently sampled by Carter (2000) on the Main Base are dominated by longleaf pine, a composition apparently the result of frequent prescribed burning.

MANAGEMENTS CONSIDERATIONS - Most management concerns in this LT relate to wildfire suppression, impacts to rare species in the ecotone with more well-drained sites, and prescribed burning. Decades of fire suppression have led to a buildup of volatile fuels in much of this LT. Recent fire research work on the Croatan National Forest has demonstrated that the window for safe burning in the pocosins may be greater than previously thought (Otmar and Bucher 1996). In general, the concern of organic matter consumption during prescribed burning is significantly reduced when water tables are closer than 18" from the soil surface.

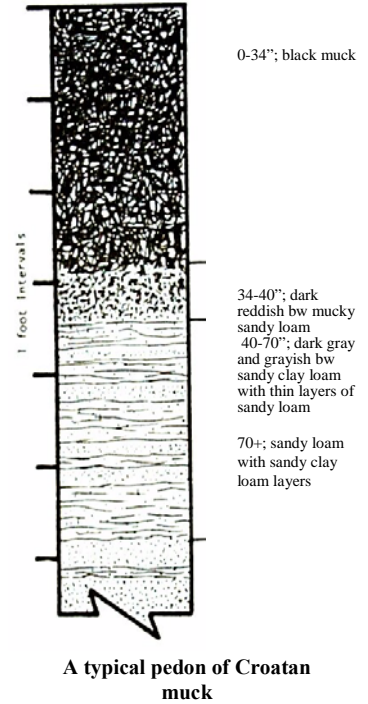
LT PHASES (LTPs) - This LT includes two LTPs separated on differences in soil texture and vegetation stature.

LTP #	soil type	extent (acres)	drainage	surface texture	surface depth	subsurface texture	permeability
801	Croatan	8,662	very poorly drained	muck	34"	sandy loam, sandy clay loam	moderate
802	Murville	8,160	very poorly drained	fine sand	55"	sand, layers of sandy loam	rapid

LTP # 801-VERY POORLY DRAINED, POND PINE POCOSIN on PEAT



Bear Alley, Great Sandy Run Pocosin, MCB Camp Lejeune, NC



This LTP occurs in only 12 map units on MCB Camp Lejeune, two of which exceed 2,800 acres in size. The largest are at the Great Sandy Run Pocosin. Total extent is about 8,600 acres distributed across three of the four Landtype Associations found on MCB Camp Lejeune. The type is most extensive in the Great Sandy Run Pocosin (LTA 13) and does not occur in the Onslow Maritime Zone (LTA 9). It is commonly associated with mucky pocosins and pond pine woodlands in pocosin fringes.

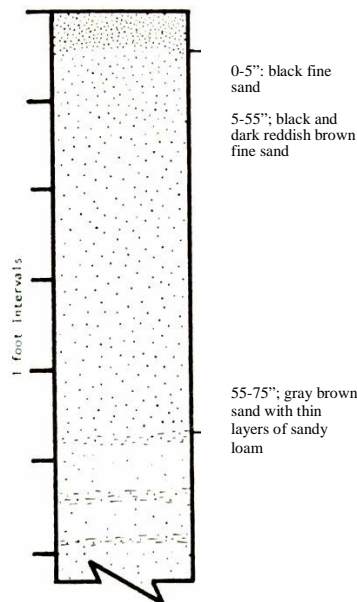
Soils are very poorly drained Croatan mucks and typically have a deep to moderately-deep organic surface layer. The Croatan series are classic pocosin soils, with stature under the original fire regime mostly limited to low pocosin by the combination of extreme infertility and fire (Frost 2000). On the domed landforms, precipitation is virtually the only source of plant nutrients. As a result, nutrients are scarce and the ecosystem is referred to as ombrotrophic (i.e. nutrient poor) with stunted, open pocosin vegetation.

Current vegetation may vary from low to high pocosin with a dense shrub layer 5 to 15 feet tall, except when recovering from recent fire (Schafale and Weakley 1990). The overstory is often scattered pond pine and loblolly bay from 20-40+ feet in height. Frost (2000) believes that canebrake plant communities once occurred on the less infertile Croatan muck soils in the eastern part of MCB Camp Lejeune. When fire is excluded for long periods, they may form a temporary dense canopy. In Great Sandy Run, the Forest Stands / Compartments database (IGIR 2000) indicates that the primary dominant species in 25% of pocosins is loblolly or slash pine. Furthermore, in over 60% of pocosins the primary dominant species are hardwoods (Table 3). Although extensive ditching, drainage, timber harvest, bedding, and pine plantation management has occurred in this area, the least impacts across the MCB Camp Lejeune landscape have occurred in the pocosins. It is likely that the database figures overestimate the amount of pocosins dominated by species other than pond pine.

**LTP # 802-VERY POORLY DRAINED, SANDY MUCK,
POND PINE POCOSIN**



Longleaf Pine Ridge, MCB Camp Lejeune, NC



A typical pedon of Murville fine sand

This LTP occurs in over 80 map units; one exceeds 2,500 acres in size however most are less than 100 acres in size. Total extent is about 8,200 acres distributed across all Landtype Associations found on MCB Camp Lejeune. This LTP is least common in the Onslow Maritime Zone (LTA 9) and most common in the Great Sandy Run Pocosin (LTA 13) and the Bogue-Topsail Coastal Sandridge (LTA 4). The type occurs in association with deep organic pocosins and as a distinct mosaic with wet-mesic to xeric longleaf pine savannas.

Soils are Murville mucky sands. These soils have a dark surface but not a well-developed organic layer and therefore a low risk of soil ignition during prescribed or wildfire. The surface may be slightly mucky especially after prolonged absence of fire. Height growth increment is poor for all tree species (Table 4).

Vegetation may appear similar to that found on pocosins on deep peat but grades into tall pocosin and pond pine forest in the slightly more fertile situations when bordered by mineral soils. On 56% of the map units on the Main Base, the primary dominant species is pond pine (Table 2). Open, low pocosin in this LTP occurs in the G-10 impact area.

WET-MESIC AND WET PINE SAVANNAS - LT # 09

GENERAL DESCRIPTION - This LT occurs throughout the southeastern coastal plain in upland flats and interstream areas. These somewhat poorly to poorly drained sites have a seasonal high water table, periodic to frequent burning, and mostly sandy soils. The potential natural vegetation dominants include longleaf pine (*Pinus palustris*), pond pine (*Pinus serotina*), and wiregrass (*Aristida stricta*).

There are two phases of this LT and they are often found in close proximity: (1) somewhat poorly drained, sandy and loamy, longleaf pine and mixed pine savanna, and (2) poorly drained, sandy, longleaf pine savanna.. These moist to wet sites are commonly referred to as ‘wet pine flatwoods’ or ‘wet pine savannas’ and have an open grassy understory when burned and a scattered longleaf pine tree canopy somewhat stunted in size due to site infertility. They occur on the wet end of the moisture gradient for longleaf pine. Without periodic burning, the more fertile sites are rapidly invaded by shrubs and hardwood trees. In Onslow County, outside of MCB Camp Lejeune they extend over 42,000 acres and across the base on about 17,800 acres. They are most common on the coastal sandridge and in the Great Sandy Run Pocosin area.

LANDSCAPE/LANDFORM PATTERN - This type occurs in small to very large, irregular shaped patches, and less often in narrow, linear patches in ridge and swale topography or linear sand lenses within large peatlands.

DISTURBANCE - The major natural disturbance was frequent low intensity fire at intervals of 1 to 3 years. Under natural fire regimes, fires occurred early in the growing season. Other disturbances include lightning, wind events from tornadoes, tropical storms, and microbursts. Much of this LT has been entirely cleared, planted to loblolly pine or slash pine, and fire suppressed. This is the situation in much of the Great Sandy Run Pocosin.

PRESETTLEMENT VEGETATION – Under the pre-settlement fire regime, this LT supported open pine savannas. In southeastern fire-adapted communities the term savanna applies to any fire-maintained two-layered community in which the two layers are a tree layer with up to 50% cover, over a continuous, usually grassy herb layer (Frost, Walker and Peet 1986). This LT supported predominately longleaf pine savanna, but also mixed longleaf pine – pond pine savanna. The herb layer was often dominated by wiregrass (*Aristida stricta*). These savannas had only scattered inkberry (*Ilex glabra*), blue huckleberry (*Gaylussacia frondosa*) and creeping blueberry (*Vaccinium crassifolium*)

EXISTING VEGETATION - Many of these moist communities have become shrubby or densely wooded because of fire suppression. Species diversity in the understory has been significantly reduced. On many sites, loblolly pine and hardwoods now dominate in the absence of fire. With longer fire suppression, some pine savannas may succeed to pond pine woodland.

MANAGEMENT CONSIDERATIONS - These are some of the wettest soils that are capable of supporting longleaf pine. Slightly greater site moisture and organic matter, that may occur within this ecological type, will discourage longleaf pine and favor pond and loblolly pine. Seasonal wetness may also limit equipment use. Periodic fire and reduction of plow lines in ecotones is necessary for maintenance of rare plant and animal species that occur in this zone. Low-lying areas are subject to flooding, however, these sites may be droughty during the growing season and tree growth may be suppressed. Seasonal drought can affect seedling survival.

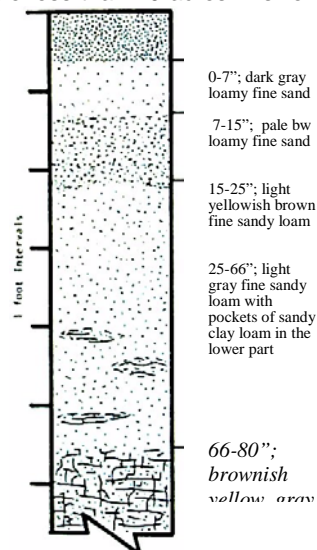
LT PHASES - This LT includes two LTPs separated on differences in soil drainage and soil texture.

LTP	soil type	extent (acres)	drainage	surface texture	surface depth	subsurface texture	permeability
901	Stallings	3,864	somewhat poorly drained	loamy fine sand	15"	fine sandy loam	mod. Rapid
	Lynchburg	158	somewhat poorly drained	fine sandy loam	13"	sandy clay loam	moderate
902	Leon	13,804	poorly drained	fine sand	17'	cemented fine sand	moderate

**LT # 901-SOMEWHAT POORLY DRAINED, SANDY and LOAMY,
LONGLEAF PINE and MIXED PINE SAVANNA**

This LTP is mapped in 93 map units, only 10 exceed 100 acres in size: one-third are less than 20 acres in size. Total extent is about 4,000 acres concentrated mainly in the Great Sandy Run Pocosin (LTA 13). It is located in small areas in the New River Dissected Terraces (LTA 12) and the Bogue-Topsail Coastal Sandridge (LTA 4). This LTP occurs on interstream flats and is commonly associated with mixed pine savanna and pond pine woodlands.

There are two soil series comprising this type. The somewhat poorly drained Lynchburg fine sandy loam is the least common, occupying only about 160 acres on the Base. The seasonal high water table is between .5 and 1.5 feet below the soil surface. The most extensive soil is the somewhat poorly drained Stallings loamy fine sand where the seasonal high water table ranges from 1.5 to 2.5 feet below the soil surface. Although this soil is somewhat poorly drained, internal drainage is moderately rapid especially in the sandy surface horizons. As a result, seasonal drought may be an important management consideration. Other soil inclusions occur in about 20% of the map units. The somewhat poorly drained Pactus and Lynchburg soils are intermingled, the moderately well drained Foreston and Onslow soils occur along edges of drainageways, and the poorly drained Woodington is in small depressions. Productivity of loblolly pine, pond pine, and slash pine is only moderate and low in longleaf pine (Table 4).



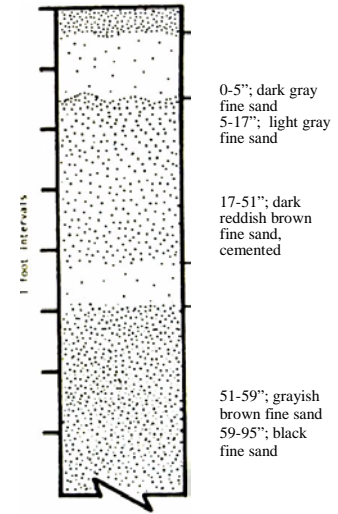
**A typical pedon of Stallings
loamy fine sand**

Pre-settlement vegetation in this LTP was predominately longleaf pine or mixed pine savanna. These sites are rapidly invaded by shrubs, sweetgum (*Liquidambar styraciflua*) and red bay (*Persea borbonia*). There are very few examples of this LTP that have not succeeded to loblolly pine and hardwoods. Currently longleaf pine is the primary or secondary dominant species in only 16% of the mapped area on the Main Base and about 5% of the LTP in the Great Sandy Run Pocosin area (Tables 2 and 3). Most areas are dominated by loblolly, pond pine, or hardwoods.

LTP # 902-POORLY DRAINED, SANDY, LONGLEAF PINE SAVANNA



Longleaf Pine Natural Area, MCB Camp Lejeune, NC



A typical pedon of Leon fine sand

This is the second largest LTP on MCB Camp Lejeune and is mapped in 124 map units; three exceed 1,000 acres in size and only one-quarter are less than 10 acres in size. Total extent is about 13,800 acres concentrated mainly in the Bogue-Topsail Coastal Sandridge (LTA 4) where it is the predominant LTP. It is also common in the Great Sandy Run Pocosin (LTA 13). This type is located on interstream flats where it is mainly associated with xeric longleaf pine savannas, wet pine savannas, and pocosins.

Soils are poorly drained Leon fine sands, deep sandy soils with a weakly cemented subsoil horizon. These soils are relatively infertile especially on sites surrounded by pocosin. The seasonal high water table is at or near the soil surface. Although this soil is poorly drained, internal drainage is moderately rapid especially in the sandy surface horizons. Seasonal drought is therefore an important management consideration. On low, narrow ridges, inclusions of somewhat poorly drained Stallings and Pactolus soils may occur. These inclusions make up about 15% of the map units. Tree growth is slow on these sites. Height growth increment is very low in loblolly pine, moderate for slash pine, and low for both longleaf pine and pond pine (Table 4).

Pre-settlement vegetation in this LTP was longleaf pine savanna with wiregrass (*Aristida stricta*) and bracken fern (*Adiantum pedatum*) often dominating the understory layer. Other characteristic species included yellow pitcher plant (*Sarracenia flava*), and Carolina yellow-eyed grass (*Xyris caroliniana*). Plant diversity was high and rare plants such as Venus’s flytrap (*Dionaea muscipula*) and rough-leaved loosestrife (*Lysimachia asperulifolia*) were maintained by frequent burning through the ecotone between this LTP and pocosin. Fire suppression on the more nutrient-poor sites, such as those surrounded by pocosin, has lead to a buildup of litter and a dense shrub layer resembling pocosin. This buildup in fuels may increase the probability of crown replacement fires even where longleaf pine is the dominant overstory species. Succession is even more rapid on less-sterile sites. Red maple (*Acer rubrum*) sweetgum (*Liquidambar styraciflua*), red bay (*Persea borbonia*), sweet bay (*Magnolia virginiana*) and tall gallberry (*Ilex coreaca*) quickly invade these sites within 5 to 10 years of burning. However, due to the extensive use of prescribed burning on MCB Camp Lejeune, longleaf pine is currently the primary or secondary dominant species in over 50% of this LTP on the Main Base (Table 2).

MESIC PINE SAVANNAS - LT # 10

GENERAL DESCRIPTION - This LT occurs throughout the southeastern coastal plain on upland terraces in broad flats and rolling topography. Sites are mesic, have a seasonal high water table within 1.5 to 2 feet from the soils surface, frequent burning, and are found on well-drained to moderately well-drained deep loam soils. These sites have optimal drainage and soil texture for agriculture and have been sought out for that purpose. The potential natural vegetation dominants include longleaf pine (*Pinus palustris*), wiregrass (*Aristida stricta*), and a diverse mixture of graminoids and forbs. Community structure was savanna. Both loblolly pine (*Pinus taeda*) and pond pine (*Pinus serotina*) were common codominants but have now become the dominant species.

There are two phases of the LT and they can be found in the same landscapes: (1) well-drained, loamy, longleaf pine savanna, and (2) moderately well-drained, loamy, longleaf pine savanna. These savannas are often referred to as “flatwoods” and represent the most productive savannas because of the combination of available moisture and nutrients. This is one of the more extensive LTs found on MCB Camp Lejeune and the most extensive type found outside of the Base in Onslow county where it covers over 85,000 acres. On the base, it is roughly 14,000 acres in size and is found primarily in the upland terrace and at Great Sandy Run Pocosin.

LANDSCAPE/LANDFORM PATTERN – This LT occurs in medium to large, irregularly shaped patches most often in a mosaic with other longleaf pine dominated LTs or as small patches in a matrix with pond pine forests.

DISTURBANCE - In pre-settlement forests, the major disturbance was frequent low intensity fire at intervals of 1 to 3 years. Under natural fire regimes, fires occurred early in the growing season. Other disturbances include lightning, wind events from tornadoes, tropical storms, and microbursts, and periodic droughts that may result in intense fire (Landers and Boyer in Draft). Much of the former longleaf pine stands in this LT were cut over in the early to mid-1800s, farmed or managed as pine plantations.

PRESETTLEMENT VEGETATION - This LT supported Pine Savannas and Mesic Pine Flatwoods (Schafale and Weakley 1990). On the more mesic loam soils in this LT, frequent burning created pure longleaf pine dominated stands with dense wiregrass and high species diversity in the herb layer. These forests were distinctly 2-layered and included mixed pine stands with longleaf, loblolly, and pond pine growing on the same site.

EXISTING VEGETATION - Most longleaf pine savannas in this LT have been displaced by development, loblolly pine plantations, or following long-term fire exclusion, succeeded to a dense multi-storied pine-hardwood forest with a dense shrub cover. Succession to woody shrubs and hardwood trees is more rapid on these mesic sites in the absence of fire than on other sites that support longleaf pine savannas. On MCB Camp Lejeune, most of these areas are dominated by loblolly pine. In these stands, understory trees may be dense and include black oak (*Quercus velutina*), southern red oak (*Quercus falcata*), and sweetgum (*Liquidambar styraciflua*).

MANAGEMENT CONSIDERATIONS - These are the most productive longleaf pine sites on MCB Camp Lejeune and the most altered from past land use practices. They have some of the greatest potential for restoration of longleaf pine, improvement of species richness, and greatest number of management options. Frequent fire is necessary to maintain savanna structure and control competing shrubs and trees.

LT PHASES - This LT includes four LT phases separated on differences in soil drainage and texture.

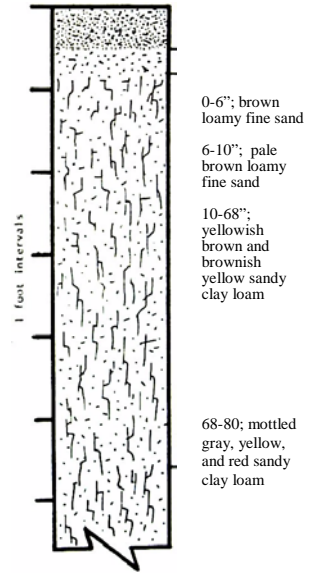
LTP	soil type	extent ac	drainage	surface texture	depth	subsurface texture	permeability
1001	Norfolk	1,280	well drained	loamy sand fine	10"	sandy clay loam	moderate
1002	Craven -B	288	moderately drained well	fine loam sandy	8"	clay loam, clay	Slow
	Goldsboro	518	moderately drained well	fine loam sandy	13"	sandy clay loam	Moderate
	Foreston	5,144	moderately drained well	loamy sand fine	12"	fine sandy loam	mod. Rapid
	Onslow	6,686	moderately drained well	loamy sand fine	17"	sandy clay loam	moderate

LTP # 1001-WELL-DRAINED, LOAMY, LONGLEAF PINE and MIXED PINE SAVANNA

This LTP is identified in only 27 map units, 3 exceed 100 acres in size; most are less than 50 acres in size. The largest occur along Well Point Road and at the Base Camp on Race Track Range Road. Total extent on MCB Camp Lejeune is about 1,280 acres. This type occurs only on the New River Dissected Terrace (LTA 12) and in a few areas at the Great Sandy Run Pocosin (LTA 13). It is associated with pine-hardwood slopes, other mesic pine savannas, and dry-mesic pine savannas.

Soils are well-drained Norfolk loamy fine sand. The seasonal high water table ranges from 3.5 to 6 feet below the surface. About 15% of the mapping units have inclusions of moderately well drained Goldsboro and Foreston soils. These are probably the most productive soils on the Base and they support the highest site index for loblolly pine (Table 4).

Pre-settlement vegetation in this LTP included forests dominated by longleaf pine (*Pinus palustris*) and those having mixed pine species such as longleaf, pond pine (*Pinus serotina*) and loblolly pine (*Pinus taeda*). Wiregrass (*Aristida stricta*) was the dominant understory species occurring with a diverse mix of grasses and forbs. Creeping blueberry (*Vaccinium crassifolium*), yellow-fringed orchid (*Platanthera ciliaris*), and bluestems (*Andropogon spp.*) are characteristic species. Few scrub oaks were present perhaps due to hotter burns carried by the dense grass and forb understory. Most of these sites have succeeded to loblolly pine and hardwoods. Currently, only 2% of sampled areas where this type occurs on the Main Base have longleaf pine identified as the primary or secondary dominant species while 28% are dominated by longleaf pine in the Great Sandy Run Pocosin area (Tables 2 and 3). One of the higher quality stand conditions exists on both sides of Pocosin Road in the northeast corner of MCB Camp Lejeune.

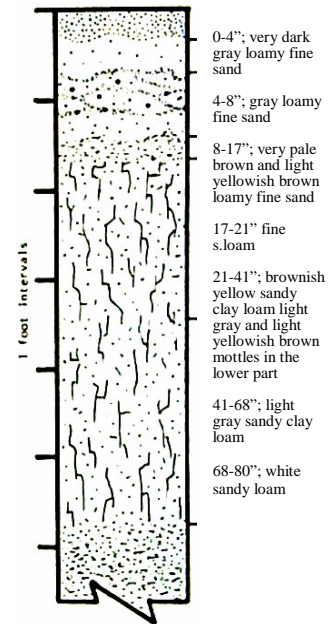


A typical pedon of Norfolk loamy fine sand

**LTP # 1002-MODERATELY WELL-DRAINED, LOAMY, LONGLEAF PINE
and MIXED PINE SAVANNA**



Holston-Hunter Creek Road, Croatan National Forest, NC



A typical pedon of Onslow loamy fine sand

This LTP is widespread and has been identified in 157 map units on MCB Camp Lejeune; three-quarters are less than 100 acres in size but four exceed 500 acres in size. The largest is located at Starrets Meadow, the name perhaps a reminder of the past condition of this area. Total extent is about 14,000 acres, one of the largest LTs on the Base. The type occurs mostly on the New River Dissected Terrace (LTA 12) where it is associated with dry-mesic pine savannas, pine-oak drainage slopes, pond pine woodlands, and mixed pine savannas. In the Great Sandy Run Pocosin (LTA 13), it is primarily associated with pond pine and mixed pine savannas.

There are four soil series comprising this type and they are all deep loams and often occur in a mosaic on broad, upland flats. The Onslow and Foreston loamy fine sands are the most extensive. Onslow soils are located across LTA 12. Foreston Soils are located primarily in LTA 13. Minor soils in this type cover less than 1,000 acres and include the Goldsboro and Craven fine sandy loam. This LTP represents one of the most productive sites on the Base. Height growth increment for all the major pines is higher than in all other types (Table 4).

Pre-settlement vegetation was longleaf pine (*Pinus palustris*) or mixed longleaf pine, pond pine (*Pinus serotina*), and loblolly pine (*Pinus taeda*) over a diverse mixture of mesic savanna graminoids and forbs. Characteristic species include little bluestem (*Andropogon scoparius*), big bluestem (*Andropogon gerardii*), bracken fern (*Pteridium aquilinum*), skeleton grass (*Gymnopogon brevifolius*), switch cane (*Panicum virgatum*), green sicklescale (*Anthaenantia villosa*), and yellow Indian grass (*Sorghastrum nutans*). These were some of the most species-rich sites in the coastal plain but few remain today in good condition. Fire exclusion has resulted in rapid succession to loblolly pine and hardwoods. On the Croatan National Forest, there are a few remnants of frequently burned Goldsboro soils within this LTP. These areas have some of the highest plant species diversity on the Forest. On MCB Camp Lejeune, the best restoration opportunities are along highway 17 south of Hicks Creek, Ragged Point, and around Old Bear Creek Road.

XERIC AND DRY-MESIC SAVANNAS - LT# 11

GENERAL DESCRIPTION - This LT occurs in the southeastern coastal plain on upland terraces, sandhills, and other undulating uplands. These xeric to dry-mesic habitats have a seasonal high water table below a depth of five feet, frequent burning, and are found on well-drained to excessively drained deep sands. The potential natural vegetation dominants include longleaf pine (*Pinus palustris*), wiregrass (*Aristida stricta*), and scrub oaks (*Quercus laevis*, *Quercus incana*, *Quercus marilandica*, *Quercus margarettae*). Community structure is most always an open savanna often dominated by only longleaf pine and wiregrass.

There are three phases of the LT and they may be found in close proximity: (1) excessively drained, sandy longleaf pine savanna, (2) excessively drained, dry-mesic, longleaf pine savanna, and (3) well-drained, sandy, longleaf pine savanna. These savannas are commonly referred to as 'barrens', 'sandhills' or 'xeric sandhill scrub' and have characteristic scattered scrub oaks, fairly open grown pines, and exposed surface sand. The more xeric sites are normally low or deficient in moisture available to support vigorous tree growth. Although they receive adequate rainfall, they experience a rapid loss of available moisture because of percolation, evaporation, runoff, and transpiration.

This LT is the most extensive ecological type found on MCB Camp Lejeune and covers 24,000 acres but occurs in only two LTAs. It is the predominant type in the coastal sandridge and in the upland terrace on both sides of the New River. Outside of the Base in Onslow County, it occurs on an additional 32,000 acres.

LANDSCAPE/LANDFORM PATTERN - Sites are irregularly shaped and variable in size, most often occurring as narrow to broad bands associated with small to medium-sized streams or as linear patches associated with ridge and swale topography.

DISTURBANCE - In the pre-settlement landscape, the major disturbance was frequent low intensity fire at intervals of 1 to 3 years. Under natural fire regimes, fires occurred early in the growing season. The most xeric and barren sites may have produced too little fuel to sustain extensive fires at this frequency. Other natural disturbance includes wind events from tornadoes and tropical storms. Early use of longleaf pine in this LT for turpentine production during the colonial era was followed by widespread logging near the turn of the century. Pinchot and Ashe (1915) noted that "along the great sand hills just within the sounds, the longleaf pine occurs in open forests of small trees, now largely removed".

PRESETTLEMENT VEGETATION - This LT supports communities defined as savanna and share vegetative characteristics with Schafale and Weakley's (1990) Xeric Sandhill Scrub, Pine/Scrub Oak Sandhill, and Mesic Pine Flatwoods. Typical sites were dominated by a somewhat open longleaf pine canopy and wiregrass (*Aristida stricta*) understory. Bluejack oak (*Quercus marilandica*), a characteristic species on the less xeric sites, commonly occurred only as scattered individuals. The more xeric sites typically had an open canopy of stunted longleaf pine with low growing turkey oak (*Quercus laevis*), and a sparse herb layer dominated by wiregrass (*Aristida stricta*), Carolina sandwort (*Arenaria caroliniana*), sand spikemoss (*Selaginella arenicola*), and common prickly pear (*Opuntia compressa*). Also common were more open and barren conditions without shrub species and only longleaf pine, scattered turkey oak, and wiregrass. Dry-mesic sites included dwarf huckleberry (*Gaylussacia dumosa*), thread-softly (*Cnidioscolus stimulosus*), big bluestems (*Andropogon spp.*), sweet goldenrod, (*Solidago odora*), and summer farewell (*Petalostemum pinnatum*).

EXISTING VEGETATION - Fire suppression has led to changes in community structure and species diversity. Although succession is much slower in this LT than on more mesic sites, the midstory can become very dense where less xeric sites are fire-suppressed for long periods (> 10 years). Under these conditions, a multi-layered subcanopy can develop that is dominated by loblolly pine (*Pinus taeda*), turkey oak (*Quercus laevis*), and bluejack oak (*Quercus incana*). On the more infertile sands, only turkey oak has developed such dense understories. Such prolonged exclusion of fire may lead to dense pine needle and oak leaf litter accumulation up to one foot deep, which eliminates the herb layer. Fire carries poorly in oak litter, reducing the effectiveness of surface fires to consume woody competition to grasses and herbs.

MANAGEMENT CONSIDERATIONS - Management emphasis should be on maintaining a regular fire regime of understory burning. Although sites have rather low fertility, the litter layer is normally continuous and fires carry well through the stand. Longleaf pine savannas within this LT provide important habitat conditions for the red-cockaded woodpecker. Other species such as wild turkey and fox squirrel benefit from the significant production of acorns by turkey oak within this LT. Balancing the needs of these species may require a change in traditional burning methods that emphasize 'blackening' every available acre within a burn unit. A more mosaic type burn that uses the irregular pattern of fuels distribution typical on these xeric sites would retain scattered mast-producing species to develop into larger subcanopy trees.

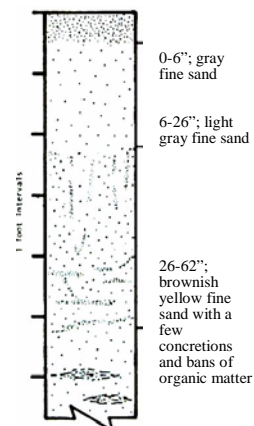
LANDTYPE PHASES (LTPs) - This Landtype includes three LTPs separated on differences in soil drainage and pre-settlement plant community types.

LTP	soil type	extent (acres)	drainage	surface texture	surface depth	subsurface texture	permeability
1101	Alpin	969	excessively drained	fine sand	13"	fine sand, loamy fine sand	very rapid
	Kureb	5,125	excessively drained	fine sand	26"	fine sand, bands of organic	rapid
1102	Wando	614	excessively drained	fine sand	6"	fine sand	rapid
1103	Baymeade	17,606	well drained	fine sand	30"	fine sand, fine sandy loam	mod. rapid

LTP # 1101-EXCESSIVELY DRAINED, SANDY, LONGLEAF PINE SAVANNA



G-10 Buffer Zone, MCB Camp Lejeune, NC



A typical pedon of Kureb fine sand

This LTP is identified in 81 map units; most are less than 100 acres in size but two exceed 600 acres in size. Total extent is about 6,100 acres occurring mainly in the Bogue-Topsail Coastal Sandridge (LTA 4) where it accounts for one-third of the landscape. In that area, it occupies the highest landscape positions and is always associated with wet pine savannas and sandy muck pocosins. In the New River Dissected Terrace (LTA 12), it is also associated with dry-mesic pine savannas and pine-hardwood slopes.

There are two soil series comprising this type; both are excessively drained, deep sands. Alpin fine sand is the least common and occurs on less than 1,000 acres. The Kureb fine sand is the most common and is less fertile than other soils having similar drainage partly due to accumulations of aluminum and organic matter in the subsoil. These spodic horizons can severely affect nutrient availability. Furthermore, moisture availability for both soils is limited because infiltration is rapid and permeability is very rapid. These sites are therefore some of the least productive for tree growth on MCB Camp Lejeune (Table 4).

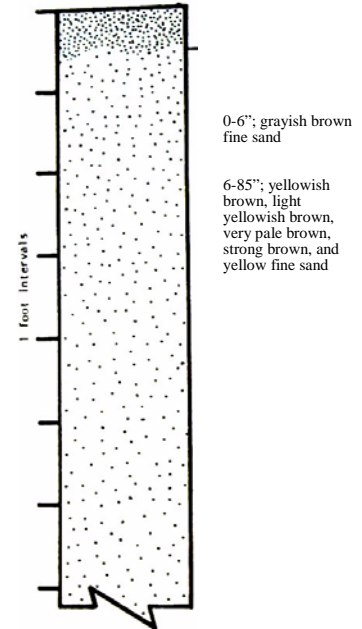
Pre-settlement vegetation was open longleaf pine (*Pinus palustris*) over a nearly continuous layer of wiregrass (*Aristida stricta*). Scattered scrub oaks, especially turkey oak (*Quercus laevis*), were present. Other characteristic species include: thread softly (*Cnidocolus stimulosus*), wax myrtle (*Myrica cerifera*), whip nuthatch (*Scleria triglomerata*), Carolina ipecac (*Euphorbia ipecacuanhae*), goats' rue (*Tephrosia virginiana*), and stiffleaf aster (*Aster leariifolius*). With a reduction in fire frequency low shrubs such as blue huckleberry (*Gaylussacia frondosa*), sparkleberry (*Vaccinium arboreum*), and stunted turkey oak (*Quercus laevis*) become established. Succession, however, proceeds slowly on these infertile and droughty sites and vegetation even without periodic fire never reaches the density of nearby wet sites.

Understory plant cover is sparse and there is always some sand exposed at the soil surface. Many good examples of open xeric pine savanna remain on MCB Camp Lejeune. Some of the best are between the G10 and highway 172, and south of Lyman road near the junction with highway 172. Currently over 60% of the forests in this type have longleaf pine as the primary dominant species. This type of dominance by longleaf pine is not found in any other type. Nevertheless, there are still opportunities to restore about one-third of the stands in this type where longleaf is neither the primary nor the secondary dominant species (Table 2).

LTP # 1102-EXCESSIVELY DRAINED, SANDY, DRY-MESIC LONGLEAF PINE SAVANNA



Near Rhodes Point Road, MCB Camp Lejeune, NC



A typical pedon of Wando fine sand

This LTP is one of the smallest types found on MCB Camp Lejeune and is identified in only 14 map units. One-half of the map units are less than 10 acres in size, however, there are two large map units exceeding 100 acres in size. These units occur just south of the mouth of Town Creek, and north of Rhodes Point Road. This LTP is found only on the west side of the New River in the New River Dissected Terrace (LTA 12) and is associated with a variety of types. Associates include pine-hardwood slopes, wet pine savannas, dry-mesic savannas, and small stream swamps.

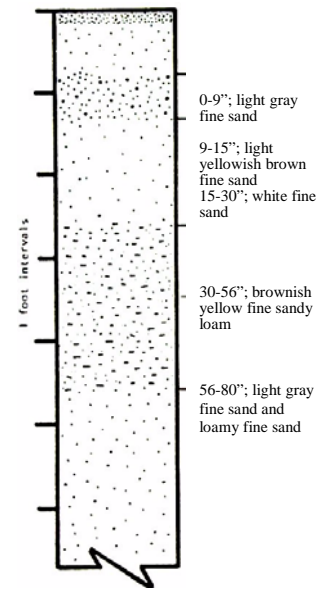
Soils are excessively drained Wando fine sand, deep sandy soils having a seasonal high water table 6 feet below the soil surface. This soil is much more common below the coastal scarp that separates the low coastal flats from the extensive upland terrace. Other soil inclusions occur in about 15% of map units. The excessively drained Alpin and Kureb are intermingled while the Baymeade is on small flat areas (Lejeune Soil Survey 1984). Height increment for both loblolly and longleaf pine is high in this LTP (Table 4).

This LTP is a typical longleaf pine/wiregrass savanna but is intermediate in moisture and species diversity between xeric and dry-mesic types. Pre-settlement vegetation included wiregrass (*Aristida stricta*.), turkey oak (*Quercus laevis*) and some mesic savanna grasses and herbs. Although more common in the maritime zone, live oak (*Quercus virginiana*) is another characteristic species in this type and scattered individuals can still be found north of Rhodes Point Road. Currently, in the area sampled by Carter (2000), loblolly pine is the primary dominant species in this LTP (Table 2).

LTP # 1103-WELL DRAINED, SANDY, LONGLEAF PINE SAVANNA



Spring Branch Limesinks, MCB Camp Lejeune, NC



A typical pedon of Baymeade fine sand

This is the largest LTP found on MCB Camp Lejeune and it is identified in over 150 map units; 44 are greater than 100 acres in size. The largest map units are greater than 500 acres in size and are located in the K-2 Impact Area and south of Stone Bay. Total extent is about 17,600 acres distributed throughout the New River Dissected Terrace (LTA 12). It also occurs in LTA 4 and in a few areas in LTA 13. Because of its extent, it can be found in association with nearly all other LTPs but is primarily associated with other pine savannas (wet, mesic, and xeric) and with pine-hardwood drainage slopes. There are an additional 3,560 acres of Baymeade soil mapped in the urban-woodland complex (LT 17).

Soils are well-drained Baymeade fine sands. These soils have deep sand surface horizons and a sandy loam subsurface. The seasonal high water table ranges from 4 to 5 feet below the surface. Included with this soil in mapping are small areas of at least six other soil series, which make up about 15% of the map unit (Lejeune Soil survey 1984). The sandier Alpin and Kureb soils are on small, slightly higher ridges. The Foreston, Leon, and Pactolus are in narrow depressions and the Muckalee soil is in narrow drainageways. The Baymeade soils are generally productive for longleaf pine and loblolly pine. Along with the Onslow and Norfolk, these soils have the greatest height increment for longleaf pine than all other types (Table 4).

Pre-settlement vegetation was longleaf pine savanna but with greater stocking than more xeric sites. Typical understory was wiregrass (*Aristida stricta*), and scattered bluejack oak (*Quercus incana*) often with few other species. Bluejack oak (*Quercus incana*) is a characteristic species and is usually present in modern landscapes. Species diversity is usually low. Succession is also relatively slow and the effect of fire suppression may not be evident for 4 to 5 years. However, sites that are more diverse may contain flowering dogwood (*Cornus florida*) and other scattered oaks such as blackjack (*Quercus marilandica*), sand post oak (*Quercus margarettae*) and turkey oak (*Quercus laevis*). Characteristic understory species include thread softly (*Cnidocolus stimulosus*), bluestems (*Andropogon* spp.) and Carolina ipecac (*Euphorbia ipecacuanhae*). Some of the best examples of this LTP are located between the G10 and Lyman Road, and around the headwaters of French's creek.

MARITIME INFLUENCED WOODLANDS AND SAVANNAS - LT# 13

GENERAL DESCRIPTION - This LT occurs throughout the southeastern coastal plain within lowland terraces adjacent to ocean-influenced wetlands. These landscapes are a complex of excessively drained and well drained low ridges and somewhat poorly drained broad interstream flats. In general, all upland landscapes that are maritime-influenced are placed in this LT including uplands fringing salt or brackish waters that are dominated by live oak communities. The potential natural vegetation dominants include live oak (*Quercus virginiana*), longleaf pine (*Pinus palustris*), pond pine (*Pinus serotina*), and loblolly pine (*Pinus taeda*).

There are four phase of this LT and they are often found in close proximity: (1) excessively drained, sandy pine-oak woodlands, (2) well-drained, sandy, longleaf pine savanna, (3) well-drained, sandy, mixed pine-oak slopes, and (4) somewhat poorly drained, mixed pine flats. This LT is located only in the Onslow Maritime Zone (LTA 9) and is one of the primary types used to differentiate this area. Total extent on MCB Camp Lejeune is about 7,400 acres. In Onslow County, outside the Base, it covers about 8,150 acres.

LANDSCAPE/LANDFORM PATTERN – This LT forms large irregular patches associated with upland pine and hardwood sites and marshes near large water bodies.

DISTURBANCE - Under natural fire regimes, most mainland maritime zones experienced frequent fires that spread from interior fire communities or more likely from adjacent saltmarsh grasses. They are susceptible to wind and flooding caused by hurricanes because of their location in low areas near the coast. Furthermore, aerosol salt may be a continuous stress factor and significant source of mineral nutrients.

PRESETTLEMENT VEGETATION - This LT can support vegetation communities ranging from longleaf pine (*Pinus palustris*) sandhills and savanna to hardwood slopes and mixed live oak (*Quercus virginiana*) – pine. Some of the more low-lying areas especially near marshland may have supported Coastal Fringe Evergreen Forests (Schafale and Weakley 1990). In general, characteristic species in the maritime zone include: yaupon (*Ilex vomitoria*), Virginia red-cedar (*Juniperus virginiana*), maxmyrtle (*Myrica cerifera*), dwarf palmetto (*Sabal minor*), and live oak (*Quercus virginiana*).

EXISTING VEGETATION - Sites within the maritime zone have experienced nearly three centuries of human exploitation and disturbance. All the live oak in the region was sought out and removed for ship timber during the 18th and 19th century (Wood 1981). Furthermore, sites that still had some of the second growth live oak, have been used for houses and farmsteads since the early 1700s. The reduction in fire frequency especially below the coastal scarp has led to an increase in loblolly pine (*Pinus taeda*), numerous hardwoods, and pocosin shrubs.

MANAGEMENTS CONSIDERATIONS – Restoration of native plant communities is perhaps the largest challenge in this LT. Salt water inundation and hurricane winds will always shape the overall vegetation structure in this zone, however, without periodic fire, dense shrub lands will persist and the once dominant live oak woodlands and open longleaf pine sandhills will be absent from the landscape. Some of the best opportunities to return fire to maritime marsh and upland zones exists around Bear Creek.

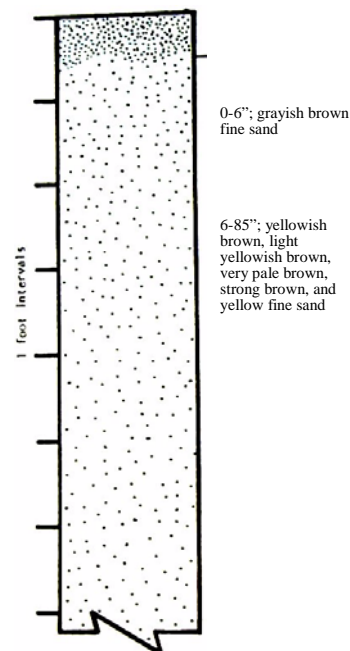
LANDTYPE PHASES (LTPs) - This Landtype includes four LTPs separated on differences in soil drainage and pre-settlement plant community types.

LTP	soil type	extent ac.	drainage	surface	depth	subsurface texture	permeability
1301	Wando	3,728	excessively drained	fine sand	6"	fine sand	rapid
1302	Baymeade	1,009	well drained	fine sand	30"	fine sand, fine sandy loam	mod. rapid
1303	Marvyn	1,000	well drained	loamy fs	8"	sandy loam, sandy clay lm	moderate
1304	Pactolus	1,663	mod.well-sw poorly drained	fine sand	30"	fine sand	rapid

LTP # 1301-EXCESSIVELY DRAINED, SANDY MARITIME-INFLUENCED PINE-OAK WOODLAND



Near Mile Hammock Bay Sandhills, MCB Camp Lejeune, NC



A typical pedon of Wando fine sand

This LTP is identified in 39 map units on MCB Camp Lejeune. Over one-half are less than 50 acres in size but nine are greater than 200 acres in size; the largest are near Salliers Bay Road. Total extent is about 3,700 acres distributed across the Onslow Maritime Zone (LTA 9). This type does not occur elsewhere on the Base and is one of the primary types used for delineating this LTA. Major associates are maritime-mixed pine flats, sandy muck pocosins, maritime influenced pine savannas, and maritime influenced pine-oak woodlands.

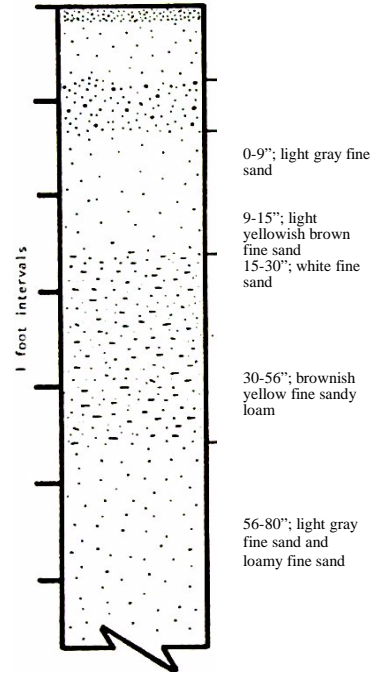
Soils are excessively drained Wando fine sands. These deep sands have a seasonal high water table 6 feet below the soil surface. This soil is common below the coastal scarp that separates the low coastal flats from the extensive uplands. There are about 600 acres of Wando find sand that occur in the New River Dissected Terrace (LTA 12). In that area, it has been placed in the dry-mesic, longleaf pine savanna type (LTP 1102) and height increment for both loblolly and longleaf pine is high. However, within the coastal scarp, height increment for loblolly pine is moderately low and for longleaf pine only moderate (Table 4).

Pre-settlement vegetation varied from pure longleaf on the inland, more fire-exposed sites, to true maritime forest with live oak (*Quercus virginiana*) and yaupon (*Ilex vomitoria*) near and along shorelines. Other characteristic species include dwarf huckleberry (*Gaylussacia dumosa*), stiffleaf aster (*Aster linariifolius*), slender spikegrass (*Chasmanthium laxum*) and butterfly pea (*Clitoria mariana*). Good examples of this type occur between highway 172 and Bear Creek and in small areas along Bear Creek to the north. A reduction in fire frequency, as has happened below the coastal scarp, has led to an increase in “off-site” pines and hardwoods. Currently nearly, 80% of the sampled area in this type had neither longleaf pine nor live oak as the primary or secondary dominant species (Table 2). Most of this type is dominated by loblolly pine

**LTP # 1302-WELL DRAINED, SANDY, MARITIME INFLUENCED
LONGLEAF PINE SAVANNAS**



**South of Sneads Ferry Road-east of Marines Road,
MCB Camp Lejeune, NC**



**A typical pedon of
Baymeade fine sand**

This LTP is identified in just 14 map units on MCB Camp Lejeune. Over one-half are greater than 50 acres in size; the largest are located south of highway 172 between Traps Bay and Courthouse Bay and at the Osprey Artillery Gun position. The type is located only in the Onslow Maritime Zone (LTA 9) and most map units occur in the northern periphery of this area. This LTP is associated with maritime influenced pine-oak slopes and pine-oak woodland, wet pine savannas, xeric pine savannas, and pocosin fringes.

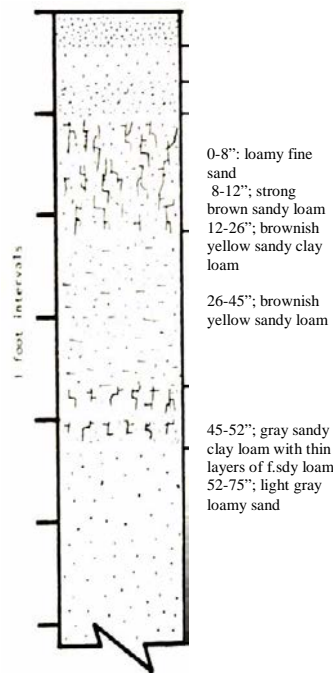
Soils are well-drained Baymeade fine sands. These soils have deep sand surface horizons and a sandy loam subsurface. The seasonal high water table ranges from 4 to 5 feet below the surface. There are inclusions in the map units of more poorly drained soils. This soil is very extensive in the upland terrace (LTA 12), dominating landscapes there. In that area, it has been placed in a dry-mesic longleaf pine savanna type (LTP 1103) and height increment for both loblolly and longleaf pine is high. However, height increment for loblolly pine is moderately low and for longleaf pine only moderate on these soils below the coastal scarp (Table 4).

Pre-settlement vegetation was longleaf pine (*Pinus palustris*) over wiregrass (*Aristida stricta*) in a typical savanna structure. Bluejack oak (*Quercus incana*) is a characteristic species and most sites are somewhat sterile; species diversity is usually. Succession is also relatively slow and the effect of fire suppression may not be evident for 4 to 5 years. However, below the coastal scarp, fire return intervals have exceeded this time period and many sites have been invaded by loblolly pine, shrubs, and midstory hardwood saplings. Over 70% of this area was sampled recently and 90% of the LTP has loblolly pine as the primary dominant species and in only 6% of the area is longleaf pine the primary dominant species (Table 2).

LTP # 1303-WELL DRAINED, SANDY MARITIME INFLUENCED MIXED PINE-OAK DRAINAGE SLOPE



Mile Hammock Bay Road, MCB Camp Lejeune, NC



A typical pedon of Marvyn loamy fine sand

This LTP is identified in 44 map units; only one is greater than 100 acres in size; over 50% of are less than 20 acres in size. Total extent is about 1,000 acres distributed mainly along first and second order drainages of the New River within the maritime zone. Most map units are on the peninsula north of the lower New River. This LTP only occurs in the Onslow Maritime Zone (LTA 9) and is commonly associated with maritime influenced pine-oak woodlands, mesic pine savannas, and maritime influenced longleaf pine savannas.

Soils are well-drained Marvyn loamy fine sands on sloping land. They have a sandy surface and predominately sandy loam subsurface. Included in the soil mapping are steeper sites and eroded sites. This soil is very extensive in the upland terrace (LTA 12), and characterizes slopes above drainages. In that area, it has been placed in LTP 401 and height increment for loblolly pine is high. Height increment for loblolly pine is only moderate on these soils within the coastal scarp (Table 4).

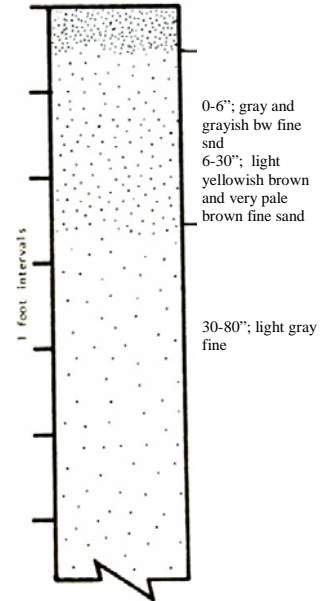
Pre-settlement vegetation was predominantly dry-mesic to mesic longleaf pine savanna and mixed pine-hardwood. Oaks increased in importance in the mid and lower slope positions. Today most of these sites are dominated by loblolly pine. Recent surveys indicate that loblolly pine is the primary dominant species in 85% of this type. Longleaf pine is the primary dominant species in only 6% of the surveyed area (Table 2.)

LTP # 1304-MODERATELY WELL DRAINED AND SOMEWHAT POORLY DRAINED, SANDY, MARITIME, MIXED PINE FLAT

This LTP is identified in 16 map units and nearly one-half of them exceed 100 acres in size. The largest is over 400 acres and occurs from Freemans Creek Road northeast along highway 172. Total extent is about 1,660 acres distributed across the lower lying areas in the Onslow Maritime Zone (LTA 9), the only LTA where the type occurs. This LTP is primarily associated with maritime saltmarsh and maritime influenced pine-oak woodland.

Soils are moderately well to somewhat poorly drained Pactolus fine sands. These deep sands occur on broad interstream areas and have a seasonal high water table ranging from 1.5 to 2.5 feet below the soil surface. About 10% of mapped areas have inclusions of excessively drained Wando and poorly drained Leon soils. Loblolly pine height growth increment is moderately low on this soil.

Pre-settlement plant communities were mostly mixed pine with longleaf pine (*Pinus palustris*) the predominant species. Other pines included loblolly pine (*Pinus taeda*), and pond pine (*Pinus serotina*). Structure was an open, two layered savanna with a diverse mix of wet mesic graminoids and forbs. Characteristic species include Carolina yellow-eyed grass (*Xyris caroliniana*), savanna meadow-beauty (*Rhexia alifanus*), deer's tongue (*Trilisa paniculata*), orange milkwort (*Polygala lutea*), and pine lily (*Lillium catesbaei*). Most all of the area covered by this LTP has now succeeded to loblolly pine, shrubs, and swamp hardwoods because of the reduction in fire frequency (Table 2). The best opportunities for restoration of this type are near the marshes of Bear Creek where marsh communities could provide the fuel for frequent burning.



A typical pedon of Pactolus fine sand

MARITIME DUNES, SWALES, AND MARSHES -LT # 14

GENERAL DESCRIPTION –This LT includes shores and dunes of barrier islands, margins of estuaries, other upland margins, and old flood tide deltas near closed inlets. These salt-influenced sea level wetlands and upland sand ridges are strongly influenced by daily tides and wind, and by periodic severe hurricanes and storm wave action. The dominant vegetation is graminoids (*Uniola paniculata*, *Panicum amarum*, *Eragrostis* spp., *Spartina patens*) and, in more stabilized area, shrubs and trees (*Juniperus virginiana*, *Quercus virginiana*, *Myrica cerifera*, *Iva Frutescen*).

LANDSCAPE/LANDFORM PATTERN – This LT is long and linear and runs parallel to the shoreline.

DISTURBANCE - Flooding is the major continual disturbance. Tidal waters affect salinity and influence the distribution of communities and species along a salt tolerance gradient. Periodic hurricanes, however, have the greatest influence on this landscape, shifting dunes, creating new ocean inlets, and temporarily devastating shrub and tree cover.

PRESETTLEMENT VEGETATION – In pre-settlement landscapes, vegetation in most marshes (except true salt marshes), shoreline vegetation, and maritime forest hummocks were influenced by fire. The marsh-upland transition today shows signs of fire suppression, being dominated in places by cedar, loblolly pine, and wax myrtle (*Myrica cerifera*). Loblolly pine marsh may have once dominated these fringe areas. This 2-layered community had a canopy of pure loblolly pine over an open grassy layer of marsh graminoids such as slender spikegrass (*Chasmanthium laxum*). They were kept open by frequent fire spreading from the uplands or adjacent marsh (Frost 2000).

EXISTING VEGETATION – This complex of soils and disturbance regimes support a variety of vegetation types that include permanently inundated saltmarsh cordgrass (*Spartina alterniflora*) at sea level, hummocks and flats of maritime live oak (*Quercus virginiana*), and beach grasses on shifting sand dunes. Near upland margins where salinity is reduced by fresh groundwater input there are small stands of loblolly pine and maritime live oak forest. These Estuarine Fringe Loblolly Pine Forests (Schafaly and Weakley 1990) provided one of the original locations for naturally occurring loblolly pine in the southeastern coastal plain.

MANAGEMENTS CONSIDERATIONS - Management concerns relate to protection of the important functions that these coastal estuarine systems provide, especially nutrient cycling, energy production, and habitat. Areas with regular daily lunar tides have a regular input of nutrients, which makes them highly productive. The marsh plants contribute nutrients to the estuaries benefiting fish and shellfish and provide habitat for wetland wildlife. Stabilization of backdunes may interfere with normal cycles of barrier island erosion and aggradation.

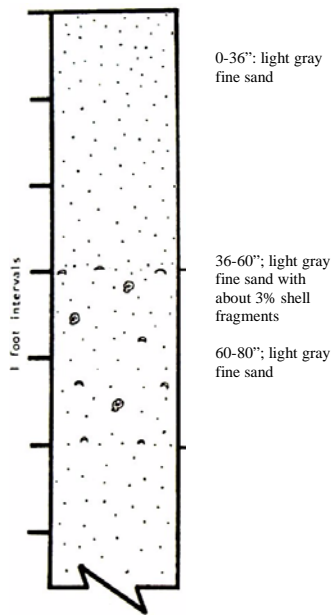
LANDTYPE PHASES (LTPs) - This Landtype includes two LTPs separated on differences in soil drainage, landform, and pre-settlement plant community types.

LTP	soil type	extent (acres)	drainage	surface texture	surface depth	subsurface texture	permeability
1401	Newhan Corolla Duckston	909 198 235	excessively drained somewhat poorly drained poorly drained	fine sand fine sand fine sand	36" 44" 19"	fine sand fine sand fine sand	very rapid very rapid very rapid
1402	Bohicket	2,186	very poorly drained	silty clay loam	8"	silty clay, loamy sand	very slow

LTP # 1401-EXCESSIVELY DRAINED TO POORLY DRAINED, MARITIME DUNES AND SWALES



Onslow beach foredunes, backdunes, and swales, MCB Camp Lejeune, NC



A typical pedon of Newhan fine sand

This LTP is mapped in only 17 map units, two exceed 400 acres in size (Newhan soils); most are less than 50 acres in size. Total extent is about 1,370 acres distributed across the length of the Onslow Maritime Zone (LTA 9). This complex of ocean-side landforms and soils are associated inland with a marshland complex.

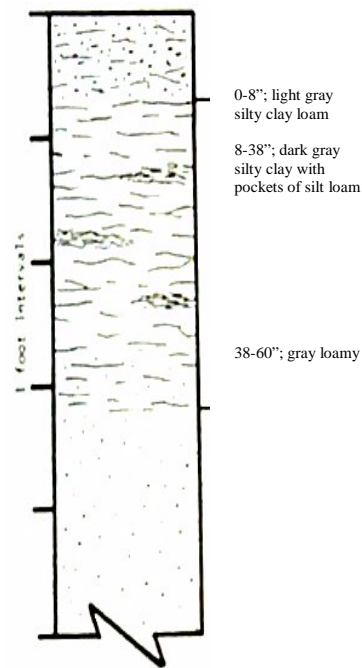
There are three soils comprising this LTP: 1) excessively drained Newhan fine sand which is the most extensive and forms taller dunes along the coast, 2) moderately well drained Corolla fine sand which forms low dunes mostly inland from the Newhan soil, and 3) poorly drained Duckston fine sand which fills swales to temporarily form flats behind the dunes. These complex landscapes are strongly influenced by ocean tides and storm overwash and are constantly in motion as the forces of erosion and wind shift the sands perpendicular to and along the main axis of the shoreline.

Current vegetation is often temporary. Fresh dunes are colonized by Sea oats (*Uniola paniculata*). Other grasses include panic grass (*Panicum amarum*) and Lovegrass (*Eragrostis* spp.). Saltmeadow cordgrass (*Spartina patens*) is more common on the lower dunes in wet transition areas. Stabilized dunes may succeed to shrubby red cedar-live oak (*Juniperus virginiana* – *Quercus virginiana*) or maritime shrubs such as waxmyrtle (*Myrica cerifera*), mulletbush (*Baccharis halimifolia*), or bigleaf marsh elder (*Iva frutescens*). Where flats and slight swales are protected, common marsh grasses such as salt marsh cordgrass (*Spartina alternifolia*), black needle-rush (*Juncus roemerianus*) and seaside goldenrod (*Solidago sempervirens*) may become established.

LTP # 1402-VERY POORLY DRAINED, LOAMY, MARITIME MARSH



Gillets Creek, MCB Camp Lejeune, NC



A typical pedon of Bohicket silty clay loam

This LTP is mapped in nearly 80 map units, seven of which exceed 100 acres in size (mouth of Bear Creek, Howard Bay); most are less than 10 acres in size. Total extent is 2,226 acres distributed across the entire Onslow Maritime Zone (LTA 9); the inland units are scattered along the lower New River. This LTP occurs mostly at elevations less than 2 feet above sea level between the seaward maritime dunes and swales and the inland maritime influenced mixed pine flats, small stream swamps and pine oak woodlands.

Soils are very poorly drained Bohicket silty clay loams and some are locally referred to as “mud flats”. There may be inclusions of other soil series in this map unit including Laffitte muck and Carteret sand. Sites are strongly influenced by tidal flooding and have a broad range in salinity varying from seawater near inlets to brackish marshes in mouths of upland drains.

Current vegetation is highly variable and includes permanently saturated marshes and shoreline marsh-maritime forest hummocks. Brackish marsh is dominated by black needlerush (*Juncus roemerianus*) or saltmeadow cordgrass (*Spartina patens*) with Big cordgrass (*Spartina cynosuroides*) and sawgrass (*Cladium mariscus ssp. jamaicense*). Salt marsh is strongly dominated by saltmarsh cordgrass (*Spartina alterniflora*) with zones of black needlerush and saltmeadow cordgrass. Salt flats have a sparse cover of saltworts (*Salicornia* sp.) and salt grass (*Distichlis spicata*). Shoreline marsh-maritime forest hummocks include live oak (*Quercus virginiana*), Loblolly pine (*Pinus taeda*), and Gum-Bay-Magnolia (*Nyssa-Persea-Magnolia*) communities. With exception of the saline Saltmarsh cordgrass, all marshes, shoreline vegetation, and maritime forest hummocks have been strongly affected by fire suppression. Many areas are now dominated by pocosin – like thickets of Swamp tupelo (*Nyssa biflora*), Swamp red bay (*Persea palustris*), red maple (*Acer rubrum*), sweetbay (*Magnolia virginiana*), and loblolly pine.

Table 3. Composition of Landtype Associations (LTA) in Onslow County and on MCB Camp Lejeune (% of total LTA extent) 1/

----- Onslow County -----								----- MCB Camp Lejeune -----						
	LTA ac →	161,206	29,750	49,252	42,354	172,504	70,413		404	14,697	15,924	72,472	41,905	
LTP	LTP acres ↓	LTA 3	LTA 4	LTA 9	LTA 11	LTA 12	LTA 13	Total acres	LTA 3	LTA 4	LTA 9	LTA 12	LTA 13	
101	1,911	0.7	0.4	--	--	0.4	--	319	--	--	--	0.4	--	
102	4,558	1.1	0.3	--	--	1.5	--	1,080	--	--	--	1.5	--	
201	33,418	7.5	5.6	2.7	--	7.0	8.8	8,196	2.3	2.2	6.0	6.0	6.1	
202	646	0.1	0.3	0.1	--	0.2	--	490	--	0.6	0.4	0.4	0.1	
401	28,566	6.5	5.1	--	--	9.6	--	8,618	2.8	2.4	--	11.4	--	
402	3,631	1.7	--	--	--	0.6	--	153	--	--	--	0.2	--	
601	34,677	18.3	1.2	--	1.1	2.4	0.3	1,089	1.3	0.3	--	1.1	0.5	
602	27,435	4.8	2.7	0.1	0.1	4.2	16.5	7,373	--	1.3	--	1.9	13.9	
701	44,377	6.7	2.6	0.1	41.9	4.4	10.5	7,726	--	2.0	--	2.4	13.6	
801	34,138	1.0	1.0	--	56.0	0.3	11.4	8,662	--	2.1	--	0.5	19.2	
802	15,756	0.4	7.8	0.9	--	3.2	9.7	8,160	--	11.1	1.5	1.6	12.3	
901	29,324	9.4	3.2	0.2	0.2	4.3	8.2	4,022	1.7	0.4	--	1.2	7.3	
902	30,843	0.9	18.2	1.7	0.1	7.4	14.7	13,804	--	32.8	2.1	3.4	14.7	
1001	28,594	11.4	3.8	0.2	--	5.1	0.3	1,280	2.8	--	--	1.6	0.3	
1002	70,568	20.2	12.3	1.2	0.6	12.7	16.5	12,636	10.7	2.0	1.5	11.1	9.7	
1101	9,728	0.2	16.5	0.3	--	2.4	0.3	6,094	--	29.9	0.6	2.2	--	
1102	1,562	--	2.8	--	--	0.4	--	614	--	--	--	0.9	--	
1103	45,424	3.8	15.4	--	--	19.3	2.3	17,606	1.9	12.5	--	20.9	1.5	
1301	6,035	--	--	12.3	--	--	--	3,728	--	--	23.4	--	--	
1302	4,462	--	--	9.1	--	--	--	1,009	--	--	6.3	--	--	
1303	1,900	--	--	3.9	--	--	--	1,000	--	--	6.3	--	--	
1304	3,157	--	--	6.4	--	--	--	1,663	--	--	10.5	--	--	
1401	3,645	--	--	7.4	--	--	--	1,369	--	--	8.6	--	--	
1402	9,646	--	--	19.6	--	--	--	2,226	--	--	14.0	--	--	
1601	2,008	0.5	--	0.2	--	0.6	0.2	976	7.0	--	0.6	1.0	0.3	
1701	10,983	2.7	--	1.0	--	3.5	--	4,939	--	--	--	6.8	--	
1801	78	--	--	--	--	--	--	46	--	--	--	0.1	--	
1802	1,566	--	--	3.1	--	--	--	558	--	--	3.4	--	--	
1803	809	0.2	0.5	0.1	--	0.1	0.2	175	--	0.2	0.3	0.1	--	
1804	879	0.2	--	0.1	--	0.3	0.2	879	69.5	--	0.2	0.6	0.3	
3001	34,459	1.5	0.3	29.5	--	10.1	--	18,917	--	0.4	14.6	22.8	0.1	

^{1/} Dominant LTPs within each LTA are highlighted.

Table 4. Dominant tree species occurring in Landtype Phases (LTP) on the Main Base, MCB Camp Lejeune^{1/}

LTP	Total Map Unit Area (ac.) Main Base	Percent of Map unit area inventoried	Inventory Area (ac.)	Percent Area Longleaf Pine Primary Dominant	Percent Area Loblolly or Slash Pine Primary Dominant	Percent Area Pond Pine Primary Dominant	Percent Area Hardwood Primary Dominant	Potential Natural Vegetation (PNV) Principal Dominant(s)	Percent of area without the PNV Principal Species as Primary or Secondary Dominant
101	319	52	168	0	1	0	99	marshland	-
102	1,080	94	1,014	0	3	0	97	cypress	100%
201	5,587	24	1,368	6	69	5	21	hardwood	76%
202	484	31	152	11	56	32	1	pond pine	68%
401	8,519	47	4,017	9	83	2	6	longleaf-hardwood	79%
402	150	97	145	0	88	0	12	hardwood	76%
601	860	69	593	4	84	11	1	pond pine-longleaf	80%
602	1,158	77	890	7	79	14	0	pond pine-longleaf	86%
701	1,989	59	1,172	4	62	34	0	pond pine	66%
801	659	48	315	4	7	89	0	pond pine	11%
901	940	75	701	16	56	28	0	longleaf-pond pine	84%
902	8,053	54	4,329	51	25	23	1	longleaf pine	48%
1001	1,128	84	944	2	95	1	2	longleaf-pond pine	98%
1002	8,048	68	5,481	13	76	11	0	longleaf-pond pine	86%
1101	6,077	57	3,461	63	27	9	1	longleaf pine	35%
1102	614	57	352	0	100	0	0	longleaf pine	100%
1103	17,086	66	11,241	22	73	4	1	longleaf pine	77%
1301	3,713	44	1,644	10	80	0	10	hardwood-longleaf	79%
1302	1,005	72	726	6	91	0	3	longleaf pine	94%
1303	993	64	639	6	85	0	9	longleaf-hardwood	82%
1304	1,654	29	484	1	62	0	37	pond pine-longleaf	99%

^{1/} data for LTPs 101-102 from Timber Stand Compartments (IGIR 2000); data for all other LTPs from Forest Inventory Report (Carter 2000)

Table 5. Dominant tree species occurring in Landtype Phases (LTP) in Great Sandy Run, MCB Camp Lejeune^{1/}

LTP	Total Map Unit Area (ac.) Main Base	Percent of Map unit area inventoried	Inventory Area (ac.)	Percent Area Longleaf Pine Primary Dominant	Percent Area Loblolly or Slash Pine Primary Dominant	Percent Area Pond Pine Primary Dominant	Percent Area Hardwood Primary Dominant	Potential Natural Vegetation (PNV) Principal Dominant(s)	Percent of area without the PNV Principal Species as Primary or Secondary Dominant
201	2,557	96	2,443	1	9	1	88	hardwood	4%
401	55	84	46	0	54	0	46	longleaf-hardwood	0%
601	223	90	201	0	70	2	28	pond pine-longleaf	98%
602	6,180	84	5,173	3	67	2	28	pond pine-longleaf	93%
701	5,714	94	5,374	1	38	3	58	pond pine	93%
801	7,997	90	7,223	0	16	13	71	pond pine	86%
802	4,800	95	4,552	2	24	5	69	pond pine	90%
901	3,055	86	2,613	5	69	1	25	longleaf-pond pine	91%
902	5,688	90	5,130	14	50	4	32	longleaf pine	84%
1001	142	82	116	28	9	0	63	longleaf-pond pine	72%
1002	4,536	88	4,012	16	57	0	27	longleaf-pond pine	84%
1103	475	87	415	0	74	0	26	longleaf pine	100%

^{1/} data from Timber Stand Compartments (IGIR 2000)

Table.6. Crosswalk Between Landtypes and Frost’s (2000) Presettlement Vegetation Community Type Groups

Landtypes soil components, (drainage class) extent on MCB Camp Lejeune	Presettlement Vegetation Community Group
Inland Tidal Marshes and Tidal Swamps Bohicket silty clay loam (very poorly drained) 316 ac. Lafitte muck (very poorly drained) 3 ac. Dorovan muck (very poorly drained) 1,080 ac.	Maritime Dune, Swale, and Marsh System (Bohicket, Lafitte) Tidal Cypress-Gum Swamps (Dorovan)
Small Stream Swamps and Streamhead Pocosins Muckalee loam (poorly drained) 8,196 ac.	Small Stream Swamps (Muckalee) Pocosin (Muckalee)
Drainage Slopes Craven-C fine sandy loam (moderately well drained) 153 ac. Marvyn loamy fine sand (well drained) 8,618 ac.	Mixed Mesic Hardwood Forest & Pyrophytic Woodland Complex on fire sheltered slopes (Craven) Mesic Longleaf Pine-Pyrophytic Woodland Complex on slopes (Marvyn)
Interstream Flats Pactolus fine sand (mod. well- somewhat poorly drained) 219 ac. Lenoir loam (somewhat poorly drained) 110 ac. Woodington loamy fine sand (poorly drained) 7,373 ac. Rains fine sandy loam (poorly drained) 760 ac.	Mixed Pine Savanna (Rains, Lenoir) Wet Longleaf Pine Savanna (Rains, Pactolus) Maritime Influenced Pyrophytic Communities (Rains) Pond Pine Forest and Canebrake (Woodington)
Pocosin Fringes Pantego mucky loam (very poorly drained) 186 ac. Torhunta fine sandy loam (very poorly drained) 7,539 ac.	Pond Pine Forest and Canebrake (Pantego, Torhunta)
Broad Pocosins Murville fine sand (very poorly drained) 8,160 ac. Croatan muck (very poorly drained) 8,662 ac.	Pocosin (Murville, Croatan)
Wet and Wet-Mesic Pine Savannas Leon fine sand (poorly drained) 13,804 ac. Lynchburg fine sandy loam (somewhat poorly drained) 158 ac. Stallings loamy fine sand (somewhat poorly drained) 3,864 ac.	Wet Longleaf Pine Savanna (Leon) Mesic Pine Savannas on Upland Terraces (Stallings)
Mesic Pine Savannas Norfolk loamy fine sand (well drained) 1,280 ac. Goldsboro fine sandy loam (moderately well drained) 518 ac. Foreston loamy fine sand (moderately well drained) 5,144 ac. Onslow loamy fine sand (moderately well drained) 6,686 ac. Craven-B fine sandy loam (moderately well drained) 288 ac.	Mesic Pine Savannas on Upland Terraces (Norfolk, Goldsboro, Foreston, Onslow, Craven-B)
Xeric and Dry-Mesic Pine Savannas Alpin fine sand (excessively drained) 969 ac. Kureb fine sand (excessively drained) 5,125 ac. Wando fine sand (excessively drained) 614 ac. Baymeade fine sand (well drained) 17,606 ac.	Xeric & Dry Mesic Longleaf Pine / Wiregrass Savanna (Alpin, Kureb, Baymeade) Mesic Longleaf Pine on Pamlico Terrace (Wando)
Maritime Influenced Woodlands and Savannas Wando fine sand (excessively drained) 3,728 ac. Baymeade fine sand (well drained) 1,009 ac. Marvyn loamy fine sand (well drained) 1,000 ac. Pactolus fine sand (mod. well- somewhat poorly drained) 1,663 ac.	Maritime Influenced Pyrophytic Communities (Wando, Baymeade, Marvyn, Pactolus)
Maritime Dunes, Swales, and Marshes Newhan fine sand (excessively drained) 910 ac. Corolla fine sand (moderately well drained) 224 ac. Duckston fine sand (poorly drained) 235 ac. Bohicket silty clay loam (very poorly drained) 2,226 ac	Maritime Dune, Swale, and Marsh System (Newhan, Duckston, Corolla, Bohicket)

Table 7. Relative Site Index Class1/ for Important Pine Species on MCB Camp Lejeune.

LTP	Loblolly Pine	FIA plots	GIS stands	Slash Pine	FIA plots	GIS stands	Longleaf Pine	FIA plots	GIS stands	Pond Pine	FIA plots	GIS stands
102	very high	1	0	-	0	0	-	0	0	-	0	0
201	high	12	21	high	7	0	medium	0	3	medium	0	4
202	med. low	1	0	-	0	0	-	0	0	-	0	0
401	high	19	56	-	0	0	medium	0	6	medium	0	4
402	medium	0	2	-	0	0	-	0	0	-	0	0
601	medium	5	5	-	0	0	medium	0	1	medium	1	4
602	very high	2	3	medium	5	0	high	1	2	medium	0	1
701	medium	1	5	low	6	0	low	0	3	high	3	4
801	-	0	0	-	0	0	-	0	0	very low	2	0
802	med. low	2	18	low	5	0	low	1	3	low	4	7
901	medium	4	18	medium	5	0	low	0	1	medium	1	1
902	med. low	10	26	medium	6	0	low	6	16	low	9	13
1001	very high	2	16	-	0	0	-	0	0	-	0	0
1002	high	18	35	high	9	0	high	1	15	high	0	6
1101	medium	3	23	-	0	0	low	10	29	low	0	6
1102	high	3	8	-	0	0	high	0	1	-	0	0
1103	high	45	101	medium	1	0	high	13	17	medium	2	6
1301	med. low	9	13	-	0	0	medium	0	5	-	0	0
1302	med. low	4	0	-	0	0	medium	1	0	-	0	0
1303	medium	6	4	-	0	0	medium	0	1	-	0	0
1304	med. low	5	3	-	0	0	-	0	0	-	0	0

Source: Forest Inventory plots (1990), MCB Camp Lejeune Forest Stands (2000).

1/ Loblolly Pine site index (SI) classes: very high = SI > 85, high = SI 81-84, medium = SI 76-80, med. low = SI < 75
 Slash Pine site index (SI) classes: high = SI > 75, medium = SI 70-75, low = SI < 70
 Longleaf Pine and Pond Pine site index (SI) classes: high = SI > 67, medium = SI 63-66, low = SI 55-62, very low = SI < 55

Table .8: Natural Areas, Rare Species and Natural Communities on MCB Camp Lejeune.

Extent of Habitats on MCB Camp Lejeune					Documented Element Occurrences ^{1/}				
LTP	LTP acres	NC Heritage Program Natural Areas (acres)	RCW Cluster Area (acres)	RCW Forage Area (acres)	Plants	Animals ^{2/}	Communities	Total EOs	EO Density ^{3/}
101	1,911	0	0	0	0	0	0	0	0
102	4,558	831	0	0	0	0	2 – 2	2 – 2	1.2
201	33,41	609	2	408	2 – 2	5 – 2	3 – 2	10 – 6	.8
202	646	77	12	176	0	0	1 – 1	1 – 1	1.3
401	28,56	861	61	900	6 – 5	1 – 1	6 – 3	13 – 9	1.0
402	3,631	0	0	4	0	0	0	0	0
601	34,67	21	0	130	0	0	1 – 1	1 – 1	.6
602	27,43	78	0	268	12 – 8	0	0	12 – 8	1.0
701	44,37	804	5	661	10 – 10	1 – 1	1 – 1	12 – 12	1.0
801	34,13	6,831	3	334	3 – 2	0	7 – 4	10 – 6	.7
802	15,75	941	81	1,996	51 – 25	5 – 4	4 – 3	60 – 32	4.7
901	29,32	26	3	219	3 – 2	1 – 1	0	4 – 3	.6
902	30,84	1,678	502	4,903	112 – 33	16 – 5	15 – 7	143 – 45	7.6
1001	28,59	164	1	40	4 – 4	1 – 1	1 – 1	6 – 6	3.0
1002	70,56	293	95	1,850	37 – 19	7 – 4	7 – 6	51 – 29	2.5
1101	9,728	1,387	490	3,550	52 – 18	9 – 6	7 – 6	68 – 30	8.6
1102	1,562	47	0	0	0	0	1 – 1	1 – 1	1.0
1103	45,42	1,217	272	2,798	24 – 14	12 – 6	10 – 6	46 – 26	2.0
1301	6,035	37	7	161	4 – 4	1 – 1	0	5 – 5	.9
1302	4,462	0	0	26	0	0	0	0	0
1303	1,900	0	0	14	0	0	0	0	0
1304	3,157	88	0	6	1 – 1	2 – 2	1 – 1	4 – 4	1.5
1401	3,645	126	0	0	1 – 1	4 – 4	1 – 1	6 – 6	2.8
1402	9,646	425	0	0	1 – 1	2 – 1	1 – 1	4 – 3	1.2
water ^{4/}	34,45	-	-	-	32 – 15	12 – 6	8 – 4	52 – 25	-

^{1/} Number of documented rare species and natural community Element Occurrences; # of occurrences - # of species

(NC Heritage Program 1999). LTPs with the greatest number of occurrences are highlighted.

^{2/} Excludes Red-cockaded Woodpecker element occurrences.

^{3/} Number of Element Occurrences per square mile.

^{4/} Element occurrences associated with ponds, streams, and the New River.

Appendix 6:

MCB Camp Lejeune 2014 RCW Management Plan

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Appendix 6: MCB Camp Lejeune 2014 RCW Management Plan

1.0 INTRODUCTION

This plan constitutes a revision of MCB Camp Lejeune’s 2007 RCW Recovery Plan. Much of the plan remains unchanged for this revision. Notable changes for this plan include a suspension of restoration of longleaf pine and management for RCW habitat improvements in GSRA pending completion of the planning/design process for the GSRA Tactical Maneuver Course or at the end of the 5-year INRMP period, whichever comes first. Also, this plan will place a greater emphasis on management in support of off-road tracked vehicle maneuver. This support will come in the form of assistance in the design of maneuver corridors, including the Combined Arms Amphibious Assault Course (CAAAC) Phase 1, (Beach to Combat Town Maneuver Course [BCTMC]) to minimize conflicts and management of future and existing RCW clusters to reduce conflicts with planned training projects. During this period, tracked vehicle impacts to habitat will be monitored in order to inform future decisions regarding the compatibility of off-road tracked vehicle maneuver and RCW habitat. MCB Camp Lejeune will initiate consultation with the U.S. Fish and Wildlife Service for any projects that may affect RCW, including CAAAC Phase 1.

This plan provides a basis by which MCB Camp Lejeune will continue to pursue its RCW population objective of 173 active clusters, the attainment of which will allow MCB Camp Lejeune to lift all training restrictions due to the RCW. The plan continues an aggressive approach to restoring and enhancing RCW habitat and increasing the base-wide population, while also reducing conflicts with military activities. Implementation of this plan will satisfy MCB Camp Lejeune’s requirement to conserve RCW while enhancing the Marine Corps’ ability to utilize MCB Camp Lejeune's training areas.

Since RCW management and MCB Camp Lejeune training requirements might change over the life of this plan, MCB Camp Lejeune recognizes that modifications to the plan may be required, based on reevaluation of management plan implementation, the plan’s effectiveness, and the status of RCWs.

2.0 RED-COCKADED WOODPECKERS ON MCB CAMP LEJEUNE

For the 2013 nesting season, MCB Camp Lejeune reported 114 active RCW clusters. This number represents an increase of 256% since 1986, when intensive population monitoring began, and a 44% increase during implementation of the current INRMP (Figure 1). Since signing of the last INRMP, MCB Camp Lejeune’s RCW population has averaged 5.2% growth per year.

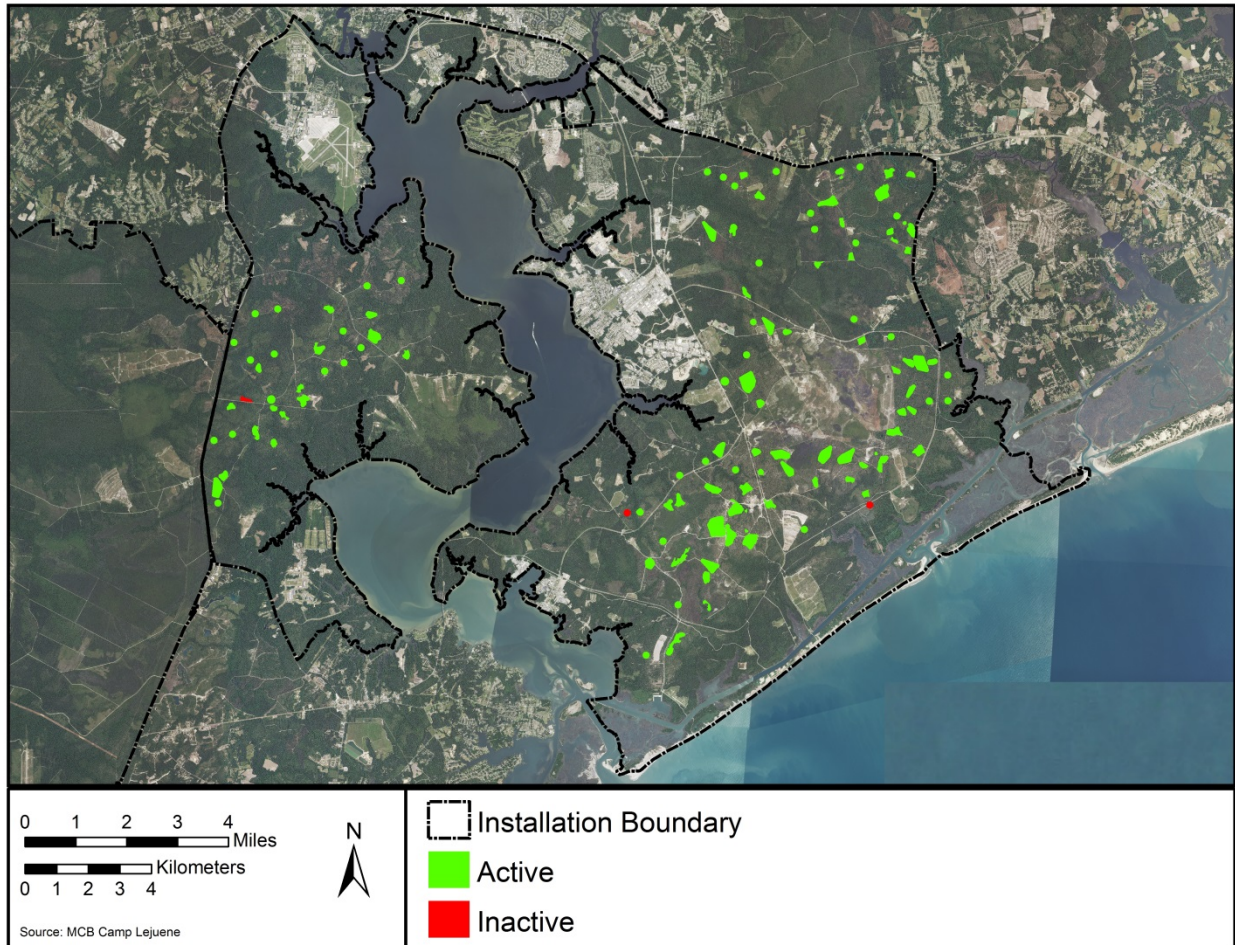


Figure 1. Map of MCB Camp Lejeune showing active and inactive RCW clusters as of October 2013.

The Recovery Goal of 173 RCW clusters, established in the 1999 plan, was based on 36,922 acres of pine or pine-hardwood forest present on MCB Camp Lejeune in 1999. For the current plan, MCB Camp Lejeune has re-evaluated its RCW management acres to include additional acres that currently contain hardwood on soils that historically supported longleaf pine. MCB Camp Lejeune will maintain the previously established recovery goal of 173 RCW clusters. The GSRA has 23,111 acres of pine or pine-hardwood; however, there are no RCW clusters present due to the predominance of young pine plantations.

Intensive monitoring of RCW clusters on MCB Camp Lejeune began in 1986, when the base had 32 active clusters. Since that time, MCB Camp Lejeune has seen this number grow by 256% to 114 active clusters in 2013. Figure 2 shows the growth in active clusters and nests between 1986 and 2005.

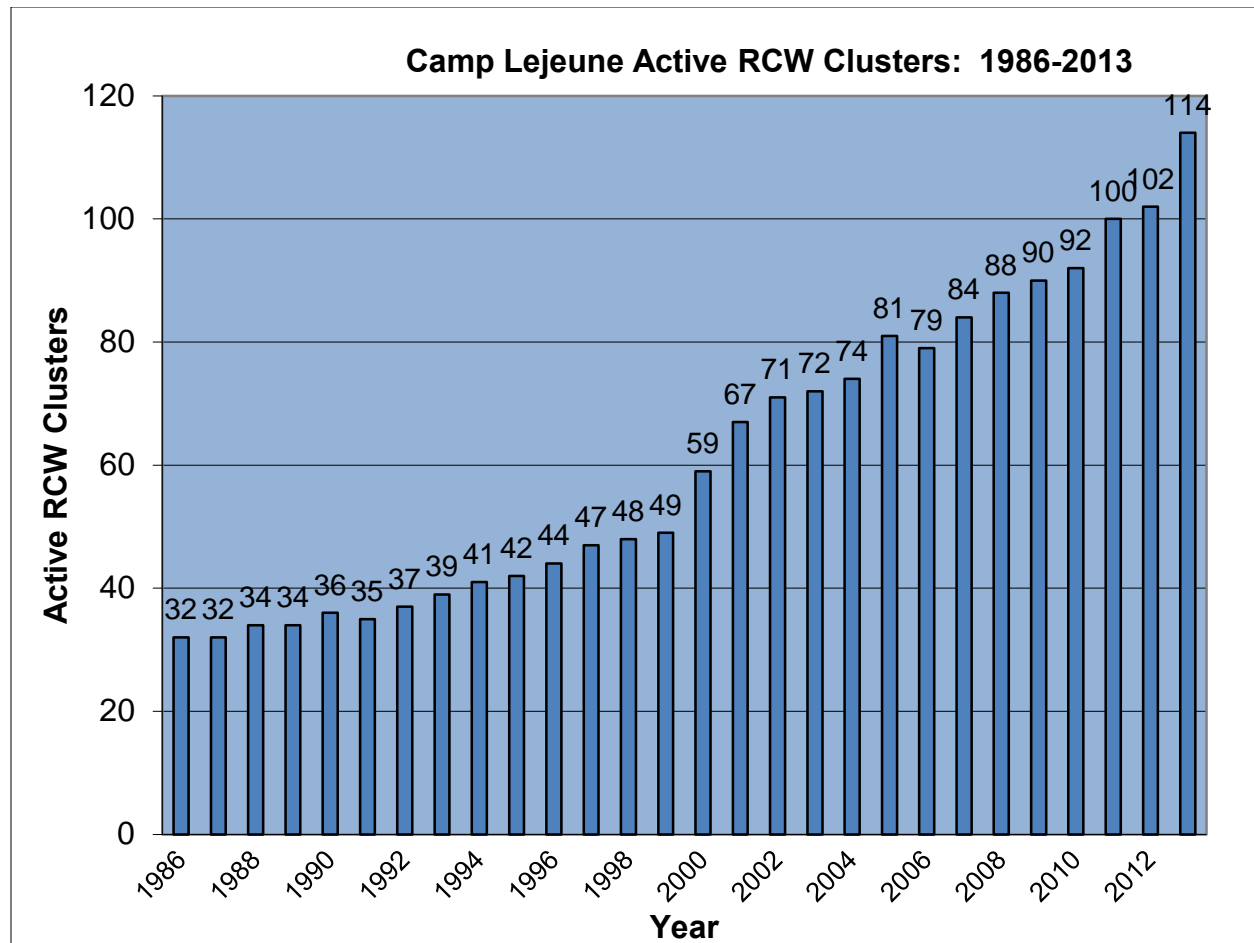


Figure 2. Number of active RCW clusters on Marine Corps Base MCB Camp Lejeune from 1986 to 2013

3.0 HABITAT REQUIREMENTS

The RCW is unique in that it is the only woodpecker that excavates its cavities in living pine trees. Although many southern pine species are used for cavities, RCWs show a preference for longleaf pine (Hooper 1988). Regardless of the pine species selected, RCWs generally prefer mature trees for cavity excavation (Hooper and Harlow 1986).

Most active clusters occur in open stands of pine with a sparse midstory. RCWs will tolerate various levels of midstory density, but abandonment generally increases as hardwood midstory encroachment occurs. As a general rule, abandonment occurs when the hardwood midstory reaches the height of the cavity (Hooper et al. 1980).

Foraging habitat provides an area for RCWs to search for food, primarily insects such as ants, roaches, beetles, spiders, and centipedes, captured on and under the outer bark of live pine trees and in dead branches of live pines. Prescribed fire plays an important role in the quality of foraging habitat by reducing hardwood midstory and increasing the abundance of arthropod prey.

Habitat preference tends to increase with age of the stand, decreasing density of smaller pines, and decreasing density of hardwoods.

In general, MCB Camp Lejeune habitat management is focused on growing and maintaining open stands of relatively old longleaf pine. Specifically, management is designed to move toward or maintain good quality habitat as defined in the 2003 RCW Recovery Plan, with the recognition that longleaf pine restoration may result in temporary degradation of habitat quality.

3.1 GOOD QUALITY FORAGING HABITAT

In the 2003 RCW Recovery Plan, the U.S. Fish and Wildlife Service (USFWS) defines good quality foraging habitat for RCWs. Good quality foraging habitat is characterized by some large old pines, low densities of small and medium pines, sparse or no hardwood midstory, and a bunchgrass and forb groundcover. As defined in the 2003 RCW Recovery Plan, good quality habitat has all of the following characteristics:

- *Eighteen (18) or more stems/ac of pines that are > 60 years of age and > 14 in diameter at breast height (dbh). Minimum basal area for these pines is 20 ft²/ac.*
- *Basal area of pines 10-14 in dbh is between 0 and 40 ft²/ac.*
- *Basal area of pines < 10 in dbh is below 10 ft²/ac and below 20 stems/ac.*
- *Basal area of all pines > 10 in dbh is at least 40 ft²/ac (the minimum basal area for pines in categories (a) and (b) above is 40 ft²/ac).*
- *Groundcover of native bunchgrass and/or other native, fire-tolerant, fire-dependent herbs total 40% or more of ground and midstory plants and are dense enough to carry growing season fire at least once every 5 years.*
- *No hardwood midstory, or if a hardwood midstory is present, it is sparse and < 7 ft in height.*
- *Canopy hardwoods are absent or are < 10% of the number of canopy trees in longleaf forests, and < 30% in loblolly forests.*
- *All of this habitat is within 0.5 mi of the center of the cluster, and preferably 50% or more is within 0.25 mi of the cluster center.*
- *Foraging habitat is not separated by more than 200 ft of non-foraging areas. Non-foraging areas include (1) predominantly hardwood forest, (2) pine stands < 30 years in age, (3) cleared land such as agricultural lands or recently clearcut areas, (4) paved roadways, (5) utility rights of way, and (6) bodies of water.*

The amount of habitat necessary to support a single RCW cluster will vary with habitat quality and site productivity. In areas of medium to high productivity, including MCB Camp Lejeune,

120 acres (49 ha) of good quality habitat is sufficient to support a cluster. Some areas on MCB Camp Lejeune, for example the G-10 and Combat Town RCW management areas, support clusters on substantially less than 120 acres. These areas support MCB Camp Lejeune’s best quality RCW habitat, primarily due to the presence of relatively old longleaf pine and habitat, and frequent fires. Portions of the base that do not have the same history of frequent fires tend to require more aggressive habitat management, including mechanical hardwood removal (Figure 3).

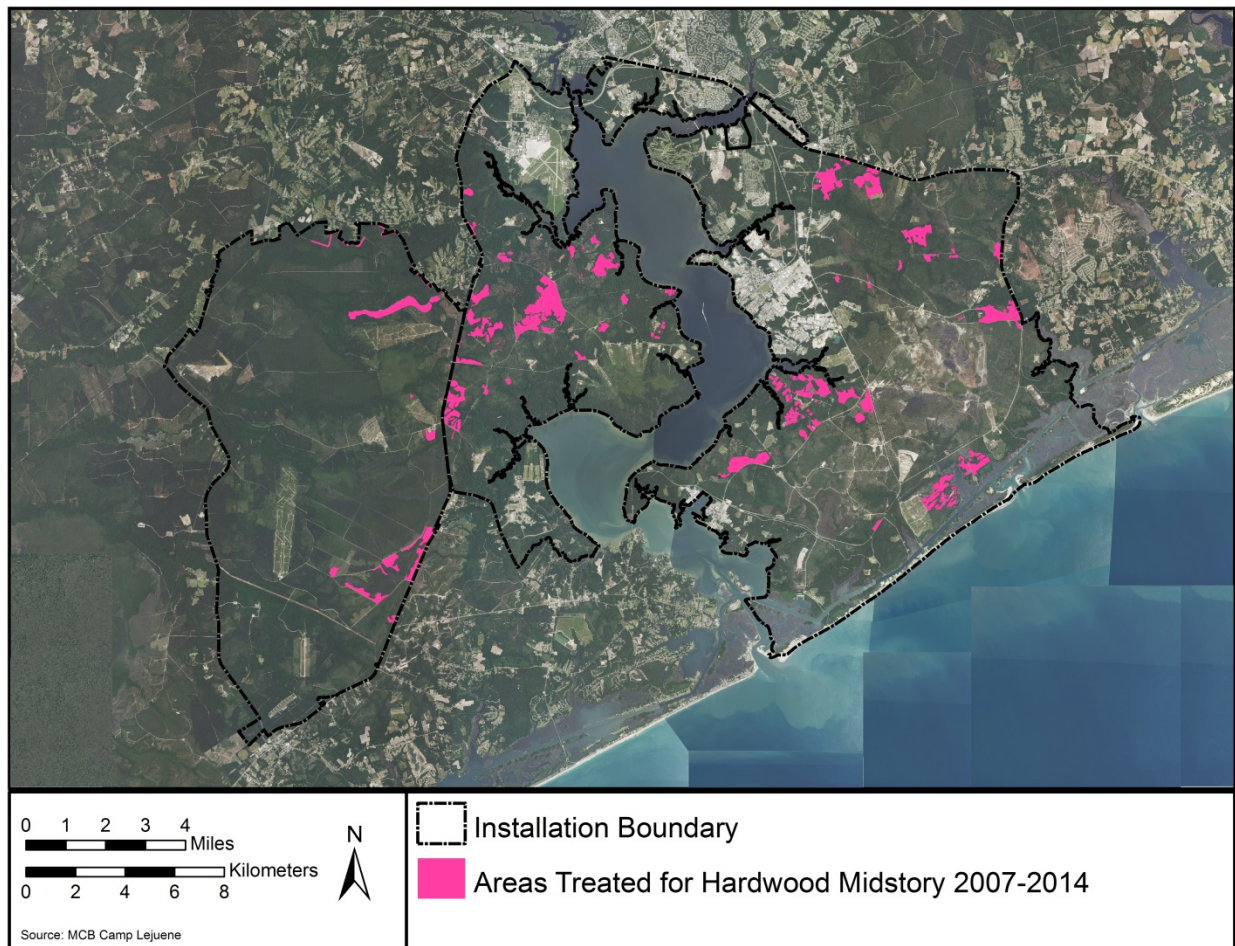


Figure 3. Areas that were treated for hardwood midstory in 2007-2013

4.0 RCW MANAGEMENT ON MCB CAMP LEJEUNE

4.1 RECOVERY GOAL

Since habitat quality in the Atlantic Coastal Plain is generally high, a density objective of one group per 200 acres of suitable habitat is commonly accepted. Based upon this ratio, and with consideration to facilities development, identified military construction projects, and constraints on silvicultural practices, the recovery goal for MCB Camp Lejeune was set at 173 active clusters in 1999. This goal remains valid for the current plan.

MCB Camp Lejeune’s RCW population is part of the Coastal North Carolina Primary Core population and shares a recovery goal of 380 active clusters with Croatan National Forest and Holly Shelter Gamelands. The active cluster goal should be sufficient to result in 350 potential breeding groups, the minimum for a recovered core population.

4.2 RCW MANAGEMENT ACRES

Red-cockaded woodpecker management acres were delineated using the modeling feature of ArcGIS 9 in conjunction with MCB Camp Lejeune’s forest stand layer and an ecological classification layer for priority convertible soils. This stand-alone model was developed by the Threatened and Endangered Species Section with help from the MCB Camp Lejeune GIS section. The parameters on the model are set to select those stands that are pine, or those that are hardwood on priority soils for longleaf conversion. Features such as ranges, drop zones, tactical landing zones, and wildlife openings are excluded from the final GIS layer. The model can be run at any time on the forestry stands to take into account stands that may be re-classified due to ongoing prescription cycles.

4.3 POPULATION MILESTONES AND REMOVAL OF RESTRICTIONS

MCB Camp Lejeune will continue to implement a system established in the 2007 INRMP, by which training restrictions are removed on clusters once population milestones are met. Milestones will start out in increments of 25 active clusters, but will become smaller as MCB Camp Lejeune approaches its recovery goal of 173 active clusters. Currently, MCB Camp Lejeune has 114 active clusters. The next milestone will be 125 clusters. The percentage of unmarked clusters will increase as each milestone is met. Milestones and percentages of unmarked clusters are as follows:

- 125 active clusters – 60% unmarked,
- 150 active clusters – 70% unmarked,
- 170 active clusters – 80% unmarked, and
- 173 active clusters – 100% unmarked.

Upon reaching the goal of 173 active clusters, MCB Camp Lejeune will have the option of removing all RCW military training restrictions. This removal of training restrictions will apply as long as the RCW population remains at or above the mission compatible goal of 173 active clusters. As MCB Camp Lejeune approaches its recovery goal, the Base may decide to exceed its recovery goal before removing all training restrictions in order to ensure a buffer against falling below the goal again.

4.4 MONITORING OF RCW POPULATION AND MILITARY IMPACTS

MCB Camp Lejeune will continue to intensively monitor all RCW clusters for activity, group composition, nesting, and fledging and will band all known RCWs. This continued monitoring will allow us to detect changes in cluster status that may result from military training or re-designation clusters as unmarked. In addition, a plan will be developed to monitor habitat effects from off-road tracked vehicle maneuver in designated corridors, including CAAC Phase 1 (BCTMC).

The RCW database at MCB Camp Lejeune is currently maintained by Virginia Polytechnic Institute and State University. MCB Camp Lejeune will continue to develop this database to track group status, cavity use, habitat improvement, treatment accomplishments and needs, cluster conditions, and population survey status. The database will be updated annually and used to set treatment priorities, report accomplishments, identify population trends, report reproductive success, and describe response to treatments.

Changes in cluster status will be tracked and updated annually. A cluster can be declared abandoned after a 5-10 year period of inactivity with the concurrence of the USFWS, and after 10 years without consultation with the USFWS. Once designated as abandoned, no further protective measures, use restrictions, or cluster management activities will apply.

4.5 MANAGEMENT ACTIVITIES

Management activities for RCWs generally can be divided into three general categories: 1) forage habitat/partition management, 2) cluster management and protection, and 3) population monitoring and management. The outline below shows specific management activities that fall within these general categories:

1) Forage Habitat/Partition Management

- a. Forest Management
 - i. Longleaf Pine Restoration
 - ii. Thinning
 - iii. Regeneration
- b. Prescribed Burning
- c. Midstory and Canopy Hardwood Control
- d. Partition-level Management

2) Cluster/Cavity Tree Management and Protection

- a. Cluster Buffer Marking

- b. Restricted Activities
 - i. Management Activities
 - ii. Training Restrictions
- c. Cavities
 - i. Maintenance of Sufficient Numbers of Cavities
 - ii. Provisioning Artificial Cavities
 - iii. Cavity Restrictors
 - iv. Protection of cavity trees from wildfire and prescribed burning
- d. Cluster Reconfiguration

3) Population Monitoring and Management

- a. Monitoring and Evaluation
- b. Translocation and Augmentation

4.5.1 Forage Habitat/Partition Management

Management of RCW habitat is carried out by MCB Camp Lejeune's Timber Management and Forest Protection Sections. Management consists of traditional silvicultural techniques, as well as actions carried out specifically for the benefit of the RCW and ecosystem in general.

Forest Management

While the practice in the past has been to treat RCW nesting habitat differently from foraging habitat, the 2003 Red-cockaded Woodpecker Plan (U.S. Fish and Wildlife Service 2003) recommends treating all habitat in a similar manner, by burning and retaining old trees across the landscape. Although special attention will be paid to nesting and recruitment stands to ensure that cavity trees are available, MCB Camp Lejeune will retain potential cavity trees in all areas that are not being restored to longleaf. Additionally, no regeneration of loblolly will take place on soils that historically supported longleaf pine.

The majority of MCB Camp Lejeune's forest is loblolly pine, most of which will be restored to longleaf pine over time. Although the goals of restoring longleaf pine to its historic range on MCB Camp Lejeune will benefit RCW in the long run, there will be short-term impacts to suitable habitat as loblolly will need to be cut in order to plant longleaf. MCB Camp Lejeune will attempt to balance this short-term conflict by emphasizing RCW habitat partitions as the primary driver of forest management. Management at the partition level will allow MCB Camp Lejeune to assess, for each RCW group or recruitment cluster, the need for habitat improvement and the acreage available for conversion to longleaf. Additionally, where feasible, MCB Camp Lejeune

will attempt to conserve old loblolly pine trees in stands that will be restored to longleaf pine. Stands that are to be restored will be assessed for experimental underplanting (i.e. planting longleaf under a sparse canopy of loblolly). The highest priorities for underplanting will be where an intact pyrogenic groundcover such as wiregrass is in place. This will have the dual benefit of conserving high-quality groundcover while ensuring that competition from loblolly regeneration can be controlled with fire in these areas. The decision to leave loblolly overstory on restoration sites will be made by managers on a case-by-case basis.

In order to support future clusters, MCB Camp Lejeune will designate RCW management partitions that each have sufficient acreage of suitable or potentially suitable habitat to support an RCW cluster. Partition acreage will be based on several factors, including habitat quality, acreage in longleaf and loblolly pine, and spatial arrangement and density of clusters. Additional acreage, beyond what is necessary to support a cluster will be included in a partition to allow for landscape flexibility for future projects and management actions, such as conversion to longleaf pine that may impact habitat quality in the short term. Where necessary, partitions may larger than 200 acres, but only if partition spacing allows for a cluster density mimicking that of natural clusters (i.e. $\frac{1}{4}$ - $\frac{3}{4}$ mile between cluster centers).

Because of the difficulty in managing for RCW habitat in the Cantonment area, emphasis will be placed on management and regeneration of loblolly pine on a shorter term rotation, as opposed to conversion to longleaf. Also, in some cases, stands will be managed to favor hardwoods.

Longleaf Pine Restoration

Longleaf pine has historically provided much of the RCW's habitat. It is estimated that before European settlement, longleaf pine may have dominated as much as 92 million acres in the Southeast; longleaf forests now comprise only about three million acres (Landers et al. 1995). Over much of the areas, longleaf pine has been replaced by other species such as loblolly, slash, and sand pines.

With the exception of GSRA, where longleaf restoration will be put on hold for the five-year period of this plan, or until plans for the GSRA Mechanized Assault Course are finalized, longleaf pine will be restored in areas of suitable soils, except where a site-specific analysis shows that short-term impacts would outweigh long-term benefits to the RCW. Figure 4 depicts longleaf pine stands on MCB Camp Lejeune and the 25,995 acres of habitat with priority soil type for restoration to longleaf pine.

As important as restoring longleaf pine is to the long-term survival and recovery of the RCW, it is important to restore longleaf in a way that minimizes any potential adverse effects to RCW. MCB Camp Lejeune will analyze each RCW partition in order to determine how best to restore longleaf in a given area. The decision to restore longleaf to a particular stand will be based on the following factors: 1) whether a partition is occupied by RCW and, if not, the expected time of

occupation, 2) amount of suitable habitat available in a given partition, 3) distance of conversion stand to a cluster, 4) age of potential conversion stand (generally, potential cavity trees will be kept, unless there is a surplus of potential cavity trees in a partition, or the age and health of a stand make it likely that potential cavity trees will die before they could be occupied), 5) the percentage of a given partition that is in loblolly pine (the higher the percentage, the greater the incentive to convert), and 6) the importance of a given stand in terms of habitat continuity (priority will be placed on stands that will not impact continuity, if cut). MCB Camp Lejeune intends to carry out longleaf restoration in a way that does not jeopardize the ability of a partition to support RCWs. For occupied partitions, this means keeping a minimum of 120 acres of contiguous, suitable habitat (though not necessarily Good Quality Foraging Habitat as defined in the 2003 RCW Recovery Plan), and for recruitment partitions, this means ensuring sufficient, contiguous habitat at the expected time of occupation. During all restoration efforts, all existing longleaf pine should be retained. This retention will expedite development of potential cavity trees.

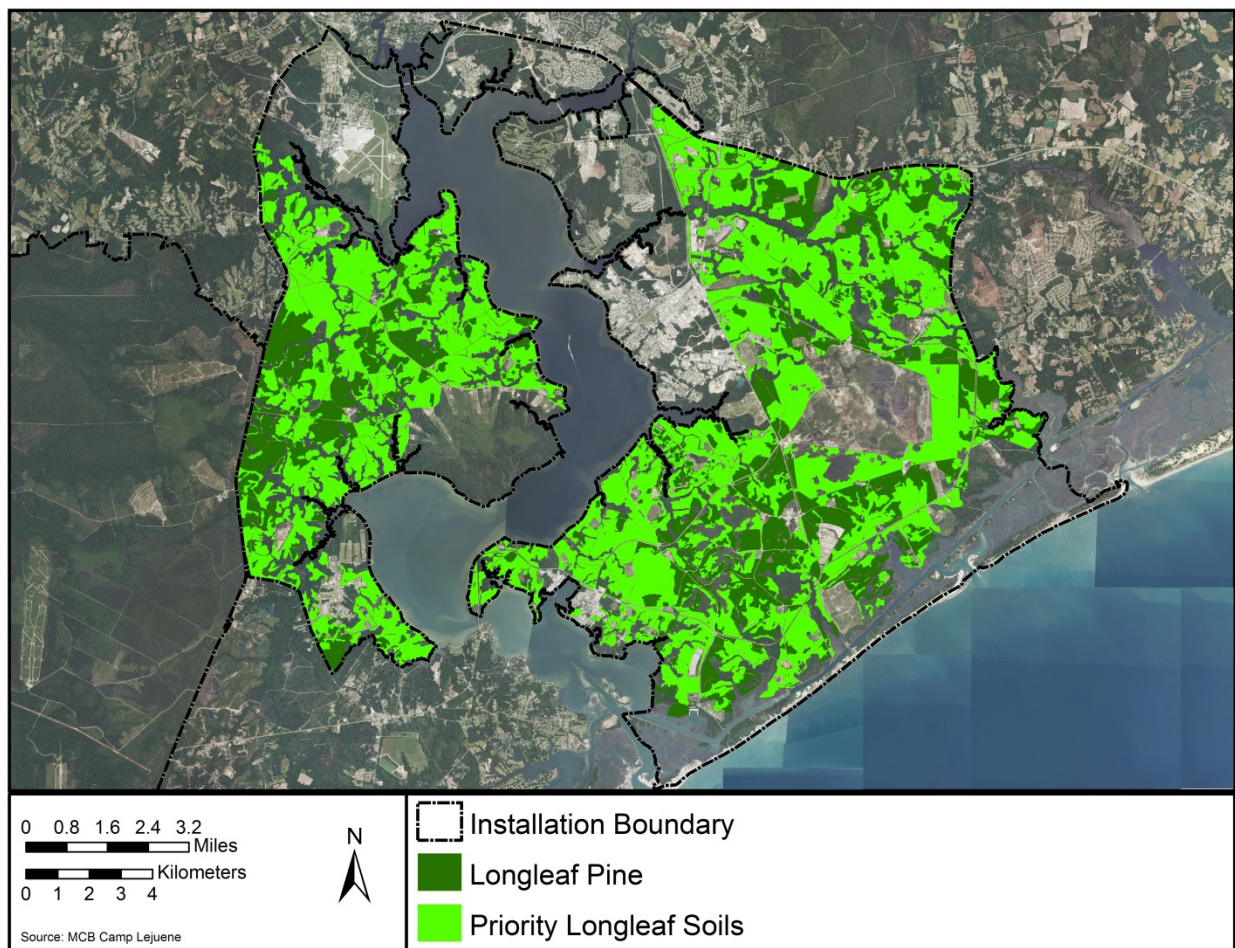


Figure 4. Longleaf Pine stands and areas of priority soil types for longleaf restoration.

Camp Lejeune recognizes the substantial task of restoring longleaf to a majority of the base while also restoring RCW. As stated above, although the goal is moving all stands toward Good Quality Foraging Habitat (GQFH), it may not be possible to reach and maintain the Recovery Standard (i.e. 120 acres of GQFG) until longleaf restoration is complete. In most cases 120 acres of suitable (i.e. habitat that at least meets the Managed Stability Standard) habitat is a realistic goal during the restoration process.

In restoring longleaf to the landscape, MCB Camp Lejeune will employ several methods, with the intent of converting loblolly stands in the most efficient manner, while retaining habitat value for RCW when necessary. Below are options that MCB Camp Lejeune will use for longleaf restoration:

- Conversion of offsite species to longleaf pine
 - Clearcut (When determining the size of clearcuts, several factors will be considered, including proximity to active RCW clusters, available foraging acres within a given RCW partition, and proximity to loblolly stands that could seed into the stand.)
 - Modified clearcut leaving 6-10 residual trees per acre
 - Underplanting longleaf seedlings while leaving 40 ft² of basal area of loblolly overstory

- Thinning (non-cantonment areas)

When thinning mature stands (greater than 10 inches dbh), MCB Camp Lejeune will maintain pine basal area of 60 square feet per acre, depending on site and stand condition. The priorities for selecting pine trees to remain after thinning, from high to low priority, are:

- Relict trees
- Trees greater than 14 inches dbh and/or greater than 60 years old
- Trees greater than 10 inches dbh
- Trees less than 10 inches dbh

In short, MCB Camp Lejeune will thin pine stands “from below” in order to move the habitat closer to a good quality condition.

In stands where pine trees are less than 10” dbh, a number of intermediate thinning methods may be used, including pre-commercial thins, crown thins, and leave tree thins. Generally, in less than 10” stands, the basal area of remaining trees will be higher than 60 ft² per acre.

There may be rare cases where loblolly stands with mixed ages may be thinned of older, potentially senescing trees, in order to preserve nesting habitat and extend the life of the stand.

- Silvicultural Techniques for Natural Regeneration (non-cantonment areas)

MCB Camp Lejeune will emphasize natural regeneration methods and prescribed fire as the primary seedbed preparation method, where site conditions allow. However, in regenerating stands containing high concentrations of competing hardwood species, herbicides such as Velpar, Arsenal, or Garlon may be used to reduce or eliminate these competing species.

In longleaf pine stands, options for regeneration consist of modified shelterwood (i.e. two-aged management), and single-tree or group selection (i.e. uneven-aged management). Longleaf regeneration will not occur in a particular compartment until all of the high-priority conversion soils have been restored to longleaf pine in that compartment. These methods are explained below:

- *Modified Shelterwood—The residual seed source in a shelterwood cut should be left to a basal area of 30-40 square feet/acre of the best dominant or co-dominant longleaf pines in the stand. Under the modified shelterwood method, 40 square feet of pine basal area remains. The overstory will not be removed, thus allowing the stand to be utilized as RCW foraging habitat. The shelterwood cut is followed by adequate site preparation to ensure seeds have access to mineral soil. Prescribed fire will be the primary method of site preparation.*
 - *Single-tree or Group Selection Cut for longleaf pine—Single or small groups of mature trees are uniformly removed across a stand. This harvest is designed to imitate natural openings such as lightning strikes or wind events. The resulting small openings will provide areas for regeneration with minimal impact to the overall structure of the stand. The preferred outcome of successive cuts is an uneven-aged stand that is continually regenerating while providing ample older growth for habitat needs.*
- Although we do not intend to regenerate loblolly stands that are on longleaf soil, in areas managed for RCW, if there was a need to do so, they would be regenerated similarly to longleaf stands, with two-aged, or uneven-aged management. Cantonment Areas

The management of forestland located in cantonment areas presents unique management opportunities. Prescribed burning is a key management tool used in the forests of MCB Camp Lejeune for maintaining longleaf pine ecosystem health. However, because of smoke management issues, MCB Camp Lejeune is unable to prescribe burn timber stands that are intermingled with urban areas such as busy highways, schools, housing and

industrial complexes. Additionally, much of these areas are expected to be developed in the future, which will further increase fragmentation. In these areas MCB Camp Lejeune will emphasize management for mast producing hardwoods and loblolly pine. There will be no longleaf restoration in the cantonment area. Below are options that will be used in cantonment compartments:

- *Pine thins for loblolly leaving more than 60 sq ft basal area of pine may be utilized*
- *Seedtree cuts that allow for removal of residual trees*
- *Pine Only Thin—An intermediate harvest in a stand to improve hardwood mast production in hardwood stands with less than 30% pine component*
- *Pine Removal—An intermediate harvest, where all pines are removed, in a stand to improve hardwood mast production in hardwood stands with less than 30% pine component*

Southern Pine Beetle (SPB) Suppression

MCB Camp Lejeune will attempt to minimize the impact of SPB to cavity trees and foraging habitat. When RCW clusters, recruitment stands, and replacement stands are threatened by infestation, the following standards apply:

- Prohibit cutting of trees already vacated by beetles unless they pose a threat to public safety.
- Allow cutting of inactive or relict cavity trees, if infested, within a designated treatment buffer zone only to protect the rest of the cluster.
- Allow cutting of uninfested trees within 200 feet of a cavity tree only to protect cavity trees.
- Prohibit cut and remove operations within 200 feet of cavity trees during nesting season.
- Prohibit the use of the pile and burn control technique within clusters.

Prescribed Burning

The open structure of longleaf pine forests preferred by the RCW was historically maintained by periodic fires. Over most of the RCW's range, these fires occurred during the growing season, although natural fires did occur year-round. Continued use of fire, through an intensive prescribed burning program, is critical to the survival and recovery of the RCW.

Prescribed burning will be conducted on a cycle of two to five years to aid in control of midstory vegetation within clusters and recruitment stands. Outside these areas, MCB Camp Lejeune will annually prescribe burn acreage sufficient to maintain quality forage habitat and may require

burning whenever conditions permit. MCB Camp Lejeune will use natural firebreaks (streams, swamps, lakes, etc.) wherever possible to reduce the impact from constructing fire lines.

MCB Camp Lejeune will continue to protect cavity trees by raking or back burning adjacent fuels. When necessary, plow lines will be placed beyond 200 feet of cavity trees to prevent root damage unless needed to protect the cavity trees during an emergency or if site specific circumstances such as location of property boundary etc., dictate the need to locate them closer.

Midstory and Canopy Hardwood Control

Since RCWs prefer to nest and forage in habitat with little to no hardwood midstory, the control of midstory can have a dramatic effect on habitat quality. Prescribed burning is generally the best way to control midstory vegetation, especially small hardwoods. However, fire cannot control larger hardwoods (usually greater than two inches in diameter) that are common in stands where fire has been excluded for several years or where dormant season burns have been ineffective. These larger hardwoods can be eliminated by:

- Mechanical methods using a feller buncher, or hydro-ax/mower;
- Manual methods using a chain saw, brush hooks, etc.;
- Herbicides applied by injection, hypo-hatchet, hand sprayer, etc.; or
- A combination of these methods.

In 2004, MCB Camp Lejeune purchased a hydro-ax with a mowing head capable of taking down hardwoods up to 8 in dbh. With this machine, MCB Camp Lejeune intends to treat 600 acres/year for hardwood and midstory. In stands with RCW clusters, MCB Camp Lejeune will practice midstory control over at least 10 acres for each cluster. The treatment should eliminate all hardwood midstory trees within a 50-foot radius of all active and inactive cavity trees, and should leave no more than 10% of the canopy trees in hardwoods. Midstory management in nesting and foraging areas will be conducted to approximate good-quality habitat for this parameter, which is no hardwood midstory or sparse midstory less than 7 feet in height. Additionally, canopy hardwoods, after management, will not exceed 10% of the number of trees. Pine midstory should be controlled before the trees block access to cavity trees, potential cavity trees, and line-of-site between them. However, the pine midstory (usually sapling and pole size trees) needed to replace the stand must be preserved.

Areas outside clusters and recruitment stands will be targeted for mechanical treatment if they do not meet the standard for good-quality habitat for hardwood midstory. Stands needing treatment will be identified during the RCW habitat survey and subsequent timber prescription surveys. Priority for hardwood/midstory management will be given in the following order: 1) active clusters, 2) inactive clusters and provisioned recruitment clusters, 3) future recruitment stands, and 4) foraging habitat. The goal of mechanical management is twofold. First, mechanical

hardwood/midstory management can, in a very short amount of time, turn unsuitable habitat into suitable habitat for RCWs. Second, mechanical management will open up areas to prescribed burning that previously had been too dangerous to burn because of the potential for crown fire. MCB Camp Lejeune will still emphasize prescribed burning as the primary tool to accomplish hardwood/midstory management on a landscape scale, except in areas where smoke management poses a significant health and safety problem. Emphasis should be placed on growing season burning, thereby approximating natural conditions historically prevalent over much of MCB Camp Lejeune. After the midstory vegetation is controlled, prescribed burning during other seasons can be used infrequently.

MCB Camp Lejeune will prioritize and schedule maintenance burns for those clusters, recruitment, and replacement stands having already received initial treatment to eliminate midstory. Maintenance would receive priority to ensure previous investments in initial midstory control are not lost.

Partition Level Management

The decision to treat RCW partitions as management units represents a major shift in focus for forest management on MCB Camp Lejeune. MCB Camp Lejeune will continue to focus greater attention to RCW management needs at the level of individual clusters. The objective of partition-level management for RCW is to ensure that each partition has sufficient suitable habitat and maximize available good quality habitat available to each RCW cluster. Restoration of longleaf may create near and midterm exceptions to the continual improvement guideline, but will improve habitat over the long term. In loblolly dominated partitions, the recovery standard of 120 acres of GQFH may not be achieved until after longleaf restoration is complete. However, 120 acres of suitable foraging habitat will be a goal during restoration.

Under partition management, forestry compartments will continue to be treated on a 10-year prescription cycle (see Chapter 4). Partitions will be assessed on the compartment schedule, with some exceptions. Partitions in urgent need of management, such as those expected to be occupied by RCWs in the short term, will be addressed outside of the 10-year prescription cycle. Although partitions may overlap stand and compartment boundaries, most forest management will be prescribed at the stand level. Forest management will be consistent with all recommendations in the 2003 RCW Recovery Plan with respect to size of clearcuts and acceptable silvicultural techniques.

Red-cockaded woodpecker partitions are defined as habitat allocated to existing clusters or recruitment sites. Ideally, RCW foraging partitions are determined based on home-range follows of RCW groups (USFWS 2003). However it may not be practical, especially for large populations, to get home-range data for all clusters. Where home-range data is not available for existing clusters, partitions will be delineated according to the 2003 RCW Recovery Plan. Partitions consist of habitat within ½ mile of the cluster center, but not further than half the

distance to the nearest clusters or recruitment sites. Where clusters are closer than 1 mile to each other or to a recruitment site (i.e. ½ mile circles would overlap), the partition boundary will be half way between cluster or recruitment site centers (Figure 5). Partition boundaries may overlap forest stand and compartment boundaries.

Recruitment partitions will be delineated as described above, but they will be centered on recruitment site points rather than existing clusters. Forest stands suitable for recruitment sites were initially determined by Dr. Jeff Walters of Virginia Polytechnic Institute (VPI). Since then, MCB Camp Lejeune staff have examined the recruitment sites and revised accordingly.

The major factor in determining whether or not these sites were suitable was tree age, as well as their suitability for establishment of artificial (drilled) cavities; however, if necessary, insert cavities will be used to maintain population growth. Recruitment partitions will contain sufficient acreage of suitable or potentially suitable foraging habitat to support a cluster and to allow for management activities and landscape flexibility. Partitions will typically contain less than or equal to 200 acres of suitable or potentially suitable RCW habitat. Partitions will not be so large as to create an unnatural density of spacing of RCW clusters. Suitable foraging habitat is defined as pine habitat at least 30 years old with minimal hardwood midstory. Potentially suitable habitat includes pine habitat less than 30 years old, pine habitat with dense hardwood midstory, and hardwood stands on soil types that can support pine habitat.

Partitions will be evaluated on at least 3 levels. Partitions will be assessed for currently suitable habitat, potentially suitable habitat in need of management to improve quality (i.e. thinning or midstory control), and the acreage and age of offsite species (i.e. loblolly or hardwoods on longleaf soil types) that may be potentially available for conversion to longleaf pine. This assessment will allow managers to improve habitat where necessary, while also determining what a partition can support in terms of conversion to longleaf. In partitions dominated by loblolly pine, the need to convert to longleaf will be balanced with the need to move toward good quality habitat. In no case will management actions cause suitable habitat to drop below 120 contiguous acres in partitions that support an active cluster. In partitions with less than 120 acres, management actions will not reduce the amount of suitable habitat, unless necessary to restore longleaf pine. In such cases the Standard for Managed Stability will be the requirement.

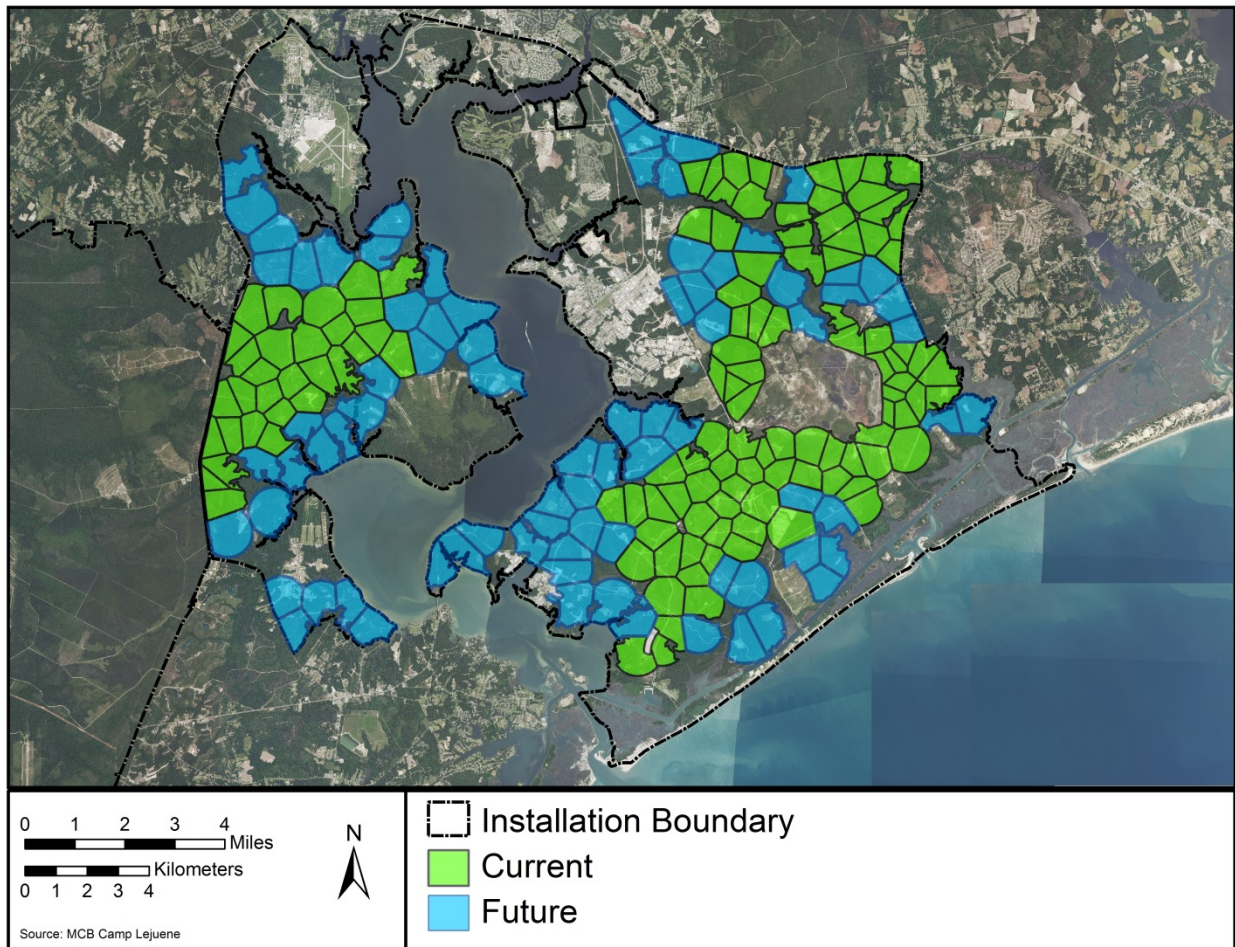


Figure 5. Map showing existing and future RCW foraging partition boundaries

In the event there are exceptions to these guidelines, MCB Camp Lejeune will consult with the USFWS and will consider the managed stability standard of 75 acres to avoid incidental take. If an existing partition is less than 120 acres but contains loblolly pine, various techniques for restoring longleaf pine may be used. Techniques include, but are not limited to, underplanting (while maintaining the minimum 40 ft² basal area), or using very small patch clearcuts (i.e. 2 acres or less). These techniques would serve to maintain relatively contiguous RCW habitat while moving toward the long-term goal of restoring these areas to longleaf pine. Figure 5 shows existing and potential future RCW partitions for the Verona Loop and Mainside of Base.

If a partition contains all longleaf, MCB Camp Lejeune will manage in an uneven-aged or two-aged manner while retaining a minimum of 40 ft² of basal area, thereby maximizing potentially suitable RCW habitat and landscape flexibility. Regardless of the management practice, MCB Camp Lejeune will retain potential cavity trees for all harvests intended to promote natural regeneration.

In recruitment partitions, management actions will help ensure that partitions will have at least 120 acres of suitable habitat by the time of occupation. Management recommendations for partitions may vary based on whether a partition is occupied, proximity to existing clusters, and expected time of occupation. Generally, the conversion acreage per partition will be determined by the percent of that partition in loblolly, and the age of loblolly stands. In practicing partition-level management, MCB Camp Lejeune will employ a number of different management strategies, all of which are consistent with the 2003 RCW Recovery Plan. Management decisions for a given partition will depend on the quality of habitat within a partition, acreage of suitable habitat, time to expected occupation, and the need for landscape flexibility. Managers will use varying techniques in order to most efficiently promote high-quality habitat, while simultaneously restoring longleaf to the landscape.

Recruitment Stands

As part of the 1999 plan MCB Camp Lejeune designated potential recruitment stands, recruitment stands are designated to provide potential nesting habitat for RCW population expansion. The selection criteria include:

- Nesting suitability considering stand age, forest type, and availability of relicts. The oldest available stands or younger stands with sufficient relicts should be selected. Portions of timber stands containing inactive clusters may be designated as recruitment stands. Midstory should be controlled, and recruitment stands may be improved by installing artificial cavities.
- Distance to a cluster. Recruitment stands should lie within 1/4 mile to 3/4 mile from a cluster or other recruitment stands to ensure good spatial distribution and increase probability of colonization.
- Adequate suitable foraging habitat connected to the cluster or recruitment stand.

4.5.2 Cluster/Cavity Tree Protection

This section discusses management actions taken to maintain and protect cavity trees and clusters in order to preserve and enhance a given cluster's ability to support an RCW group.

Cluster Buffer Marking

The area where training restrictions occur due to RCW will encompass a zone extending 200 ft out from the perimeter of a polygon created by the outermost cavity trees. These buffer zones will be marked by painting perimeter trees with white bands approximately one foot wide, four to six feet from the base of the tree. Warning signs 12 inches x 12 inches are posted at reasonable intervals facing to the outside of clusters along roads, fire breaks, and other likely entry points into clusters. The warning signs include an RCW graphic and the lettering 'Endangered Species

Buffer Zone’ printed in black. Square signs include the lettering ‘Restricted Area Endangered Species Site’ or ‘No Vehicles Allowed’ printed in reflective red. Potential points of entry along roads, tank trails, and fire breaks are also marked by trees with single white bands indicating that the adjacent area is subject to training restrictions.

MCB Camp Lejeune will continue to mark cavity trees and delineate cluster buffer zones to reduce the risk of accidental damage. MCB Camp Lejeune will be required to know where the cavity trees are located on the ground to consistently apply the protective standards and guidelines and to monitor the cluster. All active and inactive cavity trees will be checked whenever a cluster is visited. The boundaries of clusters or recruitment stands with cavities (active or inactive) must be marked. The marking of cluster boundaries may be temporary (signs) or continue as permanent (paint).

Protection of Cavity Trees from Fire

To protect RCW cavity trees from prescribed burning and wildfires, Threatened and Endangered Species staff brushcut and rake vegetation away from the base of cavity trees to a distance of at least 12 feet, creating a circle of bare ground around each cavity tree that may be vulnerable to burning. Circles will be larger in areas with tall vegetation.

Restricted Activities

Management Activities - Because RCW groups are vulnerable to disturbance within the cluster, and because habitat degradation may cause abandonment of a cluster, special attention is taken to avoid abandonment, and to avoid take due to military training and habitat management activities. Following are measures taken to protect RCW clusters from disturbance due to training, habitat management activities, or habitat degradation.

MCB Camp Lejeune will require all potentially disturbing forestry activities within clusters to be scheduled before or after the nesting season (April through June). Habitat improvement activities within clusters will also be restricted during the nesting season, unless such activity during the nesting season is necessary for the continued survival of the RCW group. Timber harvest, cutting, or killing of trees within clusters and recruitment stands is not allowed (except where those actions are necessary to protect human health or safety or protect or improve RCW habitat). Snags or other dead trees will not be removed unless they pose a threat to public safety. An exception to this limitation is prescribed burning, which may be allowed.

Cavity trees in active and inactive clusters will not be cut unless they pose a threat to public safety, or to protect the cluster, recruitment stand, and replacement stand from insect attack. Additionally, range or facilities development projects may result in the need to cut cluster trees. No cavity trees will be cut without first consulting with the USFWS.

Training Restrictions - With the 2007 plan, MCB Camp Lejeune adopted the 1996 U.S. Army guidelines (U.S. Army Construction Engineering Research Laboratories, 1997) for RCW cluster protection. MCB Camp Lejeune will continue to maintain a 200 foot buffer on all marked clusters. In addition, there is a secondary 50 foot buffer around cavity trees. The 50 foot cavity tree buffer will not be marked, but it will be estimated by Marines in the field. In general, restrictions are designed to reduce the amount of time spent within the painted cluster buffers, as well as noise and damage to tree roots. In all cases, occupation of RCW cluster buffers is not to exceed 2 hours. Below is a list of activities permitted within marked RCW cluster buffers:

- Digging of individual fighting positions /hasty defense, hand digging only – filled after use
- Transit through cluster on foot or in wheeled or tracked vehicle – Vehicles may not get closer than 50 ft (estimated by operator) to marked cavity trees, unless on existing roads, trails, or firebreaks.
- Vehicle maintenance not to exceed 2 hours
- Firing of blanks 7.62 and smaller
- Artillery, grenade and mine simulators, smoke grenades, star clusters/parachute flares

A complete list of training activities permitted and prohibited within the 200 foot and 50 foot buffer is provided in Table 1.

Table 1. Permitted and Prohibited Activities Within Marked RCW Buffer Zones.

TRAINING ACTIVITY WITHIN MARKED BUFFER ZONES	Permitted
MANEUVER BIVOUAC:	
HASTY DEFENSE, LIGHT INFANTRY, HAND DIGGING ONLY, 2 HOURS MAX	YES
HASTY DEFENSE, MECHANIZED INFANTRY/ARMOR 24 HOURS	NO
DELIBERATE DEFENSE, LIGHT INFANTRY 48 HOURS	NO
DELIBERATE DEFENSE, MECHANIZED INFANTRY/ARMOR	NO
ESTABLISH COMMAND POST, LIGHT INFANTRY 36 HOURS	NO
ESTABLISH COMMAND POST, MECHANIZED INFANTRY/ARMOR 36 HOURS	NO
ASSEMBLY AREA OPERATIONS, LIGHT INFANTRY/MECH INFANTRY/ARMOR	NO
ESTABLISH CS/CSS SITES	NO
ESTABLISH SIGNAL SITES	NO
FOOT TRANSIT THROUGH THE COLONY	YES
WHEELED VEHICLE TRANSIT THROUGH THE COLONY *	YES
ARMORED VEHICLE TRANSIT THROUGH THE COLONY *	YES
CUTTING NATURAL CAMOUFLAGE, HARDWOOD ONLY	YES

TRAINING ACTIVITY WITHIN MARKED BUFFER ZONES	Permitted
ESTABLISH CAMOUFLAGE NETTING	NO
VEHICLE MAINTENANCE FOR NO MORE THAN 2 HOURS	YES
WEAPONS FIRING:	
7.62 AND BELOW BLANK FIRING	YES
.50 CAL BLANK FIRING	NO
ARTILLERY FIRING POINT/POSITION	NO
MLRS FIRING POSITION	NO
ALL OTHERS	NO
NOISE:	
GENERATORS	NO
ARTILLERY/HAND GRENADE SIMULATORS	YES
HOFFMAN TYPE DEVICES	YES
PYROTECHNICS/SMOKE:	
CS/RIOT AGENTS	NO
SMOKE, HAZE OPERATOINS ONLY, GENERATORS OR POTS**	YES
SMOKE GRENADES	YES
INCENDIARY DEVICES TO INCLUDE TRIP FLARES	NO
STAR CLUSTERS/PARACHUTE FLARES	YES
HC SMOKE OF ANY TYPE	NO
DIGGING:	
TANK DITCHES	NO
HASTY INDIVIDUAL FIGHTING POSITIONS, HAND DIGGING ONLY, FILLED AFTER USE	YES
DELIBERATE INDIVIDUAL FIGHTING POSITIONS	NO
CREW-SERVED WEAPONS FIGHTING POSITIONS	NO
VEHICLE FIGHTING POSITIONS	NO
OTHER SURVIVABILITY/FORCE PROTECTION POSITIONS	NO

* Vehicles will not get any closer than 50 ft of a marked cavity tree unless on existing roads, trails, or firebreaks.

** Smoke generators and smoke pots will not be set up within 200 ft of a marked cavity tree, but the smoke may drift through the 200ft cluster buffer.

4.5.3 Management in Support of Training Projects in RCW Habitat

Threatened and endangered species managers will participate in the range development process to help avoid and minimize impacts on RCW clusters and foraging habitat. Future projects and alternatives, including the Beach to Combat Town Maneuver Course (BCTMC) (Phase 1 of the

Combined Arms Amphibious Assault Course), will be evaluated for relative impacts and potential mitigation measures.

Where possible, RCW management will focus on areas not designated for future projects, and/or management will be done in a way that minimizes potential conflicts. Where impacts to current or future habitat are unavoidable, RCW managers can mitigate impacts through strategic placement of artificial cavities and recruitment clusters.

In areas planned for future RCW clusters, RCW managers will place recruitment clusters in ways that minimize future conflicts. Areas without active clusters have ample flexibility in terms of placement of the cavity trees and acreage of foraging partitions, which allows for avoidance of conflicts with known training priorities. As much as possible, MCB Camp Lejeune RCW managers will seek to manage habitat in a way that avoids conflicts with known future projects.

Where impacts to existing clusters are unavoidable, artificial cavities can be used to replace lost cavities or to shift nesting activity away from areas of high-intensity training. MCB Camp Lejeune has achieved some success in minimizing the loss of clusters due to the G-10 Range Transformation by installing replacement clusters near clusters that were removed for new ranges. In an effort to assess impacts of mechanized training in RCW habitat, a habitat monitoring plan will accompany future training corridor projects like the BCTMC. MCB Camp Lejeune will proceed in its development of the Beach to Combat Town maneuver corridors with the assumption that off-road tactical vehicle and tracked vehicle maneuver is not compatible with RCW management practices. The period of this INRMP will be used to monitor and evaluate RCW responses to off-road maneuver to validate or invalidate this assumption.

Management of GSRA

In GSRA, MCB Camp Lejeune will suspend planting longleaf pine, and management aimed specifically at RCW habitat improvement will be put on hold pending completion of the planning/design process for the GSRA Tactical Vehicle Maneuver Course or at the end of the five-year INRMP period, whichever comes first. Prescribed burning for ecosystem restoration and general habitat improvement will continue on GSRA during the interim planning period, and MCBCL will continue to implement timber stand improvement projects to increase productivity and reduce fuel levels.

This plan and its associated Biological Assessment establishes an agreement with the USFWS that any new threatened and endangered species appearing in GSRA as a result of beneficial fire management and other natural resource management effects will not result in additional constraints on training or range development. This agreement reaffirms an agreement already in place for RCW and essentially pre-approves incidental take to any new occurrence of a listed species in GSRA, above the baseline. The baseline for RCW is zero clusters. This will apply to all training activities and range development projects, as well as any supporting infrastructure

and facility development projects. All consultation requirements associated with this agreement will be completed during the USFWS INRMP review and approval process. Subsequent to the INRMP consultation, any RCW (or other listed species) that appear as a result of prescribed fire or other habitat management activities can be taken without further USFWS approval or consultation. MCB Camp Lejeune will notify USFWS of any incidental take, potentially in annual INRMP update reports.

4.5.4 Population Monitoring and Management

Monitoring and Evaluation

- 1) Since 1986, MCB Camp Lejeune has carried out an annual population-monitoring program in conjunction with North Carolina State University and recently with Virginia Polytechnic Institute and State University. MCB Camp Lejeune will continue its population-monitoring program on a contract basis, using the following protocol:
- 2) All recruitment clusters, if unoccupied at the end of the breeding season, will be checked for occupancy again at the end of the 2014 breeding season.
- 3) All known woodpecker cavity trees on the base will be visited and data on activity recorded. New excavations (starts) will be located. GPS locations will be taken for all new trees and added to the existing GIS cavity tree data layer maintained by MCB Camp Lejeune. A complete inventory of cavity trees and their current status will be maintained.
- 4) All clusters will be evaluated to determine the number of high quality cavities and the number of unenlarged cavities.

Population Monitoring

RCW breeding season monitoring will include the following work, as appropriate, based on the time of year and on current status of each cluster or nest:

- 1) The activity status of all known RCW clusters will be determined. Status categories to be used are inactive, occupied by a breeding group, occupied by a solitary male, and captured (used for roosting by a bird from a group whose primary residence is another cluster).
- 2) All active clusters will be checked for breeding activity. Active trees will be visited every 7-9 days to check for the presence of a nest. When nests are discovered, nestlings will be banded 6-10 days after hatching, and the group will be followed after fledging to determine which of the banded young fledged.
- 3) All RCWs on the base will be identified from auxiliary markers. The identity and social status of all group members will be determined by following groups or by censusing

groups coming to roost in the evening. Group size and group composition will be recorded. These observations will be used to separate active clusters into those occupied by a breeding group, those occupied by a solitary male, and those that are captured (see b). Any unbanded adult Red –cockaded woodpeckers will be captured and marked with USFWS bands and auxilliary bands that will permit subsequent visual identification of individuals.

- 4) Whenever population monitoring reveals indicators of new, unknown clusters such as territorial conflicts in an area where none occurred previously, or the repeated appearance of unbanded birds in a particular area, that area will be surveyed for unknown clusters. Any clusters discovered will be included in all tasks described above.

Artificial Cavities/Provisioning

MCB Camp Lejeune will use the procedures and methods specified by Taylor and Hooper (1991) and Allen (1991) to construct or install artificial cavities in suitable trees. Three provisioning methods will be used including start holes, drilled cavities, and insert boxes. Only individuals experienced in the respective techniques will install artificial cavities in suitable trees. Midstory vegetation must be controlled in conjunction with installation of artificial cavities. MCB Camp Lejeune will prioritize and schedule installations to provide cavities where they are needed most. To the maximum extent practicable, MCB Camp Lejeune will provision artificial cavities in areas using the following priorities:

- 1) Active clusters with a single cavity
- 2) When needed to support augmentation of single bird groups
- 3) Active clusters with fewer than four usable cavities
- 4) Recruitment clusters necessary to accommodate anticipated annual growth

To promote population growth, MCB Camp Lejeune will provision recruitment clusters at a rate greater than or equal to 10% of the number of active clusters, as recommended in the 2003 RCW Recovery Plan. Provisioned cavities within recruitment stands will be assigned as either a research or control site when first established. Although management focus will be directed toward the establishment of recruitment clusters through artificial provisioning, it is recognized that additional RCW clusters will be added through natural population expansion (i.e. budding and pioneering).

Cavity Restrictors

Cavity restrictors are metal plates with an oblong hole large enough for the RCW to enter the cavity. Cavity restrictors are placed around cavity entrances to prevent other birds (especially pileated and red-bellied woodpeckers) and mammals from enlarging them and displacing the

RCW (Carter et al. 1989). Cavity restrictors should be placed on enlarged RCW cavities and on unenlarged cavities where experience shows cavity enlargement is likely. The highest priority is active clusters that have a single cavity tree followed by single bird groups, then those clusters with two to four suitable cavities, and five to eight cavities.

Evaluation of Demographic and Population Response to Management

The primary metric for evaluating effectiveness is population growth, measured in terms of number of potential breeding pairs that can be calculated from the population monitoring data. The second metric assessed is breeder survival. Survival of other status classes (helpers, fledglings) is affected by dispersal opportunities, and thus is expected to change under the Management Plan due to the increased dispersal opportunities resulting from recruitment cluster construction. Breeders seldom disperse (virtually never in the case of males), and thus their survival better reflects habitat conditions. Productivity may also be affected by habitat conditions, but its annual variation, driven by climatic conditions, is so great that detecting habitat effects is difficult. The strategy will be to compare population growth rate and breeder survival to previous values to test the hypothesis that the Management Plan will maintain or increase these parameters. Evaluation will include the following activities:

- 1) Measure population growth between breeding seasons.
- 2) Measure male breeder and female breeder survival from each breeding season to the next.

Translocation and Augmentation

Translocation involves relocating RCWs from one cluster to another. Augmentation, where a single RCW (usually a subadult male) is moved from one cluster to a cluster harboring a solitary bird, is one translocation option. Translocation can also involve relocation of one or more subadult RCWs to an inactive cluster or a recruitment cluster.

Translocation and augmentation may be conducted on MCB Camp Lejeune when deemed necessary to create potential breeding groups, and when deemed necessary to accelerate dispersal to unoccupied clusters. As explained above, priorities will be based on the spatial distribution of existing groups and the probability of natural dispersal of subadult RCWs being successful.

5.0 HABITAT INVENTORY

MCB Camp Lejeune will conduct an inventory of land managed for RCW on Mainside MCB Camp Lejeune. This inventory will use the criteria for good quality habitat, outlined in the 2003 Recovery plan, as a basis for the inventory. The habitat inventory will be based on the following criteria:

- 1) Number of pine stems > 60 years of age and >14 inches dbh
- 2) Basal area of pines 10-14 in dbh
- 3) Basal area of pines < 10 in dbh
- 4) Basal area of all pines > 10 in dbh
- 5) Groundcover % in native bunch grasses and/or native fire-tolerant, fire-dependent herbs
- 6) Density and height of hardwood midstory
- 7) By number of trees, % of canopy in hardwood species

This survey will provide MCB Camp Lejeune with data necessary to direct growth of the RCW population, assess impacts for Section 7 consultations, and provide a baseline against which the success of management efforts can be compared.

6.0 LITERATURE CITED

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Appendix 7:

MCB Camp Lejeune

Wildland Fire Management Plan

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FINAL

WILDLAND FIRE MANAGEMENT PLAN

January 2009



Marine Corps Base Camp Lejeune
Onslow County, North Carolina



EXECUTIVE SUMMARY

The purpose of the Marine Corps Base Camp Lejeune (MCB CamLej) Wildland Fire Management Plan (WFMP) is to help ensure safety, protect resources, and achieve the resource management goals and strategies as defined in the installation Integrated Natural Resources Management Plan (INRMP). This document describes in detail the installation wildland fire management program, activities, and methods that will be utilized to meet established safety, habitat, and land management objectives.

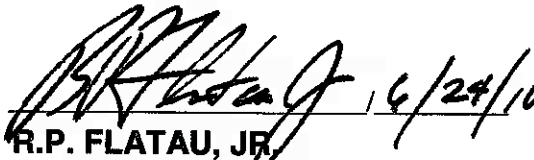
Fire is an important part of the natural environment at MCB CamLej. Fire is used as a land management tool to reduce wildfire hazard on range and training areas and in other sensitive areas of the installation. Fire is also critical to the survival of fire-dependent species, many of which are threatened, endangered, or declining in numbers due to a disruption of the historic fire regime. Although fire has a natural and beneficial role in the ecosystems of MCB CamLej, all wildland fire will be managed according to installation natural resource management goals and the many interagency, Department of Defense, Marine Corps, and installation policies.

Interagency cooperation is a key component of wildland fire planning and operations. This WFMP incorporates the guidelines and principles established by interagency fire management groups such as the National Wildland Fire Coordination Group, National Fire Protection Association, and the National Interagency Fire Center. In addition, wildland fire management information and procedures established by the land management agencies of the United States Department of the Interior (Fish & Wildlife Service, National Park Service, Bureau of Land Management) and the Department of Agriculture (Forest Service) are incorporated into the fire management program at MCB CamLej.

This is especially true of wildland fire assessment of preparedness at the installation. Natural fuels at MCB CamLej are discussed and mapped to aid in the assessment and understanding the fire danger of the installation and to aid in fire management decisions. Operational preparedness planning at MCB CamLej identifies actions, resources, weather, fuel, and other key indicators that may prompt preparedness actions.

The WFMP also outlines wildland fire management strategies and the equipment, personnel, and training needed to safely and effectively implement these strategies. The over-riding appropriate wildland fire management strategy is based on the well-being and safety of suppression and installation personnel and residents; beyond safety, the appropriate strategy is based on the military mission.

As part of the approval of this plan, the Supervisor, Forest Protection Section, Environmental Conservation Branch, Environmental Management Division, is designated as the Wildland Fire Program Manager for MCB CamLej.


R.P. FLATAU, JR.
Commanding Officer



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 - C. NFPA 1143-09
 - D. NFPA 1144-02
 - E. NFPA 1710-04
 - F. NFPA 1977-05

2. **NIFC Documents**
 - A. 2008 Red Book
 - B. Prescribed Fire Resources
 1. NIFC 2008 Interagency Prescribed Fire Planning and Implementation Procedures Guide
 2. NIFC Prescribed Fire Complexity Analysis Worksheet
 3. PMS 421 Prescribed Fire Go/No-Go Pre-Ignition Checklist
 4. PMS 422 Agency Administrator Go/No-Go Pre-Ignition Approval
 5. PMS 424 Prescribed Fire Complexity Rating System Guide

3. **NWCG Documents**
 - A. PMS 307 Work Capacity Test Administrator's Guide
 - B. PMS 310-1 Wildland Fire Qualifications System Guide
 - C. PMS 410-1 2004 Fireline Handbook
 - D. PMS 410-2 2006 Fireline Handbook Appendix B
 - E. PMS 420-2 2001 Smoke Management Guide for Prescribed and Wildland Fire
 - F. PMS 461 2004 Incident Response Pocket Guide
 - G. PMS 902 Interagency Incident Business Management Handbook
 - H. PMS 902 Chapter 80, Exhibit 1 Incident Standard Estimate Rates
 - I. PMS 932 National Fire Danger Rating System

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 3. 1995 Federal Wildland Fire Policy
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 7. DoDI 6055.6p (2006) Fire and Emergency Service Program
 8. Interagency Agreement with United States Forest Service
 9. MCB CamLej BO 5090.113
 10. MCB CamLej BO 11320.1L
 11. MCB CamLej BO P3570.1B



- 12. MCO P5090.2A Chapter 11 Natural Resources Management (MC Wildland Fire Policy)
 - 13. MCO P11000.11B Marine Corps Fire and Emergency Services Program
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LIST OF ACRONYMS AND ABBREVIATIONS

°F	Degree(s) Fahrenheit
%	Percent
BI	Burning Index
BIA	Bureau of Indian Affairs
BLM	Bureau of Land Management
BO	Base Order
CO	Commanding Officer
CSRS	Civil Service Retirement System
DC/S I&L	Deputy Chief of Staff for Installations and Logistics
DHS	Department of Homeland Security
DIVS	Division/Group Supervisor
DoD	Department of Defense
DoDI	Department of Defense Instruction
DST	Daylight Savings Time
ECE	Environmental Compliance Evaluation
EOD	Explosive Ordnance Disposal
ENGB	Engine Boss
ERC	Energy Release Component
EST	Eastern Standard Time
FEMA	Federal Emergency Management Agency
FES	Fire and Emergency Services
FERS	Federal Employees Retirement System
FESD	Fire and Emergency Service Division
FFT1	Firefighter Type 1
FFT2	Firefighter Type 2
ft	Foot (Feet)
FWF	Fire Weather Planning Forecast
FWS	Fish and Wildlife Service
FY	Fiscal Year
GSA	General Services Administration
GSRA	Greater Sandy Run Area
HSPD-5	Homeland Security Presidential Directive 5
HQ	Headquarters
HQMC	Headquarters Marine Corps
ICRMP	Integrated Cultural Resources Management Plan
ICS	Incident Command System
ICT4	Incident Commander Type 4
ICT5	Incident Commander Type 5
IMT	Incident Management Team
INRMP	Integrated Natural Resources Management Plan
IQCS	Incident Qualification Classification System
IQS	Incident Qualification Standards
JDOMS	Joint Director of Military Support
MCB CamLej	Marine Corps Base Camp Lejeune
MCO	Marine Corps Order
MOA	Memorandum of Agreement
MPH	Mile(s) per Hour
MSDS	Material Safety Data Sheet
MSL	Mean Sea Level
NCDFR	North Carolina Division of Forest Resources
NCICC	North Carolina Interagency Coordination Center
NFDRS	National Fire Danger Rating System



LIST OF ACRONYMS AND ABBREVIATIONS

NFES	National Fire Education System
NFIRS	National Fire Incident Reporting System
NFP	National Fire Plan
NFPA	National Fire Protection Association
NIFC	National Inter-Agency Fire Center
NIMS	National Incident Management System
NPS	National Park Service
NUS	Normal Unit Strength
NWCG	National Wildland Coordinating Group
NWS	National Weather Service
PDM	Plume Dispersal Modeling
PF	Point Forecast
PMS	Publication Management System
PPE	Personal Protective Equipment
PT	Physical Training
RAWS	Remote Automatic Weather Stations
RCW	Red-Cockaded Woodpecker
RH	Relative Humidity
RxB2	Prescribed Fire Burn Boss Type 2
SMD	Smoke Management Database
SMP	Smoke Management Plan
STPL	Strike Team Leader Tractor/Plow
TPIA	Tractor/Plow Operator, Initial Attack
TRPB	Tractor/Plow Boss
U.S.	United States
U.S.C.	United States Code
USDA	United States Department of Agriculture
USFS	United States Forest Service
VIS	Ventilation Index System
WFMP	Wildland Fire Management Plan
WFS	Wildland Fire Situation Analysis



1.0 INTRODUCTION

1.1 Purpose

The purpose of the Marine Corps Base Camp Lejeune (MCB CamLej) Wildland Fire Management Plan (WFMP) is to help guide wildland fire management so appropriate measures are taken in both wildfire and prescribed fire to enhance and maintain the installation goals of military training and natural resources management. The WFMP is a tool that describes in detail the fire management programs, activities and methods that will be utilized by fire resources at MCB CamLej to attain habitat and land management objectives established for the installation. Ultimately, the WFMP is 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 MCB CamLej.

In order to sustain and enhance the high quality training environment for Fleet Marine Forces now and into the future, the base must have an effective wildland fire management program (Base Order [BO] 5090.113). 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. In accordance with the MCB CamLej Integrated Natural Resources Management Plan (INRMP), the Forest Protection Program is responsible for assisting the Fire and Emergency Services Division in the control of wildfires and for the planning and implementation of the annual prescribed burn plan.

Marine Corps Order (MCO) P5090.2A states that the installation WFMP is developed to reduce wildfire potential, protect and enhance installation natural resources, integrate applicable state and local permit and reporting requirements, and implement ecosystem management goals and objectives. This WFMP directly supports the military mission and is consistent with installation emergency operations plans (Department of Defense Instruction [DoDI] 6055.06; **Appendix 4.A.7**). Compliance with this policy will be monitored and evaluated as part of the Headquarters Marine Corps (HQMC) Benchmark Environmental Compliance Evaluation (ECE) program in accordance with MCO P5090.2A.

1.2 Authorities, Policies, Directives, and Standards

Section 11204 of MCO P5090.2A mandates that installations with burnable acres must develop a WFMP that is consistent with the installation INRMP and Integrated Cultural Resources Management Plan (ICRMP). Many national wildfire management standards were incorporated into the MCO and are discussed in detail below. The following national policies and standards are also incorporated by reference into this WFMP and are described in detail below:

1. National Fire Protection Association (NFPA) Standards:
 - a. NFPA 1051 Standard for Wildland Firefighter Professional Qualifications (**Appendix 1.B**)
 - b. NFPA 1143 Standard for Wildland Fire Management (**Appendix 1.C**)
 - c. NFPA 1144 Standard for Protection of Life and Property from Wildfire (**Appendix 1.D**)
 - d. NFPA 1710 Standard for the Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments (**Appendix 1.E**)
 - e. NFPA 1977 Standard on Protective Clothing and Equipment for Wildland Firefighting, 2005 Edition (**Appendix 1.F**)
2. Federal Wildland Fire Management Policy of 1995 and January 2001 update (**Appendix 4.A.3**)
3. The 10-Year Comprehensive Strategy for A Collaborative Approach to Reducing Wildland Fire Risks to Communities and the Environment and the 2006 Implementation Plan (**Appendix 4.A.2**)
4. National Fire Plan (NFP)
5. National Incident Management System: Homeland Security Presidential Directive 5 (HSPD-5), 28 February 2003 and Department of Homeland Security (DHS) National Incident Management System (NIMS), 1 March 2004 (**Appendix 4.A.4**)



6. National Wildland Coordinating Group (NWCG) PMS 310-1 Wildland Fire Qualification System Guide (**Appendix 3.B**)

Additionally, the Department of Defense (DoD), Marine Corps, and MCB CamLej have several directives, policies, and orders relating to wildland fire management that are incorporated into this WFMP:

7. DoDIs and MCOs:
 - a. DODI 6055.06 DoD Fire and Emergency Services Program, 21 December 2006 (**Appendix 4.A.6**)
 - b. MCO P5090.2A Chapter 11 Wildland Fire Management (**Appendix 4.A.12**)
 - c. MCO P11000.11B Marine Corps Fire Protection and Emergency Services Program (**Appendix 4.A.13**)
8. MCB CamLej Base Orders:
 - a. BO 11320.1L Fire Regulations (**Appendix 4.A.10**)
 - b. BO 5090.113 Wildland Fire Management Program at MCB CamLej, 9 July 2007 (**Appendix 4.A.9**)
 - c. BO P3570.1B Range and Training Regulations, specifically Forest Fire Danger and Ratings, pages 113-114 (**Appendix 4.A.11**)
9. Fire and Emergency Services Division Order 11320.600.06

1.2.1 National Fire Protection Association

The NFPA is an international, non-profit organization whose mission is to reduce the burden of fire and other hazards on quality of life by developing and advocating consensus codes and standards, research, training, and education. The codes and standards developed by NFPA are internationally recognized and adopted because they are developed using an open, consensus-based process. NFPA documents listed and described below are provided as Appendices to this WFMP; other NFPA documents can be ordered through the NFPA website at <http://www.nfpa.org>.

- NFPA 1051 – The 2007 edition identifies wildland fire job performance duties and requirements.
- NFPA 1143 – The 2009 edition discusses the development of the NFP, outlines steps necessary for a fire protection organization to develop a wildland fire management program, and integrates information to help fire departments prepare for fire suppression, mitigation, prevention, and community coordination.
- NFPA 1144 – The 2002 edition provides information on planning, construction, maintenance, education, and management elements for protecting life and property from wildfire loss. This document also assists fire managers in dealing with challenges presented by increasing wildland/urban interface areas.
- NFPA 1710 – The 2004 edition addresses staffing level, response time, and level of service requirements for several emergency response situations including those in the wildland urban interface.
- NFPA 1977 – The 2005 edition outlines the requirements and provisions for personal protective equipment (PPE) including added requirements for new and optional wildland firefighting equipment.

1.2.2 Federal Wildland Fire Policy

In recognition of the vast landholdings and wildland fire issues within DoD, a DoD representative was asked to participate in the Review of the 1995 Federal Wildland Fire Policy, completed in 2001 (**Appendix 4.A.1**). A key element in both the original 1995 and 2001 update of the Federal Wildland Fire Policy is the need to abide by nationally-recognized standards for wildland fire training, PPE, and fitness. These include the NFPA and NWCG standards listed in this section of the WFMP.

1.2.3 10-Year Comprehensive Strategy



The 2001 document "A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment: A 10-Year Comprehensive Strategy" (**Appendix 4.A.2**) further develops the five key points originally outlined in the NFP, discussed in **Section 1.2.4**. In this document, known by the short title of "10-Year Comprehensive Strategy", four objectives are identified:

1. Improve Prevention and Suppression
2. Reduce Hazardous Fuels
3. Restore Fire-Adapted Ecosystems
4. Promote Community Assistance

Additionally, the 2006 Implementation Plan (**Appendix 4.A.2**) establishes a framework for protecting communities and the environment by providing goals and measures to track progress toward improving forest health and reducing wildfire risk to communities. The Implementation Plan was developed by a wide-range of stakeholders in part to address wildfire threat to communities and ecosystems caused by the development of unnaturally dense, diseased, or dying forests. The 2006 Implementation Plan builds on the original ambitious goals set in the 10-Year Comprehensive Strategy to prevent and suppress wildfires, thin overstocked forests, reduce hazardous fuels, restore ecosystems, and assist communities in protecting themselves and in developing forest-based economies (Forests and Rangelands 2008).

1.2.4 National Fire Plan

The NFP is not a specific document but a broad statement of federal policy developed from several documents. The NFP requires a range of wildland fire management activities on and near federal lands. The five "key points" of the NFP are:

1. Maintain a cost-effective level of preparedness in firefighting and prevention.
2. Invest in projects to reduce fire risk with focused effort in wildland urban interface areas.
3. Work with communities to reduce the risks of catastrophic fire.
4. Rehabilitate fire-damaged wildland and restore high-risk ecosystems.
5. Establish and maintain a high level of accountability including oversight reviews, progress tracking, cost analysis, and performance monitoring.

1.2.5 National Incident Management System

The Homeland Security Presidential Directive 5 (HSPD-5), National Incident Management System (NIMS), enacted 28 February 2003 was created to "enhance the ability of the United States (U.S.) to manage domestic incidents by establishing a single comprehensive National Incident Management System" (White House 2003). HSPD-5 directs the Department of Homeland Security (DHS) to develop and administer NIMS and further requires all federal departments and agencies adopt NIMS and use it in their individual incident management plans.

The NIMS incorporates "best practices from all levels of existing response plans. It is not an operational incident management plan but a set of doctrine, concepts, principles, terminology, and organizational processes that are meant to enable effective collaboration between federal, state, and tribal agencies as well as the private sector and non-governmental organizations" (FEMA 2008).

NIMS components and resources can be accessed through the Federal Emergency Management Agency (FEMA) website at <http://www.fema.gov/emergency/nims/index.shtm>. The NIMS document can be accessed online at http://www.nimsonline.com/nims_3_04/index.htm



1.2.6 National Wildfire Coordinating Group

The NWCG attempts to improve coordination and integration of state, tribal, and federal wildland fire programs while recognizing individual agency missions while also serving as an information source and discussion forum for short and long-term wildland fire management issues (NWCG 2008).

The purpose of NWCG is to:

- Provide national leadership and establish, implement, maintain, and communicate policy, standards, guidelines, and qualifications for wildland fire program management, and
- Provide a forum in which issues, both short and long term, involving standards and program implementation can be coordinated, discussed, and resolved.

NWCG is made up of the U.S. Department of Agriculture (USDA) Forest Service (USFS); four Department of the Interior agencies: Bureau of Land Management (BLM), National Park Service (NPS), Bureau of Indian Affairs (BIA), and the Fish and Wildlife Service (FWS); and State forestry agencies through the National Association of State Foresters. The goal of NWCG is to provide more effective execution of each agency's fire management program by utilizing a formalized system to agree upon standards of training, equipment, qualifications, and other operational functions (NWCG 2008).

Current and historic NWCG documents are maintained in a Publication Management System (PMS) available online at <http://www.nwcg.gov/pms/pubs/pubs.htm>. NWCG documents are assigned unique identifying numbers following the PMS heading. Additionally, documents may also be assigned a National Fire Education System (NFES) number. Although the PMS and NFES numbers may be different, they correspond to the same document and both numbers are listed on recent NWCG publications. Publications can be searched by either the PMS or NFES number at the NWCG publications website listed above.

PMS 310-1/NFES 1414 – The main objectives of PMS 310-1 are to establish minimum requirements for, and allow cooperating agencies to agree upon, training, experience, physical fitness level, and currency for interagency national wildfire mobilization, and establish minimum qualifications for personnel on moderate or higher complexity prescribed fires. This and other NWCG publications discussed in this WFMP are included as Appendices. Additional products can be ordered through the NWCG Publication Management System at <http://www.nwcg.gov/pms/pms.htm>.

1.2.7 Department of Defense

DoDI 6055.06 instructs DoD agencies to prepare and respond to wildfires in accordance with the Federal Wildland Fire Policy, subsequently modified by the 2001 review.

MCO P5090.2A (**Appendix 4.A.12**) was enacted in January 2008 in response the DoDI above and requires that installations with, or bordered by, burnable acreage develop a wildland fire management plan consistent with the INRMP and ICRMP. The MCO authorizes the installation commander to define the roles and responsibilities for wildland fire management, plan and program resources, designate an installation Wildland fire program manager, approve the installation WFMP, and approve the deployment of Marine Corps civilian firefighters to any off installation incident. The designated Wildland fire program manager is responsible for the development of the WFMP in addition to reviewing and approving burn plans for consistency with the INRMP and other applicable operating instructions.

MCO P11000.11B Marine Corps Fire Protection and Emergency Services Program (**Appendix 4.A.13**) publishes policies, standards, guidance, and responsibilities for the Installation Fire Protection and Emergency Services Program under the office of the Deputy Chief of Staff for Installations and Logistics (DC/S I&L) at HQMC. The fire protection and emergency services program is intended to prevent loss of life, injury to personnel and damage to Government property resulting from fires and other emergencies.



1.2.8 Marine Corps Base Camp Lejeune Base Orders

BO 5090.113 establishes the 2001 Federal Fire Policy Review as the guiding document for non-Fire and Emergency Service Division personnel involved in wildland fire management activities at MCB CamLej. In addition, this BO implements the standards established in PMS 310-1 for PPE, physical fitness training, and position qualification for non-Fire and Emergency Service Division personnel tasked with wildland fire management responsibilities. This policy also outlines the duties, as relating to wildland fire, of the Directors of Installations and Environment Department, Base S-3, and the Department of Public Safety.

BO 11320.1L establishes the FESD as the Incident Commander on all wildfires occurring at Camp Lejeune. The senior FESD personnel will coordinate wildfire suppression activities, in Unified Command, with the senior Forestry personnel at the incident scene. BO 11320.1L also discusses the organization of the Fire and Emergency Service Division (FESD) at MCB CamLej, the procedures for reporting a wildfire and immediate actions, includes a copy of a Fire Bill, and outlines fire prevention regulations.

BO P3570.1B, specifically pages 113-114, outlines Range and Training regulations as pertaining to wildland fire. In March/September of each year, Range Control will publish the fire readiness plan message to remind all units of their responsibilities during the wildfire season. At no time will training details go down range or into an impact area, or in any other way place Marines in danger in an effort to fight wildfires. BO P3570.1B requires that all wildfires, regardless of size, must be immediately reported to Blackburn (34.70 MHZ or 451-3064/4449) who will then notify MCB CamLej FESD.

1.2.9 Fire and Emergency Services Division Order 11320.600.06

FESD Order 11320.600.06 provides definitions for wildland fire terms, requires that the installation FESD be familiar with the MCB CamLej WFMP, as well as prepare and maintain a Pre-Plan for wildland fire dispatch. This order also outlines the required response to wildland incidents and lists several safety precautions to implement in the case of wildland fire response. FESD Order 11320.600.06 is provided in Appendix 7.

1.3 Physical and Biological Setting of Marine Corps Base Camp Lejeune

1.3.1 General Location

MCB CamLej is located in Onslow County, North Carolina, south of Jacksonville, and comprises over 150,000 acres in the southern Atlantic Coastal Plain (Figure 1-1). The Main Base encompasses over 100,000 acres of which roughly 20,000 are the New River, the main water body that bisects the base. As an estuary, it meanders through MCB CamLej and enters the Atlantic Ocean in Onslow Bay, via the New River Inlet between two barrier islands. The Greater Sandy Run Area (GSRA) is adjacent to and west of the Main Base.

MCB CamLej is bounded by the Atlantic Ocean along approximately 11 miles of barrier islands. The Intracoastal Waterway and broad expanses of tidal marsh separate the barrier islands from the mainland. There are at least half a dozen small second order streams and two large second order streams that meander across the Pamlico surface, emptying into the Intracoastal Waterway along the installation's southeastern boundary. Although there are specified dipsites in GSRA, the New River is the main water resource for large wildfire suppression activities.

1.3.2 Physiography

MCB CamLej lies on the lower coastal plain of North Carolina (Figure 1-1), where there is relatively low topographic relief. The area includes parts of three geomorphic surfaces representing three periods of geologically recent land emergence (USDA 1992). The highest of these features is the Wicomico surface, of which only a small portion occurs on MCB CamLej. The Wicomico surface is located primarily on the



western side of the New River, south of Jacksonville. Elevations on this surface range from 45 to 70 feet above (ft) above

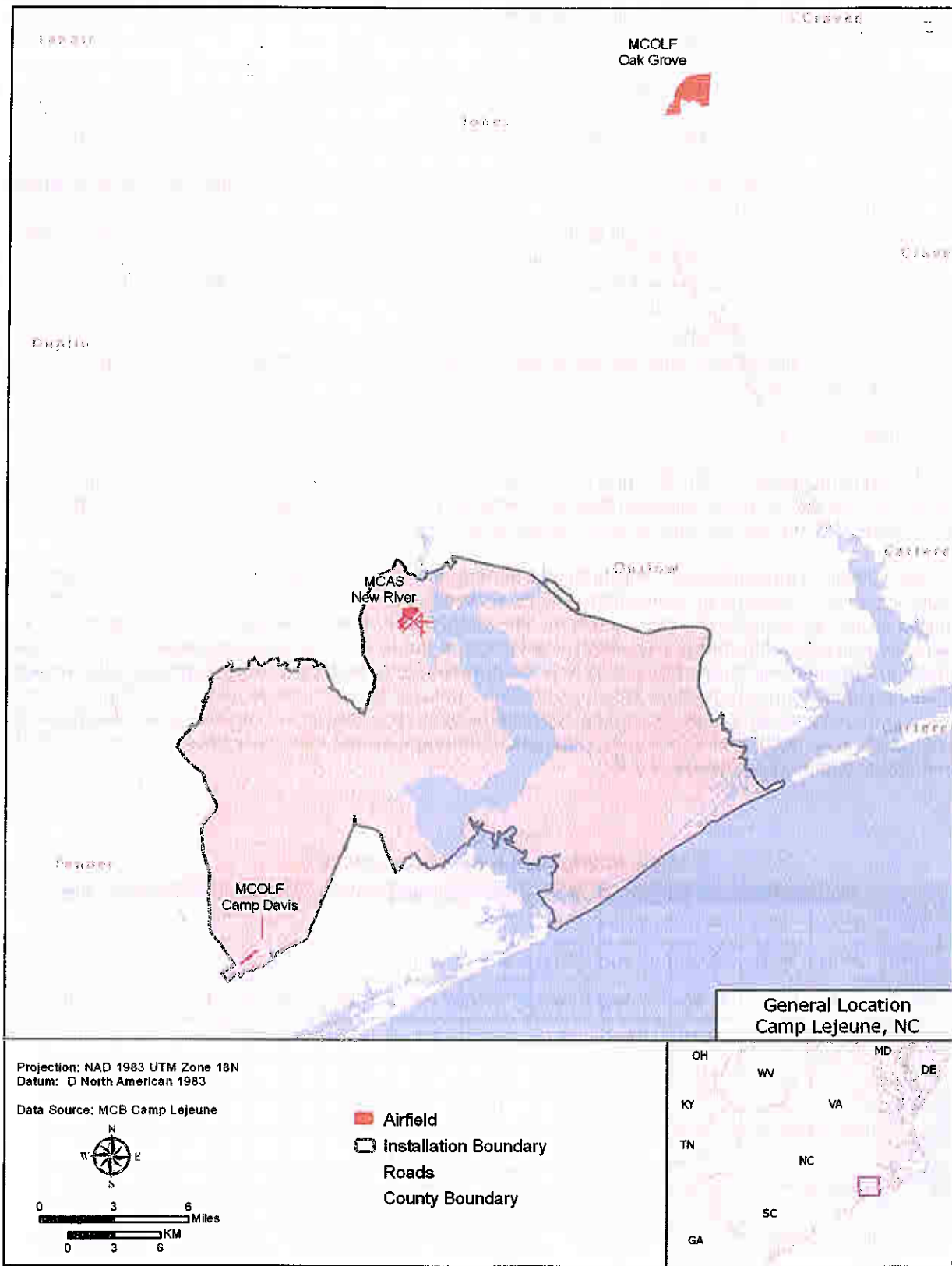
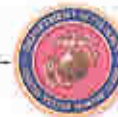


Figure 1-1. General Location of MCB Camp Lejeune.



mean sea level (MSL). The majority of the land area of MCB CamLej is found on the Talbot surface, with elevations ranging from about 25 to 45 ft above MSL. The remainder of the land area lies on the Pamlico surface, which ranges from 0 to 25 ft above MSL.

As outlined in the INRMP, this ecoregion has the following characteristics:

- Stratified marine deposits that were formed during the Cenozoic Era (66 million years ago to the present)
- Utisol and Spodosol soils that are deep, medium textured, and have adequate to excessive water supplies for vegetation
- Small to medium-sized perennial streams, few associated rivers, high water table in many areas, leading to poor natural drainage and many wetland areas
- Southern mixed pine and oak-hickory-pine forests, with areas of floodplain forest and pocosin
- Average temperature of 55-57degrees Fahrenheit (°F)
- Growing season averaging 185-220 days
- Fire is the predominant natural disturbance although frequent hurricanes and insect disturbances are also a factor

1.3.3 Climate

MCB CamLej is located in a climatic zone that receives an average of 53 inches of rain per year, mostly evenly distributed across the seasons (**Table 1-1**). Rainfall of 0.1 inch or greater occurs an average of 86 days per year. Thunderstorms occur on an average of 45 days per year.

The area typically experiences hot and humid summers and mild winters. Snowfall in the area occurs infrequently, and significant accumulation is rare. Prevailing winds are generally from the south or southwest in the spring and summer and from the north and northwest in the fall and winter. July is typically the hottest month, but hot weather also occurs in June, August, and September. The average daily high temperature for the month of July is 90°F; however, individual daily July temperatures are often significantly higher than the average values. During the past 20 years, days exceeding 96°F have been recorded in most years, and days exceeding 100°F have been recorded in a number of years. Because of the high relative humidity that is normally experienced during summer months (average 78 percent [%]) the heat index commonly exceeds 110°F.

Table 1-1
Climate Information for Jacksonville, NC.

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Avg High Temp	54°F	58°F	65°F	73°F	80°F	86°F	89°F	88°F	83°F	75°F	67°F	58°F
Avg Low Temp	34°F	36°F	43°F	51°F	60°F	67°F	72°F	71°F	66°F	54°F	45°F	37°F
Avg wind speed	8 mph	8 mph	9 mph	9 mph	8 mph	7 mph	7 mph	6 mph	7 mph	8 mph	7 mph	8 mph
Avg wind direction	N	N	SW	SW	S	S	SW	SW	NE	NE	NE	N
Avg precip	4.3"	3.7"	4.0"	3.1"	3.9"	5.1"	7.6"	6.6"	4.6"	3.0"	3.2"	3.7"
# days with precip	11	10	10	8	10	10	14	12	9	7	8	9
# days with t-storms	2	2	3	7	10	13	22	17	7	2	2	1
Avg AM Rh	79%	78%	80%	79%	82%	84%	86%	89%	88%	86%	82%	80%
Avg PM Rh	57%	54%	52%	50%	57%	62%	66%	67%	63%	58%	56%	57%

Source: CustomWeather 2008

January is typically the coldest month; however, cold temperatures are also experienced in December, February, and March. The average daily low temperature for the month of January is 36°F; however,



individual daily low temperatures can be significantly less than this. Low temperatures down to 0°F have been recorded. The growing season for Onslow County (as recognized by the US Army Corps of Engineers, Wilmington District for jurisdictional purposes) is March 19 to November 11.

1.3.4 Vegetation

Within the North Carolina coastal plain region, the natural communities of low-lying areas are predominantly comprised of extensive coastal marshes, interior swamps, and pocosins. The coastal marshes are typically dominated by persistent herbaceous plants such as cordgrasses and needlerushes. The interior swamps are typically dominated by trees such as gum and cypress. Pocosins are dominated by evergreen shrubs such as fetterbush (*Lyonia lucida*) and gallberry (*Ilex coriacea*); however, trees such as pond pine (*Pinus serotina*) and loblolly bay (*Gordonia lasianthus*) also regularly occur. Most upland areas are dominated by pine with an understory of grasses and sedges. Bogs and pocosins, in which evergreen shrubs are dominant, may also occur in poorly drained shallow depressions in these upland areas (Bailey 1995).

MCB CamLej contains approximately 92,300 acres of forest, including 47,734 acres of pine stands, 21,985 acres of hardwood stands, and 22,596 acres of mixed pine/hardwood stands. An additional 17,328 acres are non-forested and 12,543 acres fall within impact areas (MCB CamLej 2006). Loblolly pine (*Pinus taeda*) is the most common pine species, accounting for approximately 75% of timber on the installation, while blackgum (*Nyssa sylvatica*) is the most common hardwood. Fire plays a major role in shaping the ecological communities at MCB CamLej, affecting canopy and understory density and species composition.

Approximately 93,000 acres receive some level of fuels management at MCB CamLej (MCB CamLej 2006). Prescribed burning is normally conducted between the first of January and the end of June to cover both the dormant and the growing seasons. Growing season burns are conducted primarily for hardwood and understory brush control, ecosystem restoration, and threatened and endangered species management (MCB CamLej 2006).

1.4 Natural Resources Management at MCB Camp Lejeune

Historically, fire was the single most important natural process that shaped the landscape of the Southeastern Coastal Plain. Natural ignitions such as lightning strikes and fires started by Native Americans provided the source for fires that burned over much of the landscape at roughly 1 to 3-year intervals (MCB CamLej 2006). With their short fire return intervals, these fires were responsible for maintaining fire-dependent ecosystems such as the longleaf pine savanna.

Natural resource managers today use prescribed burning to mimic the historical role of fire in maintaining native ecosystems. Prescribed burning is one of the most important treatments that natural resource managers in the southeast can apply in terms of time, cost, and effectiveness to manage vegetation of the coastal plain (MCB CamLej 2006). Fire has many beneficial uses in natural resources management, including ecosystem restoration, maintenance of threatened or endangered species habitat, maintenance of quality forage vegetation for wildlife, reduction of forest fuels available to wildfire, site preparation for forest regeneration, and reduction in the amount of hardwood brush (MCB CamLej 2006).

Beginning in fiscal year (FY) 06, areas receiving prescribed burn treatments were scheduled based upon a Prescribed Burning Prioritization Model (discussed in Appendix O of MCB CamLej 2006). This prioritization model transitions the prescribed burning program from one of burning areas on a set schedule, to a program that allows for adaptive management and underscores the relative need for fire among the various habitats throughout the landscape (MCB CamLej 2006). This model assists in ensuring a suitable allocation of resources across the landscape for application of prescribed burning treatments since it assigns priorities based on various factors, such as time since last burn, red-cockaded woodpecker (RCW) cluster maintenance and recruitment site preparation and management (MCB



CamLej 2006). Burning is conducted with the primary focus on restoration of the landscape, to more closely mimic that of pre-settlement conditions.



2.0 MCB CAMP LEJEUNE FIRE PROGRAM

2.1 Discussion

Historically, fires likely burned frequently with minimal damage and with great benefit to natural ecosystem components; however, mid-Atlantic coastal plain fuel types and fire frequencies have changed drastically since settlement. Under today's conditions, unmanaged fires would endanger life and property and likely destroy essential components of the ecosystem, such as the endangered RCW habitat that MCB CamLej is committed to preserving.

Currently, MCB CamLej has relatively few naturally caused wildfires; most are caused by range and training exercises and contained through initial attack suppression actions using existing resources. **Table 2-1** gives historical wildfire and prescribed fire information for MCB CamLej.

Table 2-1.
Historical MCB CamLej Wildland Fire Information.

Year	Wildfire Numbers	Wildfire Acres	Prescribed Fire Acres
1990	122	1,718	
1991	63	104	
1992	117	2,212	
1993	148	2,399	
1994	113	2,642	
1995	73	1,458	13,591
1996	89	1,170	15,170
1997	160	1,627	10,793
1998	98	831	12,390
1999	117	2,230	17,224
2000	190	1,617	15,768
2001	149	2,269	20,675
2002	101	2,870	12,427
2003	37	457	20,865
2004	46	1,150	22,970
2005	30	878	21,157
2006	57	2,079	20,911
2007	152	2,840	22,756
2008	73	4633	4657
2009	67	3525	19204

2.2 MCB Camp Lejeune Wildland Fire Management Program Goals

The traditional role of a wildland fire management program is maximum prevention, detection, and suppression of wildland fires; however, within this fire-dependant ecosystem, full suppression of every fire is not usually possible or appropriate. To safely manage wildland fire at MCB CamLej, the habitat must be prepared for wildland fire in such a way as to minimize ecological damage and maximize benefits. In order to meet natural resource management and range and training land safety objectives, presuppression operations such as prescribed fire or mechanical treatment are used to reduce wildfire hazard and enhance installation resources. The following generalizations about fire can be made: Low to moderate intensity fire is often times beneficial, helping maintain fire dependent habitats; and High intensity fire is detrimental to most upland habitats.

Section 1.2 provided an overview of wildland fire management standards, policies, directives, and guidelines from authorities such as NWCG, NFPA, DoD, Marine Corps, and MCB CamLej. All Marine



Corps organizations involved in wildland fire activities have been instructed to incorporate NWCG, NFPA and NIMS standards into their organizational structure to accommodate cooperation and integration with interagency fire organizations as outlined in MCO P5090.2A.

As needed to support the military training mission, the established goals and objectives of the MCB CamLej wildfire management program are outlined below:

- Prescribed burning will support the military training mission by maintaining an open understory, supporting RCW recovery, managing fuel loads, improving game and non-game wildlife habitat, and restoring natural communities.
- Decrease the intensity of wildfires by reducing the amount of fuel available to wildfires through an aggressive prescribed burning program.
- Utilize an appropriate wildfire suppression response, which emphasizes the use of natural and man-made barriers, to minimize impacts to training and the environment.
- Identify, prioritize, and treat high hazard areas in the wildland/urban interface to mitigate the potential for wildfire to damage private or installation property.
- Utilize the Prescribed Burning Prioritization Model to allocate resources to prescribe burn acres from which multiple benefits will be achieved.
- Focus prescribed burning on restoration of the landscape, to more closely mimic that of pre-settlement conditions and to maintain and improve the sustainability and native biological diversity of ecosystems.
- Mechanically treat areas of the landscape that have been fire neglected in order to more effectively treat those areas with fire.

2.3 Organizational Structure

The current organizational structure of the MCB CamLej environmental division is outlined in **Figure 2-1**. All trained and qualified employees have a responsibility to support wildland fire management activities as the situation demands. All Environmental Management Division personnel involved in wildland fire activities shall meet the current wildland fire qualification standards as outlined in **Section 2.5**.

Wildland fire management personnel support both prescribed and wildfire activities on the installation. Personnel must be ready (trained and qualified) at all times since wildland fire management operations are conducted throughout the year at MCB CamLej. Basic fire training must be given to new personnel involved in wildland fire management activities as soon as possible after hiring. The required annual fire refresher training may be scheduled on a cooperative basis with coordinating agencies. Qualified personnel are responsible for each function of the wildland fire activity, although responsibilities may shift as firing progresses on prescribed burns and on less complex wildland fires, one person may be responsible for several functions.

As part of the approval of this plan, the Supervisor, Forest Protection Section, Environmental Conservation Branch, Environmental Management Division, is designated as the Wildland Fire Program Manager for MCB CamLej. The Wildland Fire Program manager is responsible for development of this WFMP and reviews and approves burn plans for prescribed fires consistent with the WFMP, the INRMP, and other applicable operating instructions (MCO P5090.2).

2.4 Safety and Operations Procedures

2.4.1 Safety Training

The training program, qualification, and certification process are the foundations of the safety program. Only qualified personnel will be assigned wildland fire duties. All assigned wildland fire personnel, whether on prescribed or wildfires, must meet NWCG training standards outlined in **Section 2.5** and PMS 310-1 (**Appendix 3.B**). All personnel engaged in fireline operations must have completed, at a minimum:



- S-110 Basic Fire Suppression Orientation;
- S-130, Firefighter Training;
- S-190, Introduction to Fire Behavior, Your Fire Shelter, and Standards for Survival; and
- I-100, Introduction to Incident Command System (ICS).

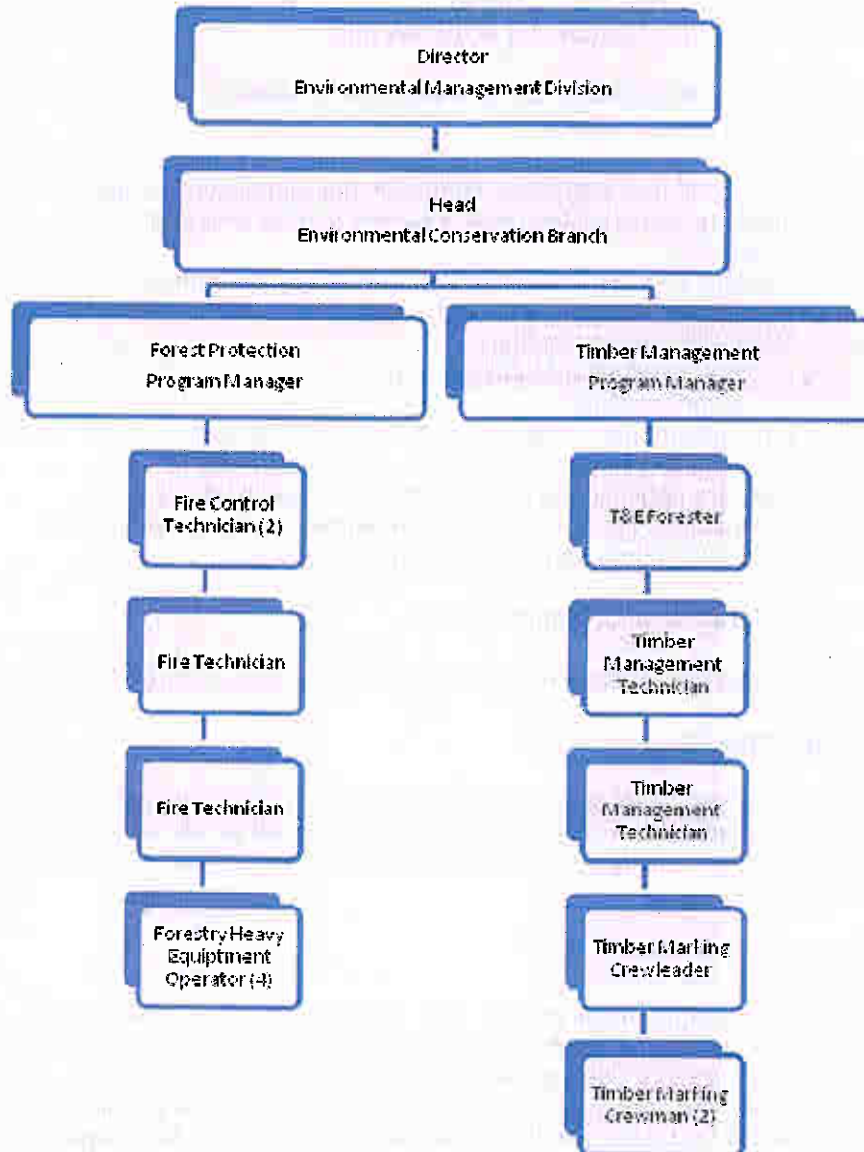


Figure 2-1. MCB Camp Lejeune Wildland Fire Management Organization Chart.

All personnel will have NWCG certified training for tasks they are assigned (see **Section 2.5**). All trained personnel are required to complete an annual refresher course, usually offered in conjunction with the annual work capacity test. Appendix N of the 2008 NIFC Red Book details the medical examination requirement for fire personnel, Appendix L is a blank copy of the health screen questionnaire, and Appendix M is a blank copy of the work capacity test (work capacity test) record. The 2008 NIFC Red Book supplied in **Appendix 2.A**.

2.4.2 Operational Safety



All wildland fire management activities at MCB CamLej are conducted in compliance with federal, interagency, DoD, Marine Corps and installation policies outlined in **Section 1.2**. Additionally, the 10 Standard Fire Orders and 18 Watch Out Situations outlined in the 2008 NIFC Red Book (**Appendix 2.A**) and Incident Response Pocket Guide (PMS 461; **Appendix 3.F**) are incorporated into all wildland fire management decision-making activities. All personnel supporting wildland fire operations should be familiar with the safety considerations and procedures found in the NWCG 410-1 Fireline Handbook (**Appendix 3.C**) and the 2008 NIFC Red Book (**Appendix 2.A**). Further information on operational safety is discussed in the authorities listed in **Section 1.2** of this WFMP.

In addition to the 10 Standard Fire Orders and 18 Watch Out Situations, 13 prescribed fire watch-out situations were first described in Maupin 1981:

1. Burning with a plan that has not been approved by the appropriate line officer.
2. You are not a qualified burning boss but have been told to go ahead and burn.
3. Burn objectives are not clear.
4. There are areas of special concern within the burn that cannot be burned.
5. Private land or structures are adjacent to the burn area.
6. You are uncomfortable with the prescription.
7. You have not requested spot weather forecasts.
8. You decide a test fire is unnecessary.
9. You decide all your people are old hands and no briefing is necessary.
10. Escape probability is small so you don't bother with escape planning.
11. You, or the firing boss, are beginning to lose control of your torch people.
12. Mop-up and patrol instructions are not specific or understood by the mop-up boss.
13. You haven't lost one in a long time and are starting to feel smug.

A fourteenth was added by Alexander and Thomas (2006)

14. Conducting a prescribed burn without having a temporary onsite or nearby weather station.

2.4.3 Leadership Requirements

Knowledgeable leadership is a significant safety factor of any wildland fire management program. Current and applicable experience, training, and physical fitness are required of all wildland fire management leadership personnel. Sufficient knowledge is necessary for managers to protect themselves, their crews, and the resources of MCB CamLej.

2.4.4 Field Operations

The Wildland fire program manager must ensure that safety issues are covered with wildland fire management personnel at all operational briefings and that safety briefings are occurring throughout the wildland fire management organization. The identification and location of escape routes, deployment, and safety zones must be stressed. The wildland fire management staff should use fire orders and "watch out" situations in the 2008 NIFC Red Book and the IRPG (**Appendix 2.A** and **3.F**, respectively) in addition to the 14 prescribed fire "watch out" situations (listed in **Section 2.4.2**) for guidance at strategy meetings, during briefings, when developing incident action plans, prescribed burn plans, safety messages, and medical plans. All preparedness actions, precautions, safety requirements, and special instructions should be outlined at burn day briefings. A record of the burn day briefing should be kept in the prescribed fire files maintained in the MCB CamLej wildland fire program office.

2.4.5 Public Safety

Public and firefighter safety is of primary concern during all wildland fire management operations. The following sections address various issues as they relate to public safety.



2.4.5.1 Smoke

Smoke across highways is one of the most common problems involved with prescribed burning. To mitigate for this potential safety issue, transport winds will be selected to carry smoke away from highways and all other sensitive areas during prescribed burning operations. If there are unpredicted wind shifts, or other unforeseen circumstances, the prescribed fire may need to be terminated. Additionally, adjoining jurisdictions will be notified of potential smoke issues through the FESD dispatch office.

Management actions such as hazard reduction burning and burnouts may minimize smoke management problems during wildfires. Hazard reduction burning in areas prone to wildfires will reduce fuel loading, resulting in less smoke. Burnouts may be undertaken so the smoke resulting from suppression actions does not add to the smoke.

If sensitive or developed areas are impacted by smoke from either prescribed or wildfire, appropriate actions must be taken. These actions may include posting a patrol along impacted roads, notifying the Range Control Office to halt training in an impacted area, or evacuating installation personnel and residents from the impacted area. All such actions must be coordinated with the appropriate installation division including Blackburn, the Range Control Office, MCB CamLej FESD, and other emergency services. When a wildfire is reported by a training unit to Blackburn, Blackburn will request that the unit report if smoke is drifting over a highway. That information will be relayed by Blackburn to the FESD dispatch along with the fire location.

2.4.5.2 Fire

Prevention of injury to the public by fire is the responsibility of wildland fire managers during prescribed wildfire suppression operations. Careful planning of prescribed fires minimizes the risk of escape that may endanger the public. Additionally, during formulation of the prescribed burn plan and during wildfire events, the location of all training operations near the burn area will be determined. Once determined, coordinate with Blackburn and the Range Control Office to limit access to impacted areas and plan detour routes around problem areas.

2.4.5.3 Public Notification

The Joint Public Affairs Office at MCB CamLej responds to all public and media inquiries regarding wildland fire management on the installation. Examples of press releases related to wildland fire management are included in **Appendix 6**.

2.5 Standards, Qualifications, and Training

Modern wildland fire management is a highly technical and professional operation requiring skilled and knowledgeable personnel to meet program objectives. Individuals will not be assigned to duties for which they lack training and/or certified experience. DoD and Marine Corps policies require that all personnel engaged in wildfire suppression and prescribed fire management activities meet or exceed standards set by NWCG. These qualification and certification standards outline minimum training, experience, and physical fitness requirements. All Environmental Management Division personnel including permanent, seasonal, and temporary positions at MCB CamLej must maintain NWCG qualifications for the fire management position assigned. These qualification and certification requirements include a physical fitness component and all personnel who are assigned wildland fire management duties must meet or exceed the physical condition requirements. MCO P5090.2A states that current training and qualification records will be maintained by the wildland fire program manager in the wildland fire management office for all personnel involved in wildland fire management activities.

2.5.1 Wildland Fire Operation Standards



The Marine Corps and other federal land management agencies have adopted PMS 310-1, as maintained and revised by the NWCG, to address wildland fire operations standards. In addition, MCO P5090.2A describes the organizational standards and requirements for wildland fire activities at Marine Corps installations. It states, "Marine Corps organizations involved in wildland fire activities will incorporate NWCG and NIMS standards into their organizational structure when necessary to accommodate cooperation and integration with other Federal, State, and local wildland fire organizations across jurisdictional boundaries."

2.5.2 Prescribed Fire Operation Standards

NWCG standards for interagency prescribed fire operations are used at MCB CamLej. Some installation prescribed fire operations may be defined as "low complexity" in nature. To be categorized as low complexity, the prescribed fire operation must have the following characteristics:

- Low risk of escape
- No negative impacts if minor escapes occur
- Require low to moderate burning condition
- Does not involve multiple fuel complexes or fuels which exhibit extreme fire behavior characteristics
- Have simple burn objectives

Prescribed fire operations at MCB CamLej require adherence to interagency guidelines and standards as outlined in PMS 310-1 (**Appendix 3.B**) and PMS 420-2 (**Appendix 3.E**). The 2008 NIFC Prescribed Fire Guide (**Appendix 2.B.1**) may be used as an additional information resource. As a minimum requirement at MCB CamLej, all prescribed burn bosses must be Prescribed Fire Burn Boss Type 2 (RxB2) qualified or under the supervision of a qualified RxB2 to conduct prescribed burns. Burning units involving low risk or low complexity burns should be clearly identified so that less qualified or less experienced personnel can be used. At MCB CamLej, low complexity prescribed burns may include miscellaneous small burns such as wildlife openings, isolated fuel islands, brush piles, etc.

Prescribed fire is a planned activity and requires a contingency plan. Such a contingency plan should identify qualified personnel to assume suppression positions should the fire escape.

2.5.3 Wildland Fire Management Physical Qualifications and Standards

The wildland fire program manager is responsible for ensuring that all Environmental Management Division personnel utilized for wildland fire management activities meet all required standards including physical qualifications. When personnel are involved in multiple positions, physical qualifications for the position with the highest physical standard must be met. Testing is required annually, using the work capacity test, to ensure that all wildland fire personnel remain physically qualified. Environmental Management Division personnel at MCB CamLej must pass the "Moderate" level of the work capacity test, although any off-site assignments require adherence to federal standards (usually "Arduous"). A regular physical training and testing program ensures that Environmental Management Division red-carded personnel meet physical qualifications. Training and testing procedures are listed in the 2008 NIFC Red Book (**Appendix 2.A**).

Measurable and objective medical examinations and physical fitness tests are used to establish fitness standards for MCB CamLej personnel that participate in wildland fire management activities. All Environmental Management Division personnel involved in wildland fire activities must meet the medical examination and physical fitness test requirement annually. NWCG publications such as PMS 310-1 (**Appendix 3.B**), PMS 304-1, PMS 304-2, and PMS 306 (contact NWCG for availability) provide guidance for establishing physical fitness standards for wildland fire management activities. The procedures for notifying affected employees and how it relates to being qualified for their jobs, how employees are to be certified as fit to train for and take the physical fitness test, the repercussions of failing the medical exam or work capacity test, and procedures for reexamination or re-testing is detailed in PMS 307 (**Appendix 3.A**). All required exams and tests are funded through the MCB CamLej wildland fire management



program. Personnel whose job description requires participation in wildland fire management activities as a primary or secondary firefighter on Marine Corps installations will meet the pre-employment medical and physical examination criteria contained in DoD 6055.05M, Occupational Medical Examinations and Surveillance Manual.



2.5.4 Physical Training Program

MCB CamLej wildland fire management employees are strongly encouraged to participate in physical fitness and wellness programs to ensure that they can properly carry out official duties and personal activities more efficiently and safely. Physical training (PT) allows for the:

- Development of a more productive and physically fit work force
- Reduced injury and absentee rate
- Active participants in PT programs develop a “mental toughness” especially useful in demanding fire environments
- Active participants in PT programs are better prepared for “life and death” situations

0400 series employees who must meet job related physical standards are authorized at least three hours per week at the start of the workday for physical training. Since most fire management activities are accomplished on a team basis, physical training activities should also be supervised on a team basis. The wildland fire program manager approves or supervises physical training activities.

At a minimum, and in accordance with BO 5090.113, all non-FESD personnel engaged in wildland fire management activities at Camp Lejeune will maintain a moderate or arduous fitness level. This is a local standard. Firefighters dispatched to off unit assignments must meet the physical standards of the receiving agency.

2.5.5 Incident Qualification Standards (IQS)

Personnel will meet Incident Qualification Standards (IQS) for any fireline duties that are assigned. PMS 310-1 contains the standards for all wildland fire positions. At a minimum, all personnel that perform wildland fire management activities shall be qualified as a Firefighter Type 2 (FFT2). In addition, personnel that perform wildland fire management activities as their primary duties will maintain the following qualifications:

- GS-5 – Firefighter Type 1 (FFT1), Incident Commander Type 5 (ICT5)
- GS-7 – FFT1, Incident Commander Type 4 (ICT4), Tractor/plow Boss (TRPB), Engine Boss (ENGB)
- GS-9 – FFT1, ICT4, Strike Team Leader Tractor/Plow (STPL), RxB2
- Heavy Equipment Operator – Tractor/Plow Operator, Initial Attack (TPIA)
- Forest Protection Program Manager – FFT1, ICT4, STPL, RxB2, Division/Group Supervisor (DIVS)

2.5.6 Training

As outlined in MCO P5090.2A (2008):

1. All civilian, contractor, and emergency services personnel involved in wildland fire management must be trained for their expected level of involvement in the wildland fire organization. Training shall meet the applicable NFPA or NWCG Standards for wildland fire activities. State training by the state in which the installation is located is also acceptable if appropriate for the employee's expected level of involvement in wildland fire activities.
2. Suppression personnel in the fire protection GS-081 job series will meet the training standards specified in NFPA 1051 (**Appendix 1.B**) and NFPA 1002 (**Appendix 1.A**), equivalent NWCG Driver/Operator Professional Qualification System Guide (PMS 310-1; **Appendix 3.B**) training or equivalent State training requirements. Personnel who have learned skills from outside wildfire suppression, such as agency specific training programs or training and work in prescribed fire, structural fire, law enforcement, search and rescue, etc. may not be required to complete specific



- courses in order to qualify in a wildland fire position; however, position task books must be completed for documentation of the training.
3. Personnel in the natural resources job series (GS-401 thru GS-499), cultural resources (GS-0193), and natural/cultural resources contractors with jobs requiring wildland fire management activities, will qualify for fire certifications as per references NFPA 1051 (**Appendix 1.B**) and NFPA 1002 (**Appendix 1.A**), or the equivalent NWCG Wildland Fire Qualification System Guide (PMS 310-1/NFES 1414; **Appendix 3.B**) certifications.
 4. Personnel mobilized to participate in wildland fire management activities on Federal properties not under DoD jurisdiction, through the National Inter-Agency Fire Center (NIFC) and the Joint Director of Military Support (JDOMS) requests (as described in chapter 12.a. of the MCO P5090.2A), must be certified for the expected level of involvement under NWCG standards. GS-081 job series and DoD contractor personnel that seek wildland fire certifications must comply with the appropriate NWCG criteria.
 5. Personnel mobilized for fire support missions under the Interagency Agreement between the National Forests in North Carolina and Marine Corps Base Camp Lejeune for Mutual Firefighting Assistance, will be fully qualified under national standards for the mission. Prior to fire season, approval for the dispatch of personnel for wildland fire assignments will be obtained from the Director Installations and Environment. On a weekly basis, during fire season, the Wildland Fire Program Manager will assess the current wildfire situation and workforce needs and submit a list of personnel that are qualified and available for fire support mobilization, to the director EMD for approval. The approved mobilization list will then be forwarded to the Fire Dispatch Office, Asheville, North Carolina and those personnel will be available for immediate dispatch during that one week period.
 6. Position descriptions for new hires that will participate in wildland fire activities will reflect the expected level of involvement and required training. Position descriptions for natural/cultural resources personnel with wildland fire management duties must state if the position qualifies the position holder as a primary or secondary wildland firefighter, as described in Chapter 46 of the Office of Personnel Management, Civil Service Retirement System (CSRS) and Federal Employees Retirement System (FERS) Handbook for Personnel and Payroll Offices. Natural resources personnel not classified as a primary or secondary wildland firefighter may perform collateral duties in wildland fire management activities as qualified.
 7. Personnel holding positions as primary and secondary wildland firefighters will be certified, as a minimum requirement, in Cardio-Pulmonary Resuscitation and Standard First Aid by the American Red Cross or comparable certification authority.
 8. Headquarters (HQ) Air Force Civil Engineering Support Agency/Civil Engineering Fire Protection is the executive agent for the DoD Fire and Emergency Services (FES) Certification Program and will be responsible for issuing, maintaining, and tracking of NFPA wildland firefighter certifications; however, the installation wildland fire program manager will maintain fire company personnel wildland firefighter NWCG qualification and certification records. The installation Wildland fire program manager is responsible for issuing, signing, and tracking of NWCG Qualification Card/Incident Command System (also known as "red cards") for installation personnel. Installations are encouraged to partner with NWCG units to issue, maintain, and track qualifications and to conduct and receive training.

2.6 Record Keeping

MCO P5090.2A specifies that current training and qualification records will be maintained for all personnel involved in wildland fire management activities. These records will be maintained in the wildland fire management program office and managed by the wildland fire program manager. Training



and qualification records include, but are not limited to: Incident Qualification Classification System (IQCS) records, position taskbooks, medical examination records, and physical fitness test records.

2.7 Partnerships

As outlined in MCO P5090.2A, installations are encouraged to develop regional partnerships for wildland fire management support by means of reciprocal agreements with federal, state, local, and private entities to share human, logistical, and operational resources. Emergency assistance and mutual aid agreements will conform to the guidelines stated in DoDI 6055.06 (Appendix 4.A.7) and MCO P11000.11B (Appendix 4.A.13).



Collaborative processes, partnerships, and agreements in place at MCB CamLej include interagency wildland fire management planning and operations with the North Carolina Division of Forest Resources (NCDFR) and the USFS North Carolina Districts. A copy of the Memorandum of Agreement (MOA) between MCB CamLej and NCDFR is provided in **Appendix 4.A.14**, and a copy of the Interagency Agreement between the United States Department of Agriculture Forest Service National Forests in North Carolina and MCB CamLej for Firefighting Assistance is given in **Appendix 4.A.8**.

2.8 Funding Sources

MCO P5090.2A identifies the appropriate sources of funding for wildland fire activities, which are outlined below.

- Costs associated with developing and drafting or amending this WFMP will be funded by the Operation and Maintenance, Marine Corps account.
- Wildland fire management activities that are conducted for the purpose of compliance with environmental laws and regulations will be supported by conservation funds.
- Wildfire suppression, prescribed burning and other wildland fire management activities to support training, range use, munitions testing and evaluation, or other mission activity will be supported by the responsible activity through direct funding or reimbursement.
- Funding for wildfire prevention and fuels management for hazard reduction is an installation operations and maintenance responsibility.
- In accordance with 10 U.S. Code (U.S.C.) 2665, expenditures for the protection and maintenance of commercial forests can be reimbursed by proceeds derived from the sale of forest products; however, the total reimbursement for forest management obligations related to wildland fire management cannot exceed the forest management program proceeds in a given FY on the installation.



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3.0 WILDFIRE RISK ASSESSMENT AND PREPAREDNESS

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

Operational preparedness planning at MCB CamLej identifies what actions should be taken and what resources will be needed under certain weather conditions, what actions are required if a wildfire occurs in a given area of the installation, and what key indicators prompt preparedness actions. This type of preparedness planning supports the suppression standards and objectives outlined in **Section 4.2**.

3.1 Wildfire Risk Assessment

Fire danger ratings are often reflective of general conditions over an extended area that affect and initiate wildfire. Such ratings are developed for either current or predicted situations and are used to plan management actions two or three days in advance, as well as to compare the severity of one day or season to another.

3.1.1 Fuel Models

Fuel models are tools to help estimate fire behavior. Fire managers must be flexible and adaptive when utilizing this aid and remember that fire burns in the stratum best supporting the fire. Therefore, one fuel model may best represent the rate of spread and another may best represent flame length, or two fuel conditions may exist on the site. The fire must be weighted by the fraction of the area occupied by each fuel.

All combustible material available to burn within a given area of land is considered part of the natural fuel complex. Each type of fuel has distinct burning characteristics based on several inherent factors, including moisture content, volume, live to dead vegetation ratio, size, arrangement, and genetic composition. Fuel arrangement is a critical factor in fire behavior as it is linked to both intensity and rate of spread. Fire intensity is directly related to the amount and distribution of fuels across the landscape (commonly referred to as fuel loading), and fuel loading is typically measured in tons per acre.

In an attempt to estimate fire behavior, the USFS developed 13 fuel models that categorize fuels by their burn characteristics. The fuel models described in Anderson 1982 are inputs to a variety of fire behavior prediction systems that attempt to predict real-time fire behavior across a range of conditions. Four general groups were used to classify fuels: grass, shrub, timber, and logging slash (**Table 3-1**). Using the USFS system, MCB CamLej fuels were analyzed; grass, shrub, and timber are the most common fuel classes found at MCB CamLej and are depicted in **Figure 3-1**.

3.1.2 Risk Factors

The primary function of MCB CamLej is the training of combat-ready military troops. As part of this training, a number of pyrotechnic devices, incendiary rounds, and tracer ammunition are utilized. A large number of wildfires are ignited as an offshoot of this training every year. To help reduce the amount of fuel available to such a wildfire, natural resource and wildland fire managers conduct prescribed burning across the MCB CamLej landscape. Training ranges are scheduled for annual controlled burns and the surface danger zone for the G-10 impact area is burned in a checkerboard pattern on a two year cycle.

Additionally, training at MCB CamLej requires the use of impact and explosive ordnance disposal (EOD) areas. Access is not allowed in these areas due to an increased safety risk. Wildfires that start in these areas are managed with limited suppression tactics as outlined in **Section 4.2**.



**Table 3-1
 Description of Fuel Models.**

Fuel Model	Typical Fuel Complex	Fuel Loading			Fuel Bed Depth	Rate of Spread	Flame Length	NFDRS* Correlation
		< 3" dead and live	Dead, 1/4 inch	Live				
		Tons/acre			Feet	Chains/hour	Feet	
Grass								
1	Short grass (1 foot)	0.7	0.7	0.0	1.0	78	4	A, L, S
2	Timber (grass and understory)	4.0	2.0	0.5	1.0	35	6	C, T
3	Tall grass (2.5 feet)	3.0	3.0	0.0	2.5	104	12	N
Shrub								
4	Chaparral / High pocosin	13.0	5.0	5.0	6.0	75	19	B, O
5	Brush (2 feet)	3.5	1.0	2.0	2.0	18	4	D, T
6	Low pocosin; Dormant brush; Hardwood slash	6.0	1.5	0.0	2.5	32	6	F, Q
7	Southern rough	4.9	1.1	0.4	2.5	20	5	D
Timber								
8	Closed timber litter	5.0	1.5	0.0	0.2	1.6	1	H, R
9	Hardwood litter	3.5	2.9	0.0	0.2	7.5	2.6	E, P, U
10	Timber (litter and understory)	12.0	3.0	2.0	1.0	7.9	4.8	G
Slash								
11	Light logging slash	11.5	1.5	0.0	1.0	6	3.5	K
12	Medium logging slash	34.6	4.0	0.0	2.3	13	8	J
13	Heavy logging slash	58.1	7.0	0.0	3.0	13.5	10.5	I

Source: Albini 1976, Anderson 1982
 *NFDRS = National Fire Danger Rating System

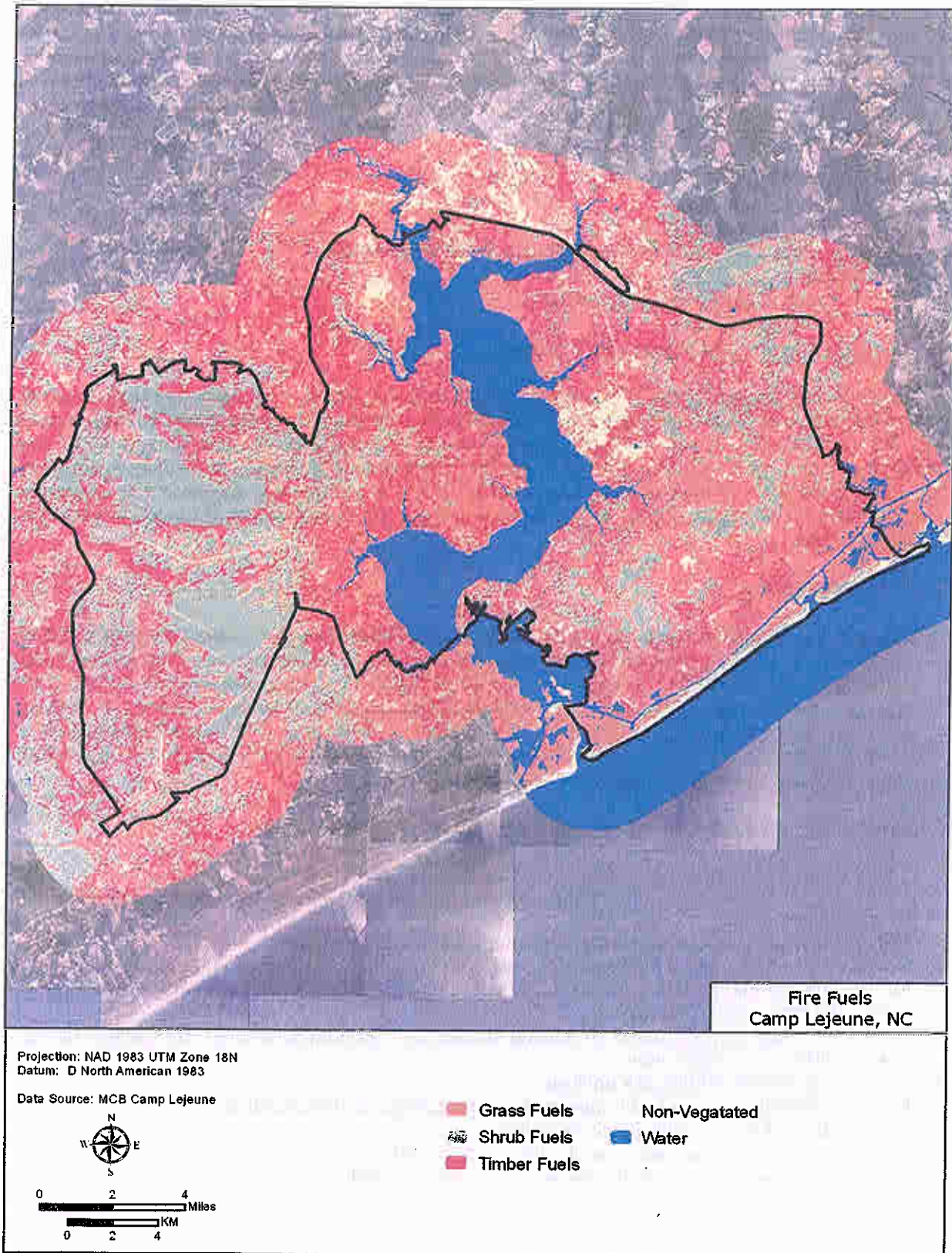


Figure 3-1. Fuel Classes at MCB Camp Lejeune.



3.1.3 Pre-Season Wildfire Risk Analysis

Pre-season risk analysis provides the basis for wildland fire management actions such as pre-positioning of critical resources, requesting additional funding, or modifying applicable cooperative agreements to meet anticipated needs. A pre-season wildfire risk analysis checklist for MCB CamLej is below. This and any other applicable information will be used to predict the severity and duration of the wildfire season at MCB CamLej.

- Check current and predicted weather, especially
 - Precipitation levels
 - Drought indices
- Compare current and predicted weather with historical information
- Check fuels info, such as
 - Areas of new disease or dieback
 - Recent blowdown
- Compare fuels info with historical information

Key indicator values are compared with average values and with levels of significant wildfire years to determine the potential for the current year. Many different indicators can be used to develop a pre-season risk analysis including precipitation levels, drought indices, fires to date, and regional fire preparedness level. Current regional drought levels and a link to further drought monitoring information are located at http://www.dfr.state.nc.us/fire_control/kbdi.htm. If the analysis suggests that an abnormal fire season might be anticipated, local and regional resources will be notified of the potential need for additional resources.

3.2 Preparedness

Preparedness is the process of planning and implementing activities prior to wildland fire ignition and is the foundation for an effective wildland fire management program at MCB CamLej. Thorough planning enables managers to effectively meet a variety of wildland fire management objectives. The preparedness planning process includes routine actions completed prior to each fire season as well as supplemental actions conducted in response to changing fire danger. Fireline construction and maintenance is an example of a routine preparedness action; as fire danger increases, the level of effort must also increase and supplemental actions may need to be taken.

At a minimum, MCB CamLej will accomplish the following preparedness actions:

1. Incorporate preparedness considerations in the WFMP
2. Maintain a cache of supplies, materials, and equipment sufficient to meet normal unit strength (NUS) requirements
3. Maintain fully qualified personnel commensurate with PMS 310-1
4. Operate fire-related data processing systems to enter, archive, retrieve, and interpret information for wildland fire management planning and operations. Maintain record systems, weather data, maps, and other related information
5. Adhere to a step-up plan based on staffing classes derived from a National Fire Danger Rating System (NFDRS) or other index
6. Prepare pre-season wildfire risk analysis
7. Provide a dispatch system for fire management resources on the installation
8. Maintain detection and initial attack capabilities
9. Ensure maintenance and operation of a fire weather station
10. Review agreements to coordinate interagency operations and update as necessary



3.2.1 Preparedness Level

MCB CamLej contains varying fuel types that react differently under different drought conditions. Drought index, energy release component, and water levels can be used as measurable objective figures to indicate an appropriate preparedness level. Ignition component, season, national and regional fire activity, and other circumstances are also considered in preparedness decisions.

Ignition sources for wildland fire at MCB CamLej include but are not limited to escaped prescribed fires, range/training fires, equipment fires, and lightning. Ignition sources vary by season since temperature, lightning activity, rainfall, relative humidity (RH), fuel moisture content, and curing stage of live fuels vary seasonally. Although lightning is not an important ignition source at MCB CamLej, lightning fires may occur more frequently during the Atlantic storm season from May through August. Escaped prescribed fires may occur during the dormant season and range/training caused fires may occur year-round.

MCB CamLej fire preparedness levels are directly linked to the NCDFR determinations; state preparedness levels are used in the installation step-up staffing plan (described below). National, regional, and local resource availability levels are determined by NFRDS using national weather data. These levels affect the amount of back-up resources available in case of wildland fire or during prescribed fire actions at MCB CamLej and the use of prescribed fire may be limited when national or regional planning levels are high.

Current information on NCDFR fire readiness by district is available online at http://www.dfr.state.nc.us/fire_control/readiness_plans.htm
Additional information on wildfire, prescribed fire, and fire safety can be found on the NCDFR Fire Website at http://www.dfr.state.nc.us/fire_control/fire_menu.htm.

3.2.2 Step-Up Staffing Plan

A step-up plan identifies the process and procedures for determining the level of preparedness activities for wildland fire staff and suppression equipment on an incremental basis in response to increasing fire danger. Step-up plans typically use NFRDS calculated values such as Burning Index (BI), Energy Release Component (ERC), or staffing class to determine the current and expected level of fire danger. As the level of fire danger increases, various wildfire management actions are scheduled to occur automatically as defined within the WFMP. This includes authorization of funding during periods of high to extreme fire danger for extra staffing, extended work hours, and emergency equipment rentals such as air tankers and helicopters.

Preparation for the normal sequence of fire seasons begins with the fire crew stepping up the maintenance of fire suppression equipment, reviewing the maintenance needs of fire break and control lines, and reviewing cooperative agreements. Protection and prevention precautions during extreme dry periods would include more stringent precautions, such as the suspension of any prescribed fire operations and implementation of preparation sequences in the step-up plan.

Using the step-up plan, wildland fire management resources may be pre-positioned during periods when preparedness levels are high, or when a pre-season risk analysis predicts that initial and extended attack needs will exceed the installation's response capability.

Preparedness Level 1:

- NFRDS Staffing Class of 2 or lower
- Little or no commitment of installation fire management resources
- Potential for escaped fires is low
- Any fires occurring present low to moderate difficulty of control using existing resources



Preparedness Actions:

- Review fire weather daily
- Maintain and stage fire suppression equipment

Step-Up Plan:

- May support resource requests from NC Division of Forestry and USFS through existing Memoranda of Agreement MOAs

Preparedness Level 2:

- Wildland fire activity is occurring in the region and a low to moderate potential exists of escapes
- NFRDS Staffing Class of 3 or lower
- Minimal regional mobilization is occurring

Preparedness Actions:

- Review fire weather daily
- Maintain and stage wildland fire suppression equipment
- Ensure that qualified fire personnel are available for initial attack

Step-Up Plan:

- May support resource requests from NC Division of Forestry and USFS through existing MOAs
- Consider increasing or transitioning to 7 day wildland fire personnel staffing

Preparedness Level 3:

- Wildfire activity requiring significant commitment of regional resources
- Initial attack is generally successful but the installation has an increasing number of ignitions
- NFDRS Staffing Class of 4 or lower
- Regional wildland fire resources are being mobilized
- Type III Incident Management Team in the area

Preparedness Actions:

- Review fire weather daily
- Maintain and stage wildland fire suppression equipment
- Ensure that a minimum of two qualified fire personnel are available for initial attack
- Wildland fire personnel will be on fire standby at the discretion of the wildland fire program manager

Step-Up Plan:

- Anticipate multiple ignitions
- Provide 7-day wildland fire personnel staffing at the discretion of the wildland fire program manager
- Consider limiting support of resource requests from NC Division of Forestry and USFS

Preparedness Level 4:

- Large or multiple wildfires in progress on the installation
- NFDRS Staffing Class of 4 or higher
- Multiple ignitions are occurring
- Resource shortages exist in the region
- Type II Incident Management Team in the area

Preparedness Actions:

- Review fire weather daily
- Maintain and stage wildland fire suppression equipment
- Ensure that a minimum of two qualified wildland fire personnel are available for initial attack



- Increase fire detection patrols or coordinate with NC Division of Forestry and USFS for wildfire detection
- Wildland fire personnel consisting of 1 strike team leader, 1 tractor crewman, 1 tractor plow strike team, and Type 6 engine will be on duty until 1830 Daylight Savings Time (DST), 1730 Eastern Standard Time (EST); additional resources may be placed on standby at the discretion of the wildland fire manager

Step-Up Plan:

- Anticipate multiple ignitions
- Prepare for a large wildfire by setting up expanded dispatch and support
- Assess the need for additional wildland fire leadership support
- Consider pre-positioning resources in high risk areas

Preparedness Level 5:

- Large or multiple wildfires in progress on the installation
- NFDRS Staffing Class of 5
- Significant competition for resources is occurring
- Type I Incident Management Team in the area

Preparedness Actions:

- Review fire weather daily
- Maintain and stage wildland fire suppression equipment
- Ensure that a minimum of two qualified fire personnel are available for initial attack
- Increase fire detection patrols or coordinate with NC Division of Forestry for wildfire detection
- Increased fire activity will require the support of the NC Division of Forest Resources for initial attack tractor strike teams, if ECON tractor strike teams are committed to other initial attack incidents. Coordination with the District 4 office of the NC Division of Forest Resources on the status of resources should be conducted each day.
- Wildland fire personnel consisting of 1 strike team leader, 1 tractor crewman, 1 tractor plow strike team, and Type 6 engine will be on duty until 1900 (DST), 1830 (EST); additional resources may be placed on standby at the discretion of the wildland fire manager

Step-Up Plan:

- Consider ordering additional wildland fire leadership assistance
- Consider pre-positioning resources in high risk areas

Preparedness Level 6 and Above:

- Large or multiple wildfires in progress on the installation
- NCDNR Level 6 or above
- Significant competition for area resources is occurring
- One or more Type I Incident Management Team in the area

Preparedness Actions:

- Review fire weather daily
- Maintain and stage wildland fire suppression equipment
- Ensure that a minimum of two qualified wildland fire personnel are available for initial attack
- Wildland fire personnel consisting of at least 2 strike team leaders, 2 tractor crewmen, 3 tractor plow units, and two Type 6 engines, will be on standby until sunset

Step-Up Plan:

- Consider ordering additional wildland fire leadership assistance
- Consider pre-positioning resources in high risk areas



3.2.3 Fire Season Readiness Evaluation

A preseason fire readiness inspection for MCB CamLej should be conducted annually prior to the wildland fire season. Fire readiness inspections are conducted to determine whether or not current training levels, equipment inventories, and organizational structure meet the standards described in this WFMP and applicable guidelines and policies. Several interagency preparedness review checklists have been developed by the BLM and are available at http://www.blm.gov/nitc/st/en/prog/fire/fireops/preparedness/preparedness_review/checklists.html.

3.2.4 MCB Camp Lejeune Fire Readiness Plan

As established by BO P3570.1B, in March and September, Range Control will publish the fire readiness plan message to remind all units of their responsibilities during the fire season. Readiness levels are determined by the NC Division of Forestry, and include MCB CamLej, OLF Oak Grove, and surrounding counties. As discussed in BO P3570.1B, fire readiness planning establishes training restrictions and preparation commensurate with the wildfire danger by establishing forest fire danger ratings as follows:

- Fire Readiness Plan 1. Fire danger is low. No restrictions on authorized ranges and training areas. Normal safety precautions will be followed.
- Fire Readiness Plan 2. Occasional fire activity. No restrictions on authorized ranges and training areas. Normal safety precautions will be followed.
- Fire Readiness Plan 3. Fire danger is moderate. The use of certain ranges and training areas may be curtailed at the discretion of the Commanding Officer (CO), MCB CamLej. Normal safety precautions will be followed. Caution shall be exercised in the use of all pyrotechnics and smoke.
- Fire Readiness Plan 4. Fire season. The use of certain ranges and training areas may be curtailed at the discretion of the CO, MCB CamLej. Warming fires, when specifically authorized, will be used only in designated places and only under supervision of a Staff Noncommissioned Officer. Pyrotechnics/smoke are restricted to authorized ranges.
- Fire Readiness Plan 5. Fire danger is high/severe. Pyrotechnics/smoke/incendiary ammunition will be restricted to the BT-3/N-1, G-10, and K-2 Impact Areas only. Tracer ammunition is restricted to the BT-3/N-1, G-10, and K-2 Impact Areas only. Authority to use tracer ammunition in GSRA or on any other ranges will be approved by the Commanding Officer or Executive Officer, MCB following consultation with Department of Public Safety, S-3 and Installation and Environment departments. Smoking is permitted only in locations specifically designated by the training unit commander to reduce the fire hazard. These areas will be fireproofed and supervised. The use of generators will be restricted to areas that have been fireproofed to mineral soil for a 50-ft diameter around each generator. Warming fires are not authorized.
- Fire Readiness Plan 6. Fire danger is critical. All military training in forested areas and other activities likely to start forest fires, such as smoking, will be suspended. Only ball ammunition, fragmentation hand grenades, demolition materials, high explosive artillery, and mortar ammunition on designated ranges/impact areas can be used during Readiness Plan 6.
- Fire Readiness Plan 7. Fire danger is extreme. All training will cease and troops will come out of the field. Request to train during Readiness Plan 7 will be submitted to the CO, MCB CamLej via Director, S-3.
- Blow-Up Alert. An alert to units that conditions could quickly elevate from level 4 to level 7 or higher. All training will cease and troops will come out of the field.
- The use of pyrotechnics, smoke and dud producing ordnance in the GSRA is prohibited



3.2.5 Adverse Wind Profiles

When MCB CamLej is on Blow-up alert or at RP-5 or above with an adverse profile, prescribed fires should be stopped as quickly as possible. Long range spotting direction is determined by upper level winds. Spotting over shorter distances, 1,000 ft. or less, will be in front of the fire. Spotting for long distances of ½ mile or more will usually be determined by direction of winds at higher levels and the chances are more than 50/50 that this type spotting will be on the right flank of the fire. Most fires in these profiles will behave much like other fires; but, remember that once a fire gets large enough, the behavior can change very suddenly and become out of hand.

Under adverse profiles, and especially on Blow-Up Alert days, all previous prescribed and wildfires should be checked very closely. Equipment should be pre-positioned around any areas that have past burns or where there has been ground fire.

TYPE 1-A

- a. Long distance spotting.
- b. Fire whirlwinds.
- c. High rates of spread. Up to 3 miles per hour (MPH) for short distances

TYPE 1-B (SIMILAR TO 1-A)

- a. Long distance spotting.
- b. Less of a tendency for fire whirlwinds.
- c. High rate of spread. (2000 acres per hour)

TYPE 1-C

- a. Long distance spotting.
- b. Tendency for large fire whirlwinds on surface and in smoke columns aloft.
- c. High rate of spread and high intensity.

TYPE 1-D

- a. Very long distance spotting and associated fire storm effects.
- b. Very rapid spread; 3-4 MPH or more.
- c. Intense whirlwinds in smoke column aloft may burrow down to surface.

TYPE 1-E (SIMILAR TO 1-A)

- a. Spread less rapid – still dangerous if fire is large from previous run.
- b. Shorter distance spotting.
- c. Less chance for whirlwinds.

TYPE 1-F (SIMILAR TO 1-B OR SMALLER SCALE)

- a. Spread less rapid – still dangerous if fire is large from previous runs.
- b. Shorter distance spotting.
- c. Less chance for fire whirlwinds.

3.2.6 Supplies, Materials, and Equipment

A certain level of inventory must be maintained to be prepared for initial attack. Ongoing wildfires require a much higher inventory of equipment and supplies. Some materials are expendable and must be replaced when used. Other materials, primarily suppression equipment, may cost hundreds of thousands of dollars and are utilized for several years or even decades. This section defines the level at which MCB CamLej should be equipped for various suppression and prescribed fire operations.



3.2.6.1 Equipment

MCB CamLej must maintain a cache of wildland fire fighting tools and PPE adequate to support all installation initial attack. The numbers, type, and distribution of materials in the cache are dictated by the staffing, suppression strategy, fuels, and wildland fire history of the installation. Cache equipment, other than installation common-use property, is considered to be the installation's NUS.

NUS is a recommended base level of all items required to support initial attack operations on wildland fires; not for support of wildfires exceeding initial attack. NUS will include PPE and safety items required for prescribed fire assignments. Equipment and supplies needed to perform extended attack activities, or to equip personnel ordered to support extended attack activities will be supplied by other sources.

Items used during initial attack on wildfires and prescribed fires will be replaced or repaired from the appropriate funding source (see **Section 2.8 Funding Sources**). NUS supplies are normally ordered through the General Services Administration (GSA) although other sources may be used, including through the North Carolina Interagency Coordination Center (NCICC) or directly from the manufacturers.

All NUS items will be maintained in such a way that they will not be used for routine natural resource management operations. If, in an emergency, NUS items must be used for non-fire operations, the items will be replaced immediately, funded by the benefiting activity. Items used in an emergency during extended suppression operations must be replaced immediately.

All wildland firefighting equipment and supplies will be kept in a constant state of readiness for fire suppression and prescribed fire activities. It is the responsibility of the MCB CamLej wildland fire program manager to ensure that an appropriate supply of wildland fire equipment is stocked, accounted for, and maintained as necessary. Quantities of the supplies/equipment are determined by the number of personnel estimated for initial attack, with an allowance for reserves. The MCB CamLej wildland fire cache will be annually inventoried and inspected in order to ensure the equipment is available and in working order. Records of the annual inventory and inspection should include the date, inspector name and signature, and note of any issues, concerns, equipment needs, etc. These records will be maintained in the wildland fire management program records.

The wildland fire program manager shall ensure that wildland fire response vehicles are available and operating in a constant state of readiness. If at any time the equipment on such vehicle is not operational, immediate corrective action will be taken. **Table 3-2** lists the interagency minimum stocking levels for Type 3-6 engines. **Table 3-3** lists MCB CamLej fire program equipment available for installation wildland fire management activities and dispatch. For equipment on this list, tractors will come with operator, groundman, and tractor boss/strike team leader. Miscellaneous equipment will come with necessary operator. **Table 3-4** lists minimum stocking levels for the MCB CamLej wildland fire cache, which is to be maintained in addition to the required equipment, materials, supplies, and PPE listed in **Tables 3-3** through **3-5** and **Section 3.2.6.2**. **Table 3-5** lists the wildland fire equipment maintained by the MCB CamLej FESD.



**Table 3-2
Interagency Minimum Stocking Levels for Type 3-6 Engines.**

Category	Item Description	NFES #	Type	
			3, 4, & 5	6
Fire Tools & Equipment	McLeod	296	1	
	Combination Tool	1180	1	1
	Shovel	171	3	2
	Pulaski	146	3	2
	Backpack Pump	1149	3	2
	Fusees (case)	105	1	½
	Foam, concentrate, Class A (5-gallon)	1145	1	1
	Chainsaw (and chaps)		1	1
	Chainsaw Tool Kit	342	1	1
	Drip Torch	241	2	1
Portable Pump		*	*	
Medical	First Aid Kit, 10-person	1143	1	1
	Burn Kit		1	1
	Body Fluids Barrier Kit	640	1	1
General Supplies	Flashlight, general service	69	1	1
	Chock Blocks		1	1
	Tow Chain or Cable	1856	1	1
	Jack, hydraulic (comply w/GVW)		1	1
	Lug Wrench		1	1
	Pliers, fence		1	1
	Food (48-hour supply)	1842	1	1
	Rags	3309	*	*
	Rope/Cord (feet)		50	50
	Sheeting, plastic, 10' x 20'	1287	1	1
	Tape, duct	71	1	1
	Tape, filament (roll)	222	2	2
	Water (gallon/person) minimum		2	2
	Bolt Cutters		1	1
	Toilet Paper (roll)	142	*	*
	Cooler or Ice Chest	557	*	*
	Hand Primer, Mark III	145	*	*
	Hose Clamp	46	2	1
	Gaskets (set)		1	1
	Pail, collapsible	141	1	1
Hose Reel Crank		*	*	
Safety	Fire Extinguisher (5 lb)	2143	1	1
	Flagging, Pink (roll)	566	*	*
	Flagging, Yellow w/Black Stripes (roll)	267	*	*
	Fuel Safety Can (Type 2 OSHA, metal, 5-gallon)	1291	*	*
	Reflector Set		*	*
Vehicle & Pump Support	General Tool Kit (5180-00-177-7033/GSA)		1	1
	Oil, automotive, quart		4	2
	Oil, penetrating, can		1	1
	Oil, automatic transmission, quart		1	1



Table 3-2 (continued)
Interagency Minimum Stocking Levels for Type 3-6 Engines.

Category	Item Description	NFES #	Type	
			3, 4, & 5	6
Vehicle & Pump Support	Brake Fluid, pint		1	1
	Filter, gas		1	1
	Fan Belts		1	1
	Spark Plugs		1	1
	Hose, air compressor w/adapters		1	0
	Fuses (set)		1	1
	Tire Pressure Gauge		1	1
	Jumper Cables		1	1
	Battery Terminal Cleaner		*	*
	Tape, electrical, plastic	619	1	1
	Tape, Teflon		1	1
Personal Gear (Extra Supply)	File, mill, bastard	60	*	*
	Head Lamp	713	1	1
	Hard Hat	109	1	1
	Goggles	1024	2	2
	Gloves		*	*
	First Aid Kit, individual	67	1	1
	Fire Shirt		*	*
	Fire Shelter w/case & liner	169	2	1
	Packsack	744	2	1
	Batteries, headlamp (pkg)	30	6	4
	Ear Plugs (pair)	1027	3	3
Radio	Portable		1	1
	Mobile		1	1
	Batteries (for portable radio)		2	2
Hose	Booster (feet/reel)	1220	100	100
	Suction (length, 8' or 10')		2	2
	1" NPSH (feet)	966	300	300
	1 1/2" NH (feet)	967	300	300
	3/4" NH, garden (feet)	1016	300	300
	1 1/2" NH, engine protection (feet)		20	20
	1 1/2" NH, refill (feet)		15	15
Wye	1" NPSH, Two-Way, Gated	259	2	1
	1 1/2" NH, Two-Way, Gated	231	4	2
	3/4" NH w/Ball Valve, Gated	739	6	4
Adapter	1" NPSH-F to 1" NH-M	3	*	*
	1" NH-F to 1" NPSH-M	4	1	1
	1 1/2" NPSH-F to 1 1/2" NH-M	7	1	1
	1 1/2" NH-F to 1 1/2" NPSH-M	6	*	*
Nozzle	Forester, 1" NPSH	24	3	2
	Adjustable, 1" NPSH	138	4	2
	Adjustable, 1 1/2" NH	137	5	3
	Adjustable, 3/4" NH	136	4	2
	Foam, 3/4" NH	627	1	1



Table 3-2 (continued)
Interagency Minimum Stocking Levels for Type 3-6 Engines.

Category	Item Description	NFES #	Type	
			3, 4, & 5	6
Nozzle	Foam 1 ½" NH	628	1	1
	Mopup Wand	720	2	1
	Tip, Mopup Wand	735	4	2
	Tip, Forester, Nozzle, fog	903	*	*
	Tip, Forester Nozzle, straight stream	638	*	*
Increaser	¾" NH-F to 1" NPSH-M	2235	1	1
	1" NPSH-F to 1 ½" NH-M	416	2	1
Coupling	1" NPSH, Double Female	710	1	1
	1" NPSH, Double Male	916	1	1
	1 ½" NH, Double Female	857	2	2
	1 ½" NH, Double Male	856	1	1
Reducer/ Adapter	1" NPSH-F to ¾" NH-M	733	3	3
	1 ½" NH-F to 1" NPSH-M	10	6	4
	2" NPSH-F to 1 ½" NH-M	417	*	*
	2 ½" NPSH-F to 1 ½" NH-M	2229	*	*
Reducer	1 ½" NH-F to 1" NH-M	9	1	1
	2 ½" NH-F to 1 ½" NH-M	2230	1	1
Tee	1" NPSH-F x 1" NPSH-M x 1" NPSH-M, w/cap	2240	2	2
	1 ½" NH-F x 1 ½" NH-M x 1" NPSH-M w/cap	731	2	2
	1 ½" NH-F x 1 ½" NH-M x 1" NPSH-M w/valve	230	2	2
Valve	1 ½" NH-F, Automatic Check and Bleeder	228	1	1
	¾" NH, Shut Off	738	5	5
	1" Shut Off	1201	1	1
	1 ½" Shut Off	1207	1	1
	Foot, w/strainer		1	1
Injector Wrench	1" NPSH x 1/12" NH, Jet Refill	7429	*	*
	Hydrant, adjustable, 8"	688	1	1
	Spanner, 5", 1" to 1 ½" hose size	234	4	1
	Spanner, 11", 1 ½" to 2 ½" hose size	235	2	2
	Pipe, 14"	934	1	1
	Pipe, 20"		1	1
Engine	Fireline Handbook	65	1	1
	GPS Unit		1	1
	Belt Weather Kit	1050	1	1
	Binoculars		1	1
	Map Case w/ maps		1	1
	Inventory List		1	1
	Current Interagency Standards for Fire and Fire Aviation Operations		1	1

* No minimums – carried by engines as an option, within weight limitations



Table 3-3
MCB Camp Lejeune Equipment Available for Wildland Fire Dispatch

Item	Quantity
Tractor/Plow, TD-15 LGP	2
Tractor/Plow, D-5H LGP	2
Tractor, D-5H LGP w/PAT Blade	1
¾ Ton Slipon 4x4, 150 gal	4
Engine, Type 6, 4x4	1
Mark III Pump	2
Mark 26	2
Honda Pressure Pumps	4
Drop Tank (Pumpkin), 2000 gal	1
Drop Tank (Pumpkin), 500 gal	1

Table 3-4
Minimum Stocking Levels for MCB CamLej Wildland Fire Cache.

Category	Description	Quantity
Hose		
	1-1/2"	3,000 ft
	1"	1,500 ft
	3/4"	500 ft
Appliances		
Reducers		
	1.5" NH X 1" NPSH	20
	1.5" NPSH X 1" NPSH	6
	1" NPSH X 3/4" NH	10
Adapters		
	1.5" NH X 1.5" NPSH	6
	1.5" NPSH X 1.5" NH	6
	1" NH X 1" NPSH	6
	1" NPSH X 1" NH	6
Couplers		
	Female 1.5" X 1.5"	2
	Male 1.5" X 1.5"	2
Nozzles		
	1.5" X 1.5"	10
WYES		
	1.5" X 1.5"	15
	1" X 1"	6
Foot Valves		
		6
Miscellaneous Support Equipment		
	Backpack Pumps	6
	Pressure Pumps (Portable)	4
	Mop-up Kit	1
	Class A foam (5 gal)	4
Hand Tools		
	Combi Tool	6
	Fire Rake	6
	Pulaski	6
Drop Tanks		
	500 gal	1
	1000+ gal	1



Table 3-5.
MCB Camp Lejeune FESD Wildland Fire Cache.

Category	Description	Quantity
Vehicles		
	Chevrolet K3500 4x4 Pickup Trucks w/Skid units, 200'x1" reel, 200 gallon w/10 gallon foam	6
	Dodge 3500 4x4 CAF unit, 200'x1" reel, 300 gallon w/ 20 gallon foam	1
	Ford F550 4x4 CAF units, 200'x1" reel, 320 gallon w/ 20 gallon foam	2
	Dodge 2500 1/2T Pickup Trucks w/Skid units, 200'x1" reel, 200 gallon w/10 gallon foam	3
Hose and Adapters		
	Hard Suction Hose	1
	1 3/4" x 50' Hose	1
	2 1/2" x 1 1/2" Wye	1
	1/2" x 1 1/2" Adapter	2
	1 1/2" Fog Nozzle	1
	Spanner Wrench	2
	Hydrant Wrench	1
Miscellaneous Equipment		
	Maps	
	Fire Shelters	2
	Water Backpack	1
	Drip Torch	1
	Round Shovel	2
	Pulaski Axe	1
	Chain Saw	1
	Chain Saw Chaps	1
	Fire Flaps	2
	Fire Rakes	2
	Handlight	1
	Medical Aid Kit	1
	Water Cooler	1
	Safety Vest	1
	No Fire Sign	1
	Hearing Protection	
	Mobile Radio	
	Portable Radio	

3.2.6.2 Personal Protective Equipment

It is mandatory that all personnel involved in direct wildland fire management activities are outfitted with protective clothing and equipment that meets NFPA 1977 – Standard on Protective Clothing and Equipment for Wildland Fire Fighting (MCO P5090.2A) and the 2008 NIFC Red Book (**Appendix 2.A**). All fire personnel must be equipped with the proper PPE necessary for wildland fire management activities. Knowledge of the proper selection, use, and care of the various tools and equipment used in wildland fire management as well as the capabilities and limitations of PPE is the responsibility of every individual. Fire personnel will ensure that proper PPE is worn at all times when actively engaged in wildland fire management activities.



The MCB CamLej wildland fire program shall maintain a minimum level of PPE at the installation fire cache to outfit all personnel assigned to fire management duties. Required PPE is described in detail in Chapter 7 of the 2008 NIFC Redbook and NFPA 1977. Required PPE for wildland fire positions at MCB CamLej is listed below.

- 8-inch high, lace-type exterior leather work boots with non-slip, Vibram type, melt-resistant soles. The 8-inch height requirement is measured from the bottom of the heel to the top of the boot.
- Fire shelter
- Hard hat with chinstrap
- Goggles/safety glasses
- Ear plugs/hearing protection
- Pants, shirts, or coveralls that meet or exceed the NFPA 1977 and 2008 NIFC Redbook standards
- Leather gloves
- Additional PPE as identified by local conditions, material safety data sheet (MSDS), or job hazard analyses.

In addition to the required PPE listed above, the following supplies are an essential part of the wildland fire personnel line gear:

- Fireline pack
- Canteen (2 quarts minimum)
- Extra set of ear plugs
- First aid kit
- File
- 1 (Meal, Ready to Eat) MRE
- Headlamp with batteries
- Flagging
- Fuzees

3.2.7 Pre-Attack Plans

The pre-attack plan is a comprehensive compilation of essential wildland fire management and planning information, which must be available in the wildland fire management office, and made available to other MCB CamLej divisions such as FESD, Range Control Office, Blackburn, etc. The pre-attack plan should be reviewed annually prior to the fire season and revised as necessary by the wildland fire program manager. The plan should include evaluations of sensitive cultural and natural resource values and hazards based on recommendations with resource specialists both prior to the fire season (pre-season planning) and throughout the season.

On an annual basis, personnel from the NCDFR, MCB, USFS and other wildland fire cooperators will meet to discuss the current wildland fire suppression capabilities of each Agency and to address wildland fire related issues prior to the onset of spring fire season.

The NCDFR MOA also outlines that the MCB CamLej wildland fire program manager, MCB CamLej FESD Chief, and personnel of the fire organizations of both MCB CamLej and the State are invited and encouraged, on a reciprocal basis, to frequently visit each other's activities for guided familiarization tours consistent with local security requirements and, as feasible, to jointly conduct pre-fire planning inspections and drills.



3.2.8 Preplanned Dispatch

Section 5.7 of NFPA 1710 (**Appendix 1.E**) discusses requirements and recommendations of fire companies that provide wildland fire suppression services. NFPA 1710 requires that fire companies ensure all levels of capability including personnel, equipment, and resources to deploy to wildfire suppression operations. Direct attack requirements include the capability to begin initial attack within 10 minutes after arrival of the initial company or crew at the scene, deploy water to the fire, secure threatened structures or development, and provide any other support activities.

In addition, NFPA 1710 requires that all wildfire suppression operations be organized to ensure compliance with NFPA 1143 Standard for Wildland Fire Management (**Appendix 1.C**). The 2009 edition of NFPA 1143 includes definitions of wildland fire terminology, discussions of risk assessment and preparedness, as well as an overview of the structure and responsibilities for incident management, wildfire suppression, and post-incident activities.

At MCB Camp Lejeune, initial attack may be initiated by trained wildland fire management personnel. NFPA 1143 makes it clear that designated personnel from all functional areas of fire management must attend an incident review to discuss safety practices and provisions, strategy and tactics, deployment of personnel, equipment and apparatus, support functions, and the overall management of wildfire. At a minimum, NFPA 1143 recommends evaluation of the following:

1. Accidents, injuries, or fatalities connected to the incident to determine cause(s) and contributing factors and, where applicable, to recommend corrective actions
2. Actions used on the incident and confirmation of effective decisions or corrected deficiencies
3. Fire cause(s) and contributing factors
4. Identification of new or improved procedures, techniques, or tactics used on the incident, or alternatives to be used on future incidents



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4.0 WILDLAND FIRE MANAGEMENT STRATEGIES AND OPTIONS

Fire is an important land management tool at MCB CamLej, used to reduce wildfire hazard on range and training areas and in other sensitive areas of the installation. At MCB CamLej wildland fire must be managed to support the military mission; all fire will be managed according to installation natural resource management goals outlined in **Section 2.2**, in addition to the federal and DoD policies referenced in **Section 1.4**. The historical and beneficial role of fire in developing and maintaining the natural ecosystems of MCB CamLej is recognized by wildland fire program managers.

4.1 General Management Considerations

General considerations for wildland fire management at MCB CamLej include the following:

- All wildland fire will be managed in a safe and efficient manner, utilizing the best practical method to produce the least negative impact on the environment, military operations, and sensitive areas. For example, existing breaks or barriers will be utilized instead of constructing new firelines; use wet lines instead of plowed lines; use hand crews for mop-up.
- Dormant and growing season prescribed fire will be used to reduce the level of hazardous fuels and restore fire dependent grassy fuel types where brush types now exist.
- Maintain or expand cooperative ventures with adjacent land management agencies to aid in suppression of large installation wildfires.
- Develop fuels management zones around range areas, the installation perimeter, and sensitive areas on the installation.
- Utilize adaptive wildland fire management considering historic fire seasons and frequencies, to restore and maintain longleaf pine habitats on suitable installation habitats.

4.2 Wildland Fire Management Options

Wildland fire management operations used at MCB CamLej will consider military mission and natural resource and fire management objectives. Wildland fire management options include suppression, prescribed fire, and non-fire fuel treatments.

4.2.1 Wildfire Suppression

A wildfire is defined as a free burning and unwanted wildland fire requiring a suppression action. Wildfires will always be suppressed in the safest, most cost-effective manner, and with the least impacts to installation resources possible, as required by MCB CamLej and interagency wildland fire policies.

Suppression includes all actions initiated to limit the growth of a wildfire. Suppression actions include, but are not limited to, control, confinement, and limited suppression options.

- Control includes all active suppression action to surround the wildfire by a fireline, natural barriers, and/or use of aerial application of water to eliminate the threat of escape. Minimum impact options (such as burning out to existing barriers) may be used; however, more active measures (such as plowing or direct attack) may be necessary to assure rapid control of the wildfire if safety and protection of resources is a factor.
- Containment refers to actions restricting a wildfire within certain boundaries that may be expected to stop the spread.
- Limited suppression is the observation of a wildfire when more active suppression is not feasible or desired. Wildfires are continuously monitored and often allowed to burn to existing unit boundaries where they are contained.



Due to safety concerns, limited suppression is the only available wildland fire management option in the impact areas (see **Figure 4-1**). Firefighting personnel will allow wildfires in the impact areas to burn until they reach the buffer zone; firefighting personnel will not enter the impact areas.

Wildfire suppression policies, operations, and tactics at MCB CamLej will be in accordance with the Interagency Standards for Fire and Fire Aviation Operations (2008 NIFC Red Book; **Appendix 2.A**). All local fire suppression operations will follow the NIMS (**Appendix 4.A.4**), PMS 310-1 (**Appendix 3.B**), and the ICS. Extended attack fires at MCB CamLej may infrequently require transition to an outside incident management team; more information is given below. All personnel utilized for wildfire suppression activities must meet physical training and experience requirements in accordance with BO 5090.113. This requirement may potentially be waived under emergency initial attack operations, but will be documented and remedied as quickly as possible. Personnel qualified for off unit dispatches must qualify for national standards outlined in the Wildland Fire Qualifications Guide, PMS 310-1.

4.2.2 Prescribed Fire

A prescribed fire is a fire ignited by wildland fire managers to achieve resource management goals. Escaped prescribed fires will be declared wildfires and the appropriate suppression response will be initiated. Prescribed fires may be used in conjunction with non-fire (mechanical/manual) hazardous fuel reduction to reduce accumulated fuels on the installation. Prescribed fire can be used as a management tool to attain the goals and objectives of the INRMP and to support other Marine Corps mission needs. Prescribed fire activities will include a monitoring program to record fire behavior, smoke behavior, fire decisions, fire effects, and any other information necessary to provide information on whether specific objectives are met.

4.2.3 Non-Fire Fuel Reduction

A variety of methods can be used to accomplish non-fire fuel reduction, including: thinning, lop and scatter, shredding, mastication, and chipping. These types of treatments are especially useful in areas where prescribed fire is not feasible or in smoke-sensitive areas. Non-fire fuel reduction actions are undertaken to reduce the wildfire hazard of an area. The potential hazard of any given site depends on a number of factors, such as the amount and type of living and dead vegetation on the site, the exposure of the site to wind and other factors involving weather and topography, and the presence of natural barriers to fire spread. Forest management activities primarily impact wildfire hazard through the influence on fuels – quantity, structure, and arrangement.

A strategic approach will be utilized for locating both prescribed fire and non-fire fuel treatments throughout the natural environment at MCB CamLej. Priority for non-fire fuel reduction will be as follows:

1. The wildland-urban interface areas in GSRA (**Figure 4-2**),
2. Timber management compartments characterized by high fire hazard and risk, and
3. Fuel treatments within sensitive habitats. Treatments in these areas should be approached cautiously and fire intensity is limited within RCW areas. Additionally, there are seasonal restrictions on activities around RCW clusters during the nesting period from March 15 – July 15.

4.3 Strategy Determination

The over-riding appropriate wildland fire management strategy is based on the well-being and safety of suppression and installation personnel and residents. Beyond safety, the appropriate strategy is based on the military mission. The most appropriate management response will be chosen and specified by the wildland fire program manager, depending on the anticipated consequences and management objectives for the burn area.

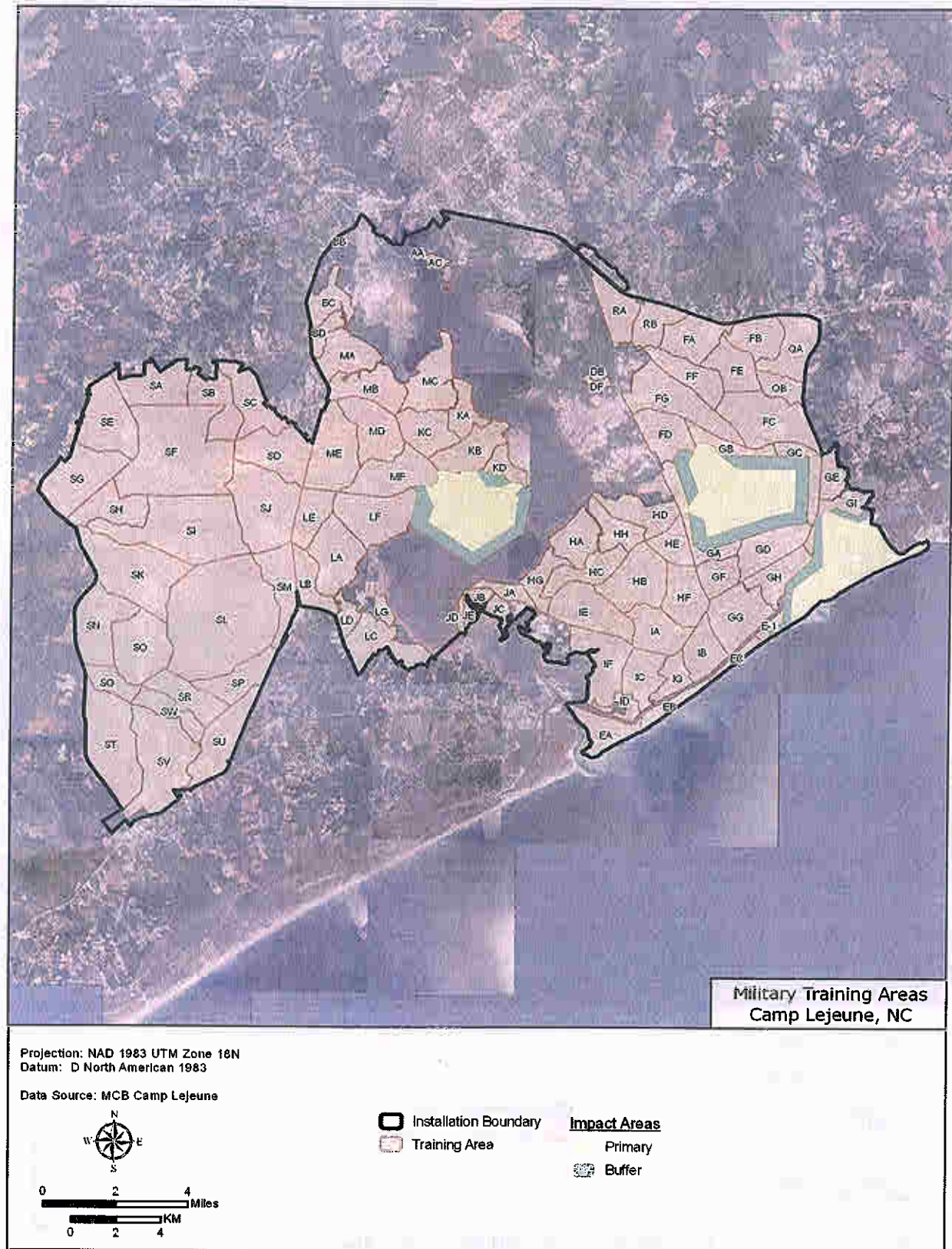


Figure 4-1. Training and Impact Areas at MCB Camp Lejeune.

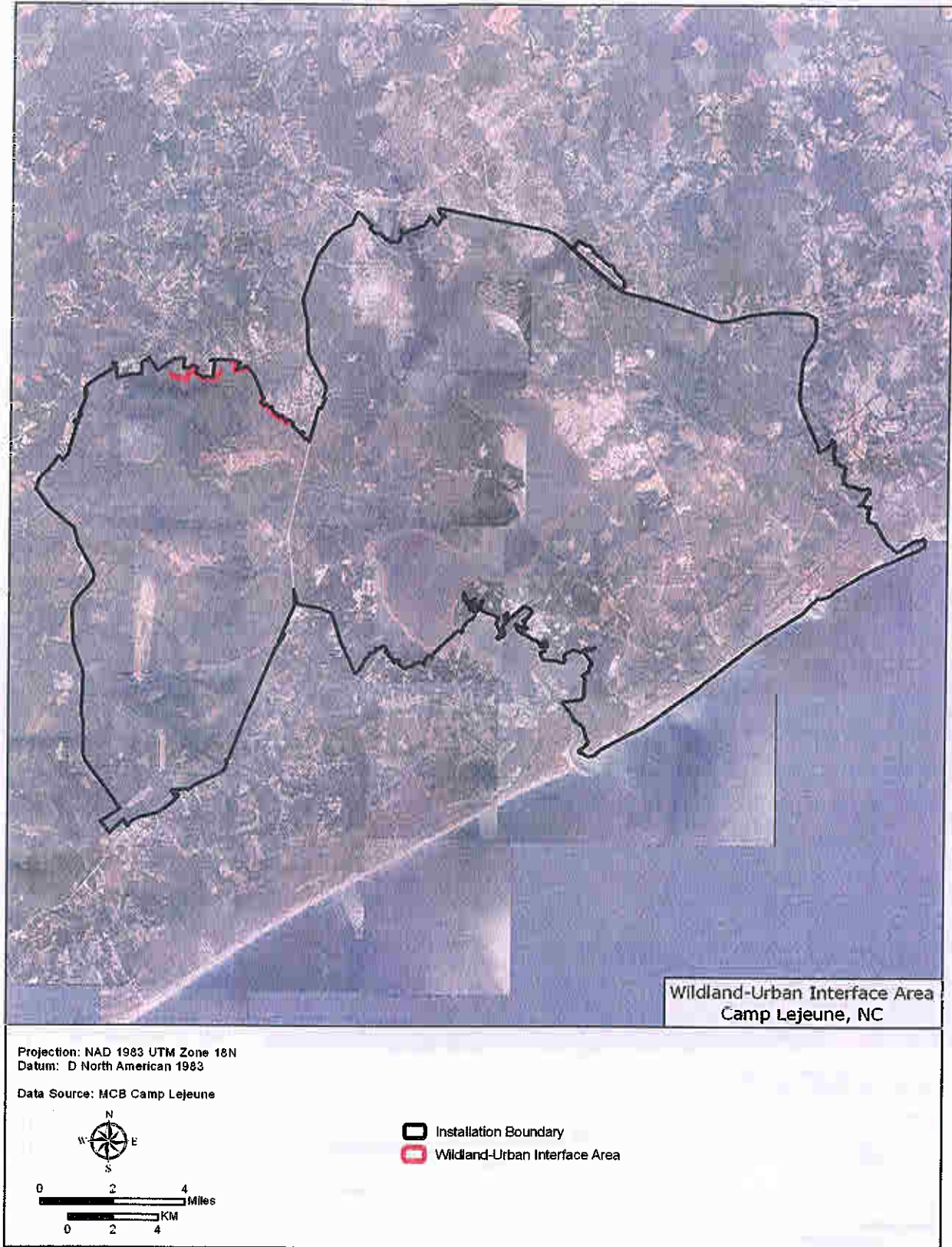


Figure 4-2. Wildland-Urban Interface Areas at MCB Camp Lejeune.



4.4 Constraints on Strategy Options

Figure 4-3 depicts areas of environmental concern at MCB CamLej that may constrain wildland fire management options. Other constraints are discussed below.

4.4.1 Life and Property

Safety is the primary consideration when selecting a wildland fire management strategy. Safety issues commonly encountered at MCB CamLej include:

- Heavy Brush – This fuel type limits the use of hand crews, wet lines, and direct attack.
- Adjacent Landowners – MCB CamLej is adjacent to both urban development as well as commercial and private pine plantations with potentially heavy understory fuels or single family dwellings. When selecting a fire management strategy, high priority should be given to the protection of private lands adjacent to the installation.
- Pocosins (wetlands) – In the thickest areas, use of hand crews and heavy equipment should be avoided due to the difficulty of travel and the intense fire behavior of these fuels.
- Air Quality – Smoke from prescribed or wildland fires may impair visibility on highways or cause health problems to installation personnel and local residents. Smoke management constraints usually require specific transport wind conditions during prescribed fire or burn-out operations. Air quality issues, and mitigating actions, are discussed in **Section 5.2**.

4.4.2 Extraordinary Fire Situations

Wildfire behavior instances may occur that exceed the ability of MCB CamLej to achieve management objectives. Although these incidents may occur infrequently, the conditions resulting from extreme resistance to control must be addressed in wildland fire management planning. Under these extraordinary circumstances, a variety of situations may arise, including unacceptable threats to firefighter safety, substantial acreage burned, uncontrollable losses of improvements, consistent failure to meet suppression objectives, and overwhelming installation or outside involvement. In such situations Incident Commanders must shift their focus from perimeter control to an interim strategy for protecting life and designated resources, on and off the installation, while providing for the safety of firefighting resources until conditions are more favorable for suppression.

4.4.3 Cultural Resources

MCB CamLej manages a variety of historic and prehistoric archaeological sites, ranging from the early Archaic period (8000 BC) to early European colonization and later settlement (MCB CamLej 2008c). In addition to archaeological resources, MCB CamLej also manages historic architectural properties constructed during the mobilization of the Marine Corps during World War II (MCB CamLej 2008c; **Figure 4-3**). Many of these buildings and developed areas remain as they were originally constructed, retaining a high degree of architectural integrity (MCB CamLej 2008c).

Construction of new roads, firebreaks, or other disturbances, requires consultation with the cultural resource manager and will be managed in accordance with the ICRMP. General locations of cultural resources are displayed in **Figure 4-3** and these resources will be addressed in all wildland fire management activities.

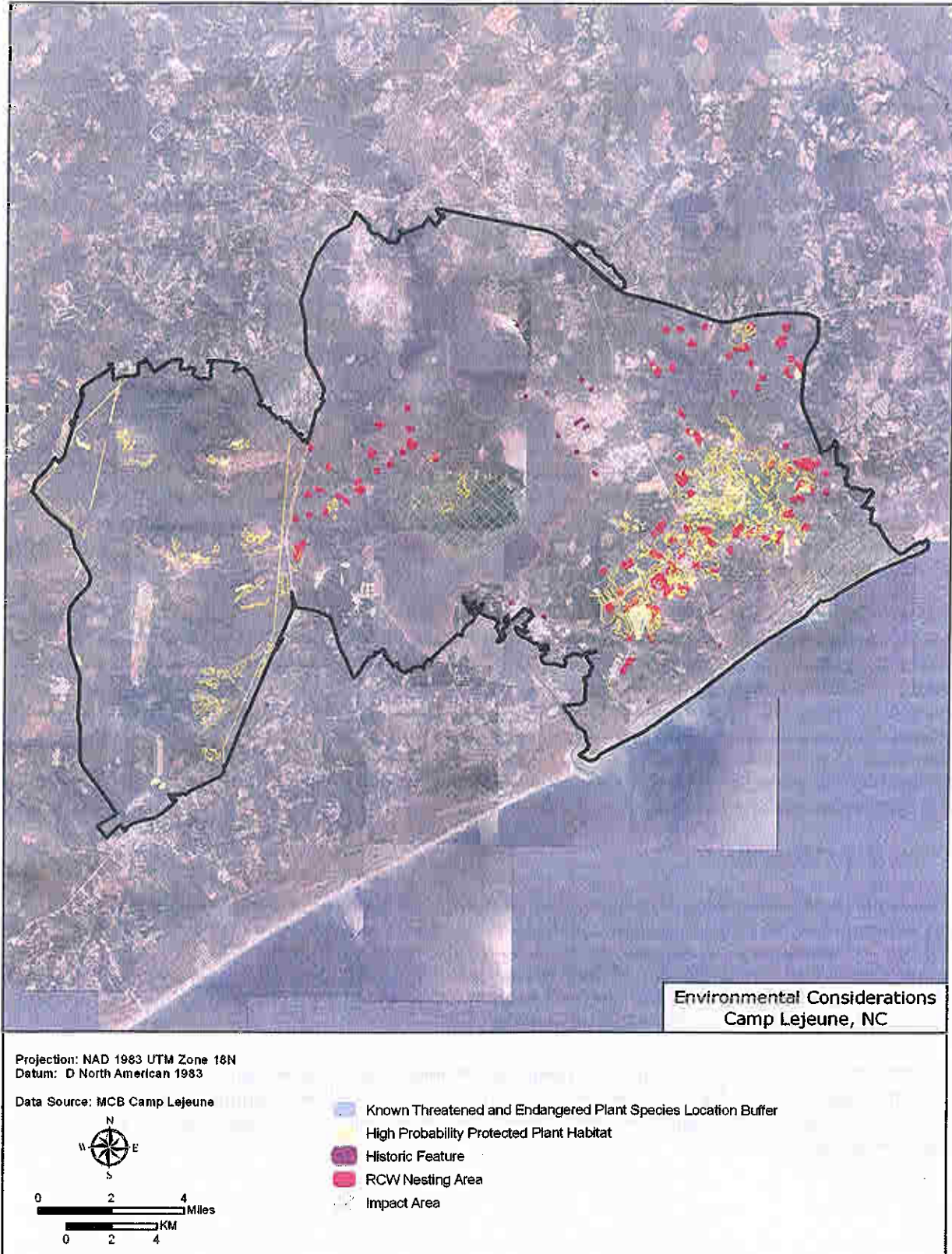


Figure 4-3. Environmental Considerations in Wildland Fire Management at MCB Camp Lejeune.



4.4.4 Wildlife and Habitat Resources

Natural fire in pre-settlement times very likely caused habitat loss and wildlife mortality, although this loss was mitigated by regional abundance and continuity. Now, with limited and fragmented habitat, any loss of isolated clusters of wildlife is significant. This is particularly important when considering rare, threatened, and endangered species. Prescribed fire must be used under appropriate conditions to limit the damage or loss of habitat and wildlife. Areas of environmental consideration are listed in **Figure 4-3** and should be addressed in all wildland fire management planning.

4.5 Justification of Strategies

In sensitive areas such as wildlife clusters, cultural sites, or range and training areas, fire events most likely will involve wildfire suppression activities; however, management of wildland fires outside sensitive areas should focus on cost effectiveness through fire preparedness activities such as hazard reduction and fuels management zones. Along with cooperative agreements with state and federal fire management agencies, these actions aid in the control and confinement of wildland fire on installation land and surrounding lands.

Additionally, fire is recommended as an effective, economical, and ecologically acceptable method to protect, maintain, and restore ecosystems and habitat communities. Habitats at MCB CamLej are predominantly fire-dependent; fire is the ideal management tool for many of the installation's natural communities.

4.6 Wildland Fire Management Compartments

At MCB CamLej, fire management unit boundaries correspond with timber compartments, and the existing installation roads are utilized as fire breaks (see **Figure 4-4**).

4.7 Aviation Support

The use of aircraft can be very helpful in accomplishing both prescribed and wildfire suppression activities. Fixed and rotary wing aircraft may be used to accomplish wildland fire and natural resource management tasks throughout the year.

Air space restrictions exist over most of MCB CamLej. Permission must be obtained by all non-DoD aircraft to enter this restricted area whenever wildland fire flight operations occur at MCB CamLej. During any prescribed or wildfire that involves aircraft, air operations and safety and emergency protocols will be managed by the MCAS New River Air Operations Division.

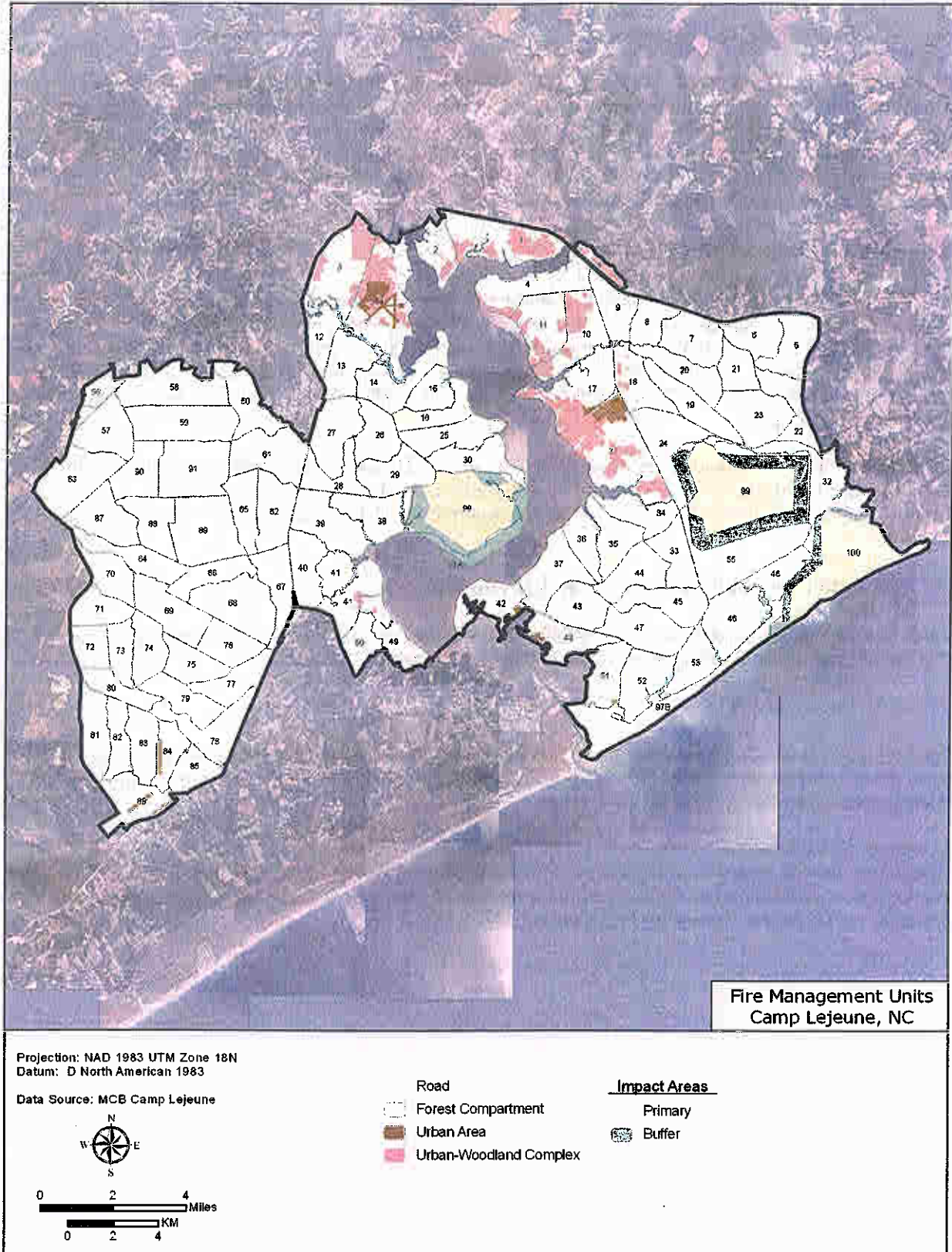


Figure 4-4. Fire Management Units at MCB Camp Lejeune.



5.0 WILDLAND FIRE MANAGEMENT AT MCB CAMP LEJEUNE

5.1 Wildfire Suppression

Wildfire suppression actions may take several forms. Most wildfires at MCB CamLej are caused by range and training exercises and contained in initial attack. All wildfires must be managed to protect firefighter, installation personnel, and resident safety, resources, facilities, and installation property; however, confining the wildfire to the fewest possible acres may not be the most desirable objective since many of the habitat types at MCB CamLej are fire dependent or fire adapted. Allowing the wildfire to burn more acres and reach existing barriers is often preferable because:

- Indirect attack methods may be safer than direct attack (care must be taken to minimize unburned fuel between suppression crews and the fire by burnout, etc.).
- Suppression costs are often lower.
- Environmental disturbance may be less since some aggressive suppression practices may cause more damage than the wildfire.
- Given that the wildfire is burning in a fire dependent system, the fire may actually be beneficial to natural resources and losses are not increased by allowing more acres to burn.

Minimum impact suppression strategies should never be used if safety is compromised or suppression objectives cannot be accomplished with this strategy.

Extended Operations occur when a wildfire is not contained or controlled by the initial attack forces, usually within the first burning period. Extended operations continue until transition to a higher-level management team is completed or until the wildfire has been contained or controlled. Extended operations may require a Wildland Fire Situation Analysis (WFSA) to guide the re-evaluation of suppression strategies.

On an annual basis, the Wildland Fire Program Manager and the Base Fire Chief will analyze the wildfire situation and mitigation measures for the upcoming fire season. Included in this analysis will be consideration of long range weather forecasts, changes to ranges, range use, range additions, emergency access to forested areas, and changes to munitions usage. Particular analysis will concentrate on the high hazard areas of the GSRA and the ranges impacting in the northern pocosin.

5.1.1 Wildland Fire Situation Analysis

A WFSA is a decision analysis process designed to outline the most appropriate suppression strategy in a systematic way. The WFSA is not necessarily a software program or computer model; a paper document covering each item is adequate. Reasonable suppression alternatives are identified, analyzed, and evaluated for consistency with the expected probability of success and consequences of failure. The MCB CamLej wildland fire program manager shall approve the WFSA and any revisions. Evaluation criteria include anticipated suppression costs, resource impacts, and environmental, social, and political considerations. The preferred alternative will be the suppression strategy employed. If the preferred strategy fails, a new WFSA must be developed. WFSA element descriptions are provided in Appendix S of the 2008 NIFC Red Book (**Appendix 2.A**) and a blank copy of the USFS WFSA is provided in **Appendix 4.C**.

5.1.2 Incident Management Team Transition

Transition to an incident management team (IMT) is required when an extended attack wildfire exceeds the capability of assigned resources. For the management of the wildfire to transition smoothly from the installation wildland fire management team to the interagency team, the following documentation and transfer of information should take place:

- Delegation of Authority – The transfer of authority for management actions on a wildfire is done through the execution of a written delegation of authority from the MCB CamLej CO or his



designee to the new Incident Commander. Information to include in a delegation of authority should include, but not be limited to: suppression objectives, their priority, and tasks requiring approval as well as cost constraints and local logistical considerations such as procurement and supply procedures. This information, along with specific limitations to the authority, should be included as part of the briefing package provided to the incoming incident management team. An example of the Delegation of Authority document is provided as Figure A.6.2.1.1(6) of NFPA 1143, and a template is provided in Appendix O of the 2008 NIFC Red Book (**Appendix 2.A**).

- Transition of Management Teams – The transition process from an incident management team to the installation or between IMTs should involve briefings from the installation, the local Incident Commander, and other individuals coordinating logistics, finance, operations, and planning activities.
- Release of Incident Management Team – The release of an IMT is basically the reverse of the transition from extended attack. The MCB CamLej CO or his designee must approve the date and time and be sure that the incoming local overhead team has had 24 hours off prior to assuming control of the incident. The outgoing team should not be released until the incoming team has been thoroughly briefed about ongoing operations, problems originating during the team's performance period have been resolved or turned over to the incoming team, and all overhead performance ratings and other administrative tasks have been completed. Following team closeout an evaluation of each Incident Management Team must be completed. A blank copy of an Incident Management Team Evaluation Form is provided in Appendix J of the 2008 NIFC Red Book (**Appendix 2.A**).

5.2 Prescribed Fire Management

Prescribed fire is an intentionally set fire that burns under specified conditions that allow the fire to be confined to a predetermined area and produce the behavior and characteristics required to attain planned treatment and resource management objectives (NFES 2394). Although there are some risks to the use of fire to obtain management objectives, those risks may be minimized by the implementation of certain requirements. In order to reduce the potential for unintended circumstances, extensive planning, coordination, and risk management should be completed prior to the ignition of any prescribed burn. Annual prescribed burning priorities are established through coordination with the program sections of the Environmental Conservation Branch. A prescribed burn prescription will then be developed by Forest Protection Program technical staff for each burn area and submitted to the Wildland Fire Program Manager for review and coordination. A map of the current fiscal years prescribed burning schedule will be made available on the EM Portal and the EMD internet homepage. Notification of prescribed burning activities will be made via e-mail to Marine Corps Base Staff sections on the day of each prescribed burn. Requirements for effective management of prescribed fire include measurable objectives, qualified personnel, quantified ranges of conditions under which burns will be conducted, a description of actions that will be taken if these conditions are exceeded, a monitoring and documentation process, and a review and approval process.

Prescribed burns are intended to simulate natural fire regimes and accomplish wildland fire and natural resource management objectives. These objectives may include:

- Reducing hazardous fuels
- Restoring habitat
- Promoting biological diversity
 - Enhancing wildlife and plant species and populations
 - Preserving endangered species
- Managing vegetation
 - Preparing sites for forest regeneration
 - Reducing hardwood brush

The annual prescribed burning goal at MCB CamLej is 20,000-25,000 acres. When a helicopter is available, firing may be accomplished using aerial ignition spheres. Otherwise hand firing crews may



utilize four-wheel drive units, or all terrain vehicles to aid in firing operations. Firing patterns may include backing, flanking, spot, or strip head fires.

Within the fire management units, smaller burning units may be delineated; these are areas that one ground crew can burn and secure on a productive burning day. When fired by aerial ignition, several burning units may be burned during one burning period. In pocosin and other high-hazard areas, a maximum manageable area may need to be designated to determine the maximum area to which the ignited fire can spread and still be in prescription.



5.2.1 Burning Seasons

Although there are two distinct burning seasons in the MCB CamLej ecosystem, prescribed burning activities take place throughout the year at MCB CamLej. The dormant season is January 1 through March 15 where cold fronts frequently occur, bringing stable winds that dry surface fuels (grass, litter, etc.), although soil moisture is high. The growing season is March 15 – end of July when winds are less predictable and air temperatures are high, drying fuels rapidly.

A general prescribed burning timetable is as follows:

- August – November: Conduct any prescribed fires that must be completed early in the season for site preparation, longleaf pine seed fall, etc. Prepare RCW cavity trees for prescribed burning.
- January – March: Conduct dormant season burns.
- March – July: Conduct growing season burns.

Typically, only special use fires are planned for the fall. As fuels are reduced and high hazard areas become more manageable, the number or acreage of growing season burns may be increased.

The prescribed burn plan and go/no-go checklist will be completed prior to putting any fire on the ground. An example MCB CamLej prescribed fire go/no-go checklist is provided on the following page. Fire behavior and monitoring actions will be accomplished during and following prescribed fire activities.

5.2.2 Prescribed Burn Plan

The MCB CamLej prescribed burn plan involves a thorough review of objectives and any special precautions that must be observed. Parts of the plan are completed on the day of the burn after weather forecasts are received, burning conditions are determined, and available resources are established. As applicable, a designated line officer that is not part of the burning team double-checks the MCB CamLej prescribed fire burn plan and the Go/No-Go Checklist with the Prescribed Burn Boss to ensure that there are no oversights, and then signs the plan before any firing begins.

The installation WFMP will identify the required components for site-specific burn plans. At a minimum, the MCB CamLej prescribed burn plan will include the following elements as outlined in MCO P5090.2A:

- Burn objectives
- Acceptable weather and fuel moisture parameters
- Required personnel and equipment resources
- Burn area map
- Smoke management plan
- Safety considerations
- Pre-burn authorization/notification checklist
- Coordination to consider mission, wildlife, endangered species, cultural resources, and noxious weed effects
- Alternative plan to cover the plan of action if wind or weather conditions change
- Plan for analysis of burn success and identification of lessons learned

In addition to the prescribed fire burn plan, the following information should also be part of the prescribed burn planning process and maintained in the prescribed burn records in the MCB CamLej wildland fire management office.



**MCB Camp Lejeune Prescribed Fire
GO/NO-GO CHECKLIST**

Unit: _____

- Yes___ No___ Are **ALL** fire prescription elements met?
- Yes___ No___ Are **ALL** smoke management specifications met?
- Yes___ No___ Are **ALL** permits and clearances obtained?
- Yes___ No___ Have **ALL** the required notifications been made?
- Yes___ No___ Are **ALL** required personnel in the prescribed fire plan on site and available?
- Yes___ No___ Has the contingency planning process adequately considered fuels adjacent to and within a reasonable proximity to the burn area?
- Yes___ No___ Has the availability of **ALL** contingency resources been checked, and are they available?
- Yes___ No___ Have **ALL** personnel viewed the areas they are responsible for?
- Yes___ No___ Have **ALL** personnel discussed and been briefed on the objectives of the burn; ignition plan; locations of extra resources such as drinking water, pump can water, drip torch fuel; crew assignments; hazards; safety zones; escape routes; and contingencies?
- Yes___ No___ Have **ALL** personnel been shown a map of the entire burn unit?
- Yes___ No___ Are the on-site holding forces adequate for containment under the expected conditions?
- Yes___ No___ In **YOUR OPINION**, can the prescribed fire meet the planned objectives, and can it be carried out according the approved plan?
- Yes___ No___ Do **ALL** crew members accept their assignments?
- Yes___ No___ Do **ALL** crew members understand the emergency protocols and communications plan?

Other considerations:

- Yes___ No___ Has a test fire been conducted and are conditions deemed safe enough to continue?
- Yes___ No___ Have all required current and projected fire weather forecasts been obtained?
- Yes___ No___ Is all equipment on-site, available, and operational?

I certify that I have reviewed the burn objectives and that all the above questions were answered "YES."

Prescribed Fire Burn Boss

Date

Time



- A *Contingency Plan* that lists actions to be taken if the prescribed fire should escape and be declared a wildfire. The contingency plan also sets over-burn limits in certain areas where the prescribed fire might be allowed to burn outside the boundaries of the burn unit. Examples are where the boundaries of a burn unit join a wetland and a maximum manageable area has been established. Generally there is no break separating the units because the fire is expected to spread a short distance into the wetland before available fuels are exhausted.
- *Site Preparation* includes any preparation of control lines that is required to safely and effectively perform the prescribed fire. Fire proofing facilities and resources like RCW cavity trees may also be undertaken. Site preparation may take place early in the burning season whereas others may be completed as part of the pre-burn preparation.
- *Equipment Preparedness* is essential for the effective and efficient operation of any wildland fire management program. Equipment should be maintained in a fire ready condition during the prescribed wildfire season. A final check of equipment may be included as part of the prescribed fire burn plan.
- A *Weather Forecast* (National Weather Service [NWS] Spot Forecast) is obtained from one or more sources on the morning of the burn, compared with prescription requirements, and maintained as part of the prescribed fire burn plan.
- A *Fire Behavior Evaluation* should be completed and compared with desired fire behavior. Fuels, topography, and predicted weather data should be used to predict fire behavior within the prescribed burn unit. If desired results are not predicted, the prescribed fire should be re-assessed and possibly canceled. The fire behavior evaluation and supporting data should be maintained as part of the prescribed fire burn plan.
- A *Smoke Management Assessment* is undertaken to determine smoke trajectory and potential target areas within the trajectory. If a critical area lies within the smoke trajectory, a further smoke analysis (fuel loading, acres burned, fire to target distance, and any mitigation etc.) should be conducted to determine if the burn may be safely conducted. The prescribed burn plan will also contain emergency actions to be undertaken if smoke becomes an unexpected problem.
- *Notification and Coordination* is an essential part of prescribed fire planning. On-base coordination will, at a minimum, include FESD, Range Control, and Blackburn. Through cooperative agreements with the NCDFR and the USFS Districts, additional resources may be available either assist in completing the prescribed burn or suppressing the fire should it escape. NCICC may also be notified of proposed and accomplished prescribed fires; they use this information to determine the quantity of resources needed to be committed to prescribed fires and the resources available, in case of escape.

5.2.3 Smoke Management

Smoke from prescribed fire is of a short duration, usually lasting only one day, occasionally as much as three days. It is also believed that continued prescribed fire will, in the long run, improve air quality by preventing or reducing catastrophic long duration wildfires that produce many times as much smoke over longer durations as prescribed fires. In the interest of health and safety, wind directions will be prescribed to avoid sensitive areas and areas of special concern (**Figure 4-3**). Prescribed fire and smoke management techniques will be used to lessen the impact of all prescribed fires.

The following holding actions may help to reduce smoke hazards:

- Use firing crews to ignite fuels, ensuring that the fuels burn with flaming, rather than with smoldering combustion.
- Construct and maintain firelines to manage fire spread.
- Mop up smoldering heavy fuels until smoke dispersion conditions improve, at which time the fire may be re-ignited.
- Use hose-lays and pumps to wet fuels and extinguish all or a portion of the flaming front, until smoke dispersion conditions improve, with possible subsequent re-ignition under prescribed dispersal conditions.



If a prescribed fire causes air quality to deteriorate beyond an acceptable standard, or if a safety problem exists, the prescribed fire will be reclassified as a wildfire and suppression actions will be taken. If declared a wildfire, a WFSA will be completed and the appropriate management action implemented. For most prescribed fires, wind directions are selected to carry smoke away from sensitive areas. In the rare case where downwind smoke may impact a sensitive area, the wildland fire program manager should coordinate with affected activities and programs to determine whether or not the burn will be conducted.

Smoke from prescribed fires has the potential to cause public safety and health problems. State and federal highways are located near the entire perimeter of MCB CamLej. Also, the City of Jacksonville and several communities are located in the area. Planning for prescribed fire activities to occur under optimal wind directions mitigates adverse effects from most prescribed fires. In the majority of cases, wind directions will be prescribed to direct the smoke plume away from MCB CamLej training and sensitive public areas. Where smoke may impact sensitive areas, the following precautions will help to minimize emissions or reduce negative impacts:

- Have defensible objectives. Be sure to have clear resource objectives, and consider the impact on the total environment, both on and off-site.
- Obtain and use weather forecasts. Weather information and fire weather forecasts are available from several sources. Such information is needed to determine what will happen to the smoke, as well as to determine the behavior of the fire.
- Do not burn during pollution alerts or temperature inversions. Smoke tends to stay near the ground and not disperse readily. Many fire weather forecasters include this information in their forecasts.
- Burn when conditions are good for rapid dispersion. The atmosphere should be slightly unstable so smoke will rise and dissipate, but not so unstable as to cause control problems. Again, the fire weather forecaster can help.
- Determine the direction and volume of smoke, especially near highways and populated areas.
- Notify state suppression agency, nearby residents, and adjacent landowners. This will let them know it is not a wildfire and provide advance notice of any adverse public reactions.
- Use test fires to confirm smoke behavior. Set the test fire in the area proposed for burning, away from roads and other "edge" effects.
- Use backing fires where possible. Assuming resource management objectives can be met, backing fires give more complete consumption of fuel and produce less smoke. Even though slower, fewer pollutants are put into the air and visibility is less affected.
- Burn in small blocks. The larger the area being burned, the more visibility is reduced downwind and a higher concentration of particulates is put into the air; however, also consider that it may be better to burn all the area when weather conditions are ideal for smoke dispersion.
- Should smoke cause a reduction of visibility on a public highway, the Base Fire Dispatcher will notify the Onslow County dispatch office of the location of the smoke. The Base Fire Chief will coordinate an appropriate response to the visibility issue. Examples of an appropriate response would be monitoring and or the posting of patrols until the issue is resolved.
- Mop-up along roads. Burn out and start mop-up along roads as soon as possible to reduce impact on visibility.
- Be cautious of nighttime burning. Predicting smoke drift and visibility is more difficult at night. The wind may lessen or die out completely and smoke will tend to stay near the ground. Burn at night only when a forecast of optimum conditions has been made.
- Have emergency plans. Be prepared to control traffic on nearby roads if the wind direction changes. Be prepared to stop a prescribed fire if it is not burning according to plan or if weather conditions change.
- Burn when duff and soil moistures are high to prevent smoldering ground fires.
- Avoid involving snag trees or stumps by treating with foam or chainsaw felling. Be prepared to mop-up if necessary.
- Anticipate down-drainage smoke flow, particularly at night.



Smoke management plans (SMP) and activities will be coordinated with state air quality personnel, and comply with regulations in place at the time of the burn. The wildfire management program at MCB CamLej will adhere to the State's SMP. The NCSMP requires that the WFPM report the following information into the Smoke Management Database (SMD) on the day of the burn. This information should also be included in the MCB CamLej prescribed burn plan (**Appendix 5**).

- Planned time of burn
- County and location (latitude and longitude)
- Type of burn
- Expected acreage to be burned and tons per acre to be consumed
- Distance to nearest downwind smoke sensitive area under the Ventilation Index System (VIS) or distance to nearest visibility and PM2.5 sensitive areas when using Plume Dispersal Modeling (PDM).
- Soil type: organic or mineral
- Person in charge of burn and how he/she can be contacted (cell phone number, radio call number, pager, etc.)

5.2.3.1 Smoke Management Forecast

NCDFR receives a NWS Fire Weather Planning Forecast (FWF) twice daily. The FWF includes smoke management information and is normally available by 7:00 A.M. EST and an updated FWF is normally available at approximately 3:00 P.M. EST. The forecasted ventilation rate, issued in the afternoon updated FWF, is for planning purposes and to evaluate the possible movement from a burning category 1 to a burning category 2. An NFDRS Point Forecast (PF) is received by NFDRS every afternoon and is available by 4:00 PM each day. With its numerical indices, the PF forecasts the expected burning conditions over a broad area for the next day and gives an indication of potential fuel availability and what size class fuels can be expected to ignite.

5.2.3.2 Special Areas of Concern

Smoke sensitive areas include population centers, hospitals, highways, or recreation areas where smoke can negatively affect health, safety, and aesthetics. When selecting a wildland fire management strategy, high priority should be given to the following areas on or adjacent to MCB CamLej. On base areas of concern are shown in **Figure 4-3**.

- **Adjacent Land** – MCB CamLej is adjacent to urban development, commercial property, and private single family dwellings.
- **Roadways** – Smoke from prescribed or wildfires may impair visibility on highways for installation personnel and local residents.
- **Installation Training Areas** – Communication and coordination with Range Control should be undertaken to provide logistical information on the burn and to help plan for contingency training plans if smoke affects these areas.
- **Wildlife** – MCB CamLej is currently home to six federally listed endangered animal species. Known populations of species of concern, and their associated buffer areas, are shown in **Figure 4-3**. While species such as the RCW ultimately benefit from the effects of fire on forest structure and composition, care must be taken to prevent damage to individuals or their required habitat from fire management activities.

5.2.4 Fire Behavior and Fire Effects Monitoring

Fire behavior indicators such as flame length and rate of spread should be monitored during prescribed burns by a burn crew member designated as a Fire Behavior/Weather Observer. Such monitoring is conducted to facilitate adaptive management by evaluating fuels management efforts and project effectiveness, as well as ensuring that installation resource management goals and objectives are not compromised by the fuels management projects. Fire effects monitoring is limited to evaluating the first



and second order effects of fuel management projects on fuel and wildlife habitat composition and structure.

The elements most commonly selected for monitoring include digital photographs (permanent photo point locations), composite burn index (includes top-kill of woody understory), consumption of 1-hour and 10-hour time lag fuels, and mineral soil exposure to litter/duff consumption. Also of interest are the longer term impacts on individual understory plant species stature and relative abundance (frequency and/or density) that are measured by utilizing permanent vegetation plots with a standardized methodology.

Monitoring should be conducted to facilitate adaptive management by evaluating the fuels management program and project effectiveness, and ensuring that refuge resource management goals and objectives are not compromised by the fuels projects. Monitoring should include before and after treatment and at 1, 2, 5, 10, and 20-year post-treatment intervals to assess effectiveness and direct future efforts.

The MCB CamLej prescribed burn plan includes a post-burn evaluation to monitor fire behavior and effects. In addition to completing this section, the permanent photo-points should be utilized to document prescribed fire effects on understory conditions.

5.2.5 Availability of Resources for Prescribed Fire

Whenever prescribed fire activities are underway, resources must be available to suppress the fire should it escape. MCB CamLej maintains an inventory of suppression resources (see **Table 3-4**) including tractor-plow units, engines, and line personnel that are immediately available or on standby during all prescribed fire operations. If installation resources are not adequate to suppress an escaped prescribed fire, additional resources may be obtained through cooperative agreements with the NCDFFR and the USFS, or ordered through NCICC.

Prescribed fire activities may be restricted during periods when fire danger is high. Management of wildfires and existing prescribed fires takes priority over igniting new prescribed fires; sufficient resources must be available to suppress wildfires. Also see the discussion on Step-Up Staffing in **Section 3.2**.

5.3 Personnel Work/Rest Guidelines

Personnel work/rest guidelines assure safe, productive, fire suppression activities by providing for rest, overhead, and support personnel on large, complex, or extended wildfires. Compliance with work/rest guidelines is a basic responsibility of all supervisory wildland fire management personnel and is described fully in Chapter 7 of the 2008 NIFC Red Book (**Appendix 2.A**) and Chapter 10, Section 12.7 of PMS 902 Interagency Incident Business Management Handbook (**Appendix 3.G**). As stated in these documents, a work/rest ratio of 2:1 should be met on all fire incidents; appropriate justification and documentation should be included in the incident records if this condition is not met.

5.4 Records and Reports

Permanent installation records will be kept to facilitate effective and defensible wildland fire management and planning. The following records will be held as permanent resource management records and kept on file in the installation fire management program office.

5.4.1 Incident Qualification and Certification System Information

IQCS is the interagency information management system that tracks training and certifications for wildland firefighters. The MCB CamLej wildland fire program manager maintains all IQCS information such as red cards, task books (both completed and open), and work capacity test related information; this information is kept on file in the wildland fire management program office.



5.4.2 Situation Reports

Situation reports contain current information about fire danger, fire status, and resource availability. Situation reports are submitted as situations change throughout the wildfire season. Outside the official wildfire season, situation reports are to be completed when an ignition source is present and fire danger is very high or extreme (Step-Up Level 4 or above), or whenever a wildfire has occurred or is in progress. Large wildfires (100 acres or more), politically sensitive fires, or fires with fatalities will require daily submission of ICS 209 forms to the NCICC (a blank ICS 209 form is included in **Appendix 4.B**).

5.4.3 Fire Weather Records

Fire weather information for MCB CamLej is obtained through coordination with the NWS Forecast Office in Newport/Morehead City, NC. NWS Fire weather observation stations provide the specialized weather observations necessary for fire weather forecasts, wildfire control and suppression efforts, and various other land management operations. Weather station locations were chosen by NWS to represent weather conditions across a district and may either be manned or unmanned Remote Automatic Weather Stations (RAWS) maintained by any of the federal or state land management agencies covered in the NWS Operating Plan (see inset). All information requested from and supplied by the NWS for fire management activities should be kept in the permanent installation records. At a minimum, day of burn fire weather forecasts for the area to be burned will be maintained with the prescribed burn plan. For prescribed fires, fire weather information will be kept with all other fire records.

The 2008 North Carolina National Weather Service Annual Operating Plan is issued in lieu of a formal MOU between the National Weather Service and MCB CamLej and can be found at http://www.erh.noaa.gov/gsp/fire/NC08/OpsPlan_main.htm

Fire weather information supplied by NWS may include any or all of the following:

- Fire Weather Planning Forecast (FWF). The FWF is used mainly for pre-suppression and management planning information and to determine general weather trends that may affect burning condition and thus fire behavior.
- Site Specific Wildland Fire Forecast (Spot Forecast). Spot Forecasts are used to determine site specific weather conditions and guide wildland fire suppression or prescribed fire planning and management activities. Spot weather observation and forecast request instructions and notes are given in Appendix E of the 2008 NIFC Red Book (**Appendix 2.A**).
- National Fire Danger Rating System Forecast (NFDRS Forecast). These forecasts are issued from pre-determined sites where NFDRS information is received.
- Fire Weather Watch. This notice is issued 12-48 hours in advance of critical weather conditions that may lead to a Red Flag Event (weather conditions that could lead to extensive wildfire occurrence or extreme fire behavior).
- Red Flag Warning. This notice is issued when a Red Flag Event is imminent or occurring.
- Fire Danger Statements and Blow-Up Alerts. These notices are requested by the land management agency and only issued by approval in instances where fire danger or occurrence is high and weather conditions extreme.

5.4.4 Wildfire Reports

An individual fire report may not be completed for each wildfire as there may be multiple fires burning at MCB CamLej on any given day. Instead of filling out an ICS 209 form for each fire, the number and acreage of fires is forwarded to USFS monthly. Large fires (100+ acres), fires burning over more than 1 burning period, and injury fires all have an ICS 209 form forwarded to the USFS. When an ICS 209 is filled out, it will be maintained in the installation electronic or hard-copy fire management records. A separate report with a new fire number should be prepared for an escaped prescribed fire. Fire reporting is an important duty; reports provide a basis for fire preparedness, support for funding requests, and aid in organizational development (NFPA 1143). The National Fire Incident Reporting System (NFIRS) is a computer-based program developed to provide for the collection of fire reports and analyze the national



collective database (NFPA 1143). NFPA 1143 Figure A.8.1(b) is a blank copy of the wildland fire NFIRS form that includes information about the cause of the fire, weather, and NFDRS fuel model at origin, among other things.

5.4.5 Prescribed Fire Documentation

Prescribed fire documentation requirements are integrated into the records and reports maintained by the MCB CamLej wildland fire program manager. The information discussed below may also serve as the day of burn action plan or briefing plan. The following documentation should be completed for each prescribed fire:

Evaluation --

- Description of Burn Area
- Objectives of Burn
- Acceptable Range of Weather Parameters
- List of Manpower and Equipment Needs
- Preparation for Burn such as:
 - Consideration of Problem Areas
 - Notification of Adjacent Landowners, Towers, VFD, and District
 - Coordination with Cooperating Agencies, if applicable
 - Fireline Inspection
 - Safety Briefing and Equipment Check
- Special Instructions
- Mop-Up Instructions
- Prescribed Fire Permit, if applicable
- Notification of NCICC, if applicable

Critique and Monitoring of Burn --

- Accomplishment of Objectives
- Acres Actually Burned
- Evaluation of Fire Effects such as:
 - Scorch Height
 - Remaining Litter Volume
 - Consumption of Understory Vegetation
 - Percent of Crown Affected
- Other Information as Necessary
- Optional Photo Documentation of Understory Conditions (by date, format, and archive location)

Smoke Management Plan --

- Map and List of Smoke Sensitive Areas
- Smoke Management Weather Data
- Map with Smoke Trajectory

5.4.6 Other Records

All records, maps, and other information relating to wildland fire management should be kept in permanent installation records to assist in future fire planning. Such records may include annual narrative reports, historic records of the installation, any photographs showing vegetative cover, cover type maps, etc., monthly reports, or other pertinent maps and files that may represent the only documentation of fire occurrence or fire behavior on the installation.

1. The first part of the document discusses the importance of maintaining accurate records of all transactions.

2. It is essential to ensure that all entries are supported by appropriate documentation and receipts.

3. The second part of the document outlines the various methods used to collect and analyze data from different sources.

4. These methods include both qualitative and quantitative approaches, each with its own strengths and limitations.

5. The third part of the document provides a detailed overview of the statistical techniques employed in the study.

6. These techniques are used to identify trends, patterns, and correlations within the data set.

7. The final part of the document discusses the implications of the findings and offers recommendations for future research.

8. It is hoped that this study will contribute to a better understanding of the subject matter and inform decision-making.



APPENDICES



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Appendix 8:

MCB Camp Lejeune Silvicultural System

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Appendix 8: MCB Camp Lejeune Silvicultural System

1.0 OVERVIEW

A good silvicultural system is not chosen but formulated as a solution to a specific set of circumstances. The silvicultural system must be responsive to natural factors affecting the forest ecosystem, and capable of evolutionary development as circumstances change, knowledge of the forested environment improves, and regulatory requirements change. The objective of the MCB Camp Lejeune silvicultural system is to provide a safe, healthy, sustainability, forest ecosystem, with a minimum of environmental restrictions, to support Marine Corps training objectives.

An even-aged silvicultural system was implemented by the 1946 management plan. This system has proven useful for the multiple-uses and sustainable forest products over many decades. However, with the new USFWS RCW Recovery Plan standards for “good quality habitat”, MCB Camp Lejeune will be emphasizing practices that more closely resemble two aged and uneven aged management in many cases.

MCB Camp Lejeune is divided into 91 compartments with the average size being approximately 1,000 acres of commercial forestland. Each compartment is further divided into timber stands.

Management of the forest ecosystem is accomplished at the stand level, with stands normally being ten acres or more and delineated by species, age, size, and stocking levels.

Timber rotations are established at 120 years for longleaf pine, pond pine, and upland hardwood species and at 100 years for loblolly pine. Rotation age in cantonment areas is 50 years for all pine species and 100 years for upland hardwood species. Currently, bottomland hardwood communities and RCW nesting sites are not assigned a rotation age. For management purposes, forestland aboard MCB Camp Lejeune is divided into four major forest types:

- Pure pine (Society of American Foresters (SAF) 81 and 70)* found on upland drier sites;
- Pond pine (SAF-98)* found on wet sites;
- Upland hardwood and mixed pine/hardwood (SAF-52, 71, 82, and 87)* found on stream sides and more productive sites; and
- Pure hardwood (SAF-91, 92, 102, 103, and 104)* found on stream bottoms and floodplains of major creeks.

The characteristics and general conditions of the major tree species, such as tolerance to shade, susceptibility to wind throw; adaptability to soil moisture conditions; ability to withstand flooding; and vulnerability to insects, disease and fire determine the type of silvicultural treatments recommended during the prescription process.

2.0 FOREST MANAGEMENT PRINCIPLES

The management of forestland used extensively for military training operations presents unique management opportunities. The Forest Management Section at MCB Camp Lejeune has provided a varied forested environment for military training since the development and implementation of the first natural resources management plan in 1946. Utilizing the ecosystem management approach, the Forest Management Section emphasizes returning the longleaf pine ecosystem wherever appropriate to its historic range on MCB Camp Lejeune. The Forest Management Section has historically used area regulation to manage quantities of timber harvested. Standing growing stock volumes and associated timber information are necessary to ensure that over-harvesting is not occurring. A comprehensive multiple use inventory helps the Forest Management Section to assess forest level trends. MCB Camp Lejeune has undergone six inventories since 1946.

2.1 SILVICULTURAL PRESCRIPTION PROCESS

The forest compartment prescription process is the basis for making stand level forest, wildlife, and training area management decisions to fulfill long-range ecosystem management goals and objectives. The purpose of the forest prescription is to:

- Determine the site productivity, forest type, age, stocking densities, operability, and forest condition classes at the stand level.
- Collect data required to determine the pre-harvest condition of the foraging habitat for RCW or other endangered or threatened species and accurately determine the effects of the harvest on the foraging habitat.
- Determine the silvicultural treatment, if any, required on a stand-by-stand basis and determine its effect on the forested ecosystem and military training.
- Develop an ingress and egress management and maintenance plan.
- Collect timber data to determine timber volume estimates on a stand-by-stand basis.
- Ensure the proposed actions are consistent with the NEPA and other applicable laws and regulations.

The Forest Management Section employs Best Management Practices (BMPs), developed by a team of forestry and sedimentation experts and recommended by the NCDENR, Division of Forest Resources (NCDFR). Developed in 2006, BMPs include recommendations for accessing and harvesting forest products, site preparation and reforestation, re-establishment of vegetation on disturbed areas, and wildlife protection. BMPs are “practices chosen to minimize erosion and prevent or control water pollution resulting from forestry operations (NCDFR 2006).”

Implementation phases of BMPs include pre-timber harvest planning, logging operations, and project closeout. The specifics for each of these phases are as follows:

- Pre-harvest Planning, including designating streamside management zone boundaries, locating haul roads and stream crossings, and designating logging deck operations.
- Logging Operations, including timber cutting and skidding, log loading and transport, and protecting streams and water quality.
- Project Closeout, including removal of temporary stream crossings; removal of logging debris from streams; providing vegetative cover for bare ground using logging debris, grass and mulch, or other suitable materials and/or methods; construction of water bars as needed on roads, trails, and logging decks; and removal and disposal of potentially toxic waste, tires, old wire cable, used engine oil, trash, etc.

The prescription process is the vehicle used to integrate forest management activities with other land management and land use organizations. Procedures for the development of a compartment prescription may be found in the United States Forest Service Manual, 2400. The Base is managed on a ten-year review cycle, which means each compartment is visited once every ten years for prescription review. Approximately ten compartments are reviewed each year. The Annual Silvicultural Prescription Plan (ASPP) is an annual operating plan, which outlines silvicultural management goals for those ten compartments for the next several years. The draft ASPP is made available for review on MCB Camp Lejeune's GIS intranet website. Comment and review is requested from the Directors of Range Development Division and Range Control Division; Director Training and Operations; and program managers within the Environmental Management Division.

Each Director is responsible to ensure their staff adequately reviews the proposed treatments and forwards comments to the Forest Management Program manager. The Forest Management Program manager reviews and incorporates comments and modifications are made to the ASPP as required to accomplish the objectives of the group. The final ASPP is then made available on MCB Camp Lejeune's GIS intranet website. Current and past ASPPs are available upon request.

2.2 LONGLEAF PINE RESTORATION

MCB Camp Lejeune has longleaf restoration as a major goal. Longleaf restoration in a landscape dominated by loblolly can be difficult and complicated by factors such as soil wetness, ground cover, and RCW requirements. MCB Camp Lejeune intends to apply a flexible (rather than proscriptive) management approach to longleaf restoration, consistent with the 2003 Recovery Plan, in order to maximize practical benefits to each RCW partition. Collaboration between the

Threatened and Endangered Species and Forestry sections will ensure that all prescribed treatments are appropriate given the site-specific circumstances.

The longleaf pine is known for its strong taproot, which makes it more resilient during catastrophic natural events than the other southern pine species. Abundant resin production gives the longleaf pine the ability to withstand insect and disease attacks. The remarkable growth history of the species allows it to reproduce abundantly in an environment where fire is a natural occurrence. With these reasons and with longleaf pine considered a key component in what constitutes suitable or high quality habitat for the red-cockaded woodpecker the Forest Management Section has been returning longleaf to its native sites aboard the base since the late 1980s. Due to its fire and disease resistance longleaf pine will continue to be restored, on suitable sites (excluding cantonment areas), even where RCW habitat is not currently a concern.

The following methods may be employed to restore pine stands, mixed pine hardwood stands, and hardwood stands to longleaf:

Clearcut — This method will only be used when the residual timber is not suitable as a seed source or when conversion to longleaf pine is desired. Clearcutting is the harvesting of all merchantable trees in a stand in one operation, with a new stand of trees established by artificial means. In a clearcut, regeneration is established after site preparation by planting long leaf pine seedlings.



Figure 1. Clearcut with minimal ground disturbance

Modified Clearcut — This method is similar to the clearcut method but 6-10 dominant or co-dominant trees per acre will be left, based on requirements of the 2003 RCW Management Plan. Regeneration is established, after site preparation, by planting long leaf pine seedlings.

Mature longleaf stands will be managed on a 120-year minimum rotation, with an increasing emphasis on two aged and uneven aged management. The following methods may be used for natural regeneration of a mature longleaf stand:

Small Patch Clearcut — To regenerate longleaf pine in existing longleaf stands, the preferred method at MCB Camp Lejeune is the small patch clear method. Under this method, harvest areas ranging in size from 5 acres or less will be clearcut in stands of existing longleaf pine. By regenerating the stand through a series of small clearcuts over time, the spatial continuity of suitable habitat within the partition will not be disrupted. The difficulty of administering a stand, which includes a series of small patch clearcuts, can be diminished if the treatment is accomplished concurrently with scheduled thinning operations. The uneven aged management approach is emphasized with this method.

Modified Shelterwood — Heavier seeded longleaf pine require more seed trees per acre than is left in a seedtree system. The residual seed source in a shelterwood cut should be left to a basal area of 40 square feet/acre of the best dominant or co dominant longleaf pines in the stand. The shelterwood method generally requires a series of preparatory cuts with the final shelterwood harvest designed to leave a higher quality seed source. For longleaf pine regeneration, MCB Camp Lejeune utilizes a modified shelterwood method. Under this modified shelterwood method, 40 square feet of pine basal area remains. The overstory will not be removed, thus allowing the stand to be utilized as RCW foraging habitat. The shelterwood cut is followed by adequate site preparation to ensure seeds have access to mineral soil. This method is particularly well suited for the heavier seeded species such as longleaf pine, oaks, and hickory



Figure 2. The shelterwood method of natural regeneration for longleaf pine showing intact ground cover

Single or Group Selection Cut for longleaf pine — The removal of single or small groups of mature trees uniformly across a stand. This harvest is designed to imitate natural openings such as lightning strikes or wind events. The resulting small openings will provide areas for regeneration with minimal impact to the overall structure of the stand. The preferred outcome of successive cuts is an uneven-aged stand that is continually regenerating while providing ample older growth for habitat needs.

2.3 REGENERATION IN LOBLOLLY PINE STANDS

Mature loblolly stands that are not on a suitable site to be converted to longleaf will be managed on a 100-year rotation and on a 50-year rotation in cantonment areas. The following methods may be used for regeneration of a mature loblolly stand.

Clearcut — Clearcutting is the harvesting of all merchantable trees in a stand in one operation, with a new stand of trees established by artificial means. In a clearcut, regeneration is established, after site preparation by planting loblolly pine seedlings.



Figure 3. The seedtree method of natural regeneration of loblolly pine is the preferred method, depending on site and seed source availability.

Seedtree — Involves leaving 6-12 of the highest quality trees per acre, evenly spaced, to provide a seed source. The seed trees may or may not be removed depending on site, logistics of removal, etc.

Single or Group Selection Cut for loblolly pine — The removal of single or small groups of mature trees uniformly across a stand. This harvest is designed to imitate natural openings such as lightning strikes or wind events. The resulting small openings will provide areas for regeneration with minimal impact to the overall structure of the stand. The preferred outcome of successive cuts is an uneven-aged stand that is continually regenerating while providing ample older growth for habitat needs.

2.4 REGENERATION OF HARDWOOD STANDS

Clearcut — Desirable hardwood species will stump sprout particularly when harvested in the winter months. In this system, all merchantable pine and hardwood are removed in a single operation, with all trees greater than one-inch dbh cut for site preparation. Clearcutting not only uses stump sprouting, or coppice, but also utilizes advanced reproduction and viable seed in the forest duff to regenerate the stand. This method may be used for hardwood or mixed pine-hardwood stands.

Shelterwood — Preference is given to mast producing species, leaving approximately 50ft² basal area/acre. When adequate regeneration is present, the overstory may be removed to prevent overstocking and suppression of the hardwood regeneration. Many desirable hardwood species will stump sprout, especially if harvested in the winter months.

Small Patch Clearcut for hardwoods — Under this method, harvest areas of 5 acres or less will be clearcut in pure hardwood stands. The difficulty of administering a stand, which includes a series of small patch clearcuts, can be diminished if the treatment is accomplished concurrently with scheduled thinning operations. Many desirable hardwood species will stump sprout, especially if harvested in the winter months.

Single or Group Selection Cut for hardwoods — The removal of single or small groups of mature trees uniformly across a stand. This harvest is designed to imitate natural openings such as lightning strikes or wind events. The resulting small openings will provide areas for regeneration with minimal impact to the overall structure of the stand. The preferred outcome of successive cuts is an uneven-aged stand that is continually regenerating while providing ample older growth for habitat needs. Many desirable hardwood species will stump sprout, especially if harvested in the winter months.

2.5 INTERMEDIATE THINNING

An intermediate thin is a silvicultural treatment made in the stand during the rotation, but before a regeneration harvest. When thinning pine or mixed pine hardwood stands where the pine is

equal to or greater than 10” dbh, MCB Camp Lejeune will retain a pine basal area of approximately 60ft²

Intermediate Thins in Pine Dominant Stands

Pre-commercial Thin — Using a drum chopper pulled by a dozer tractor, rubber-tired Hydro-Axe with Fecon mowing head, or hand tools to reduce stocking levels in unmerchantable timber stands.

Leave Tree Thin — Leaving dominant or co dominant trees based on spacing and determined by the average dbh. When thinning stands that contain trees greater than 10 inches dbh, MCB Camp Lejeune will maintain a residual pine basal area of 60 square feet per acre, dependent on site and stand condition. When thinning stands that contain trees less than 10 inches dbh or are receiving the first commercial thin, MCB Camp Lejeune will maintain a pine basal area of 70-80 square feet per acre. Using the leave tree method of thinning overstocked pine stands, helps prevent loss from southern pine beetle and major wind events, improves the quality of residual timber and prepares the stand for natural regeneration at rotation.

A leave tree thin with hardwood consideration is the same as a leave tree thin, but desirable dominant or codominant mast producing hardwood is marked as the leave tree. This type of



Figure 4. A naturally regenerated loblolly pine stand on Camp Lejeune. Strips of unmerchantable timber have been mowed with Hydro-Axe with Fecon mowing head to reduce stocking levels.



Figure 5. In a leave tree thin, the trees that are not to be harvested (“leave trees”) are marked with blue paint at approximately 4.5 feet from the ground



Figure 6. A leave tree thin with hardwood consideration shows a dominant hard mast producing species marked as a leave tree.

leave tree thin is normally used in pine-dominated stands. This system is applied in the same manner as a leave tree thin used for thinning pure pine except a desirable dominant, co-dominant mast producing hardwood can be marked as the leave tree. This system is designed for use in stands to improve wildlife habitat. This system ensures that the best mast producing trees remain at rotation and the growing space is utilized.

Hardwood Removal — An intermediate harvest to remove dominant and co-dominant hardwood species. Designed to improve RCW habitat. A maximum of 10% of the canopy may be occupied by hardwood species.

Row Thin — An intermediate thin normally used in pine plantations. Usually the first commercial thin performed in a stand. May be a third or fourth row thin, which means every third or fourth row will be removed. May also be used in conjunction with an operator select thin, where the feller/buncher operator thins the remaining rows to a desired residual basal area.

Crown Thin — An intermediate thin normally used in pine stands where part of the stand may have stems found in thick clumps and other parts of the stand may be open. Crown closure is a determining factor in which trees to remove.

Improvement Cut — Improvement cuts are made in stands where the stand is a mixture of desirable and undesirable trees. The undesirable trees are removed to improve the stand for timber growth, wildlife habitat improvement, aesthetic appeal, recreational benefits, or training area improvement.

Salvage Cut — Salvage cuts are cuts designed to remove damaged or infested trees. Man-caused and natural disturbances such as windstorms, ice storms, and wildland fires can cause damage in a forest stand. Salvage cuttings are made on an emergency basis to use damaged timber, reduce economic loss, improve aesthetics in an area, reduce fuel loading, and prevent the spread of insects and disease.



Figure 7. Every fourth row is removed in a fourth row thin.



Figure 8. A recently completed crown thin in a longleaf pine stand.

Intermediate Thins in Mixed-Pine Hardwood and Hardwood Dominant Stands

Pre-commercial Thin — Using a drum chopper pulled by a dozer tractor, rubber-tired Hydro-Axe with Fecon mowing head, or hand tools to reduce stocking levels in unmerchantable timber stands.

Leave Tree Thin — Leaving dominant or co-dominant trees based on spacing and determined by the average dbh. When thinning stands that contain trees greater than 10 inches dbh, MCB Camp Lejeune will maintain a residual pine basal area of 60 square feet per acre, dependent on site and stand condition. When thinning stands that contain trees less than 10 inches dbh or are receiving the first commercial thin, MCB Camp Lejeune will maintain a pine basal area of 70-80 square feet per acre. Trees selected as “leave trees” may be pine or hardwood species, or a combination of both. Using the leave tree method of thinning overstocked mixed stands helps prevent loss from insect and disease, and major wind events. This harvest method improves the quality of residual timber and prepares the stand for natural regeneration at rotation.

Crown Thin — An intermediate thin normally used in pine stands, but may be utilized in mixed stands. Used in stands where part of the stand may have stems in thick clumps and other parts of the stand may be open. Crown closure is a determining factor in which trees to remove.

Improvement Cut — Improvement cuts are made in stands where the stand is a mixture of desirable and undesirable trees. The undesirable trees are removed to improve the stand for timber growth, wildlife habitat improvement, aesthetic appeal, recreational benefits, or training area improvement.

Salvage Cut — Salvage cuts are cuts designed to remove damaged or infested trees. Man-caused and natural disturbances such as windstorms, ice storms, and wildland fires can cause damage in a forest stand. Salvage cuttings are made on an emergency basis to use damaged timber, reduce economic loss, improve aesthetics in an area, reduce fuel loading, and prevent the spread of insects and disease.

Pine Only Thin — An intermediate harvest in a stand to improve hardwood mast production in mixed pine hardwood stands. This treatment is normally used in compartments found in cantonment areas where hardwood is the preferred species. In stands where less than 50 square feet of desirable mast producing hardwood basal area per acre is present, a dominant or co-dominant pine should be left to give a total residual basal area of 60-70 square feet.

Pine Removal — An intermediate harvest in a stand to improve hardwood mast production in mixed pine hardwood stands. In stands where more than 50 square feet of desirable mast producing hardwood basal area per acre is available, all pine is marked for removal. This treatment is normally used in compartments found in cantonment areas where hardwood is the desired species.

2.6 TIMBER MANAGEMENT IN BOTTOMLAND HARDWOOD

The fragile nature of the soils associated with bottomland hardwood areas and the historically poor market value of associated timber products necessitate exclusion of these areas from timber harvesting. Forested wetlands, which include bottomland hardwood areas, are among some of the most important ecological habitats in the Southeast. Forested wetlands on MCB Camp



Figure 9. A typical Camp Lejeune bottomland hardwood stand.

Lejeune are diverse and include high and low pocosins, Carolina Bays, and riparian wetlands. Wetlands management and protection is addressed in Chapter 10. Management and silvicultural activities on MCB Camp Lejeune consider the ecological value of forested wetlands and predominately consist of conservation and preservation of these areas. These management actions are consistent with the overall goal of restoration and protection of mature forested wetlands. Construction projects located in these areas may require timber harvesting, provided all environmental concerns have been appropriately addressed.

2.7 TIMBER MANAGEMENT IN CANTONMENT AREAS

The management of forestland located in cantonment areas presents unique management opportunities. Prescribed burning is a key management tool used in the forests of MCB Camp Lejeune for maintaining longleaf pine ecosystem health. Because of smoke management issues, MCB Camp Lejeune is unable to prescribe burn timber stands that are intermingled with urban areas such as busy highways, schools, housing and industrial complexes. MCB Camp Lejeune will continue to manage these areas for loblolly pine and/or hardwoods. Rotation age in cantonment areas is 50 years for all pine species and 100 years for upland hardwood species. Many of these areas are expected to be developed in the future, which will further increase fragmentation. Timber compartments that are in cantonment areas are 1, 2, 3, 4, 10, 11, 12, 17, 31, and 54.

Timber in the cantonment areas will be managed as previously described in the preceding sections, with the following exceptions:

- there will be no longleaf restoration in the cantonment area
- when thinning pine or mixed pine hardwood, more than 60 sq ft basal area of pine

may be retained.

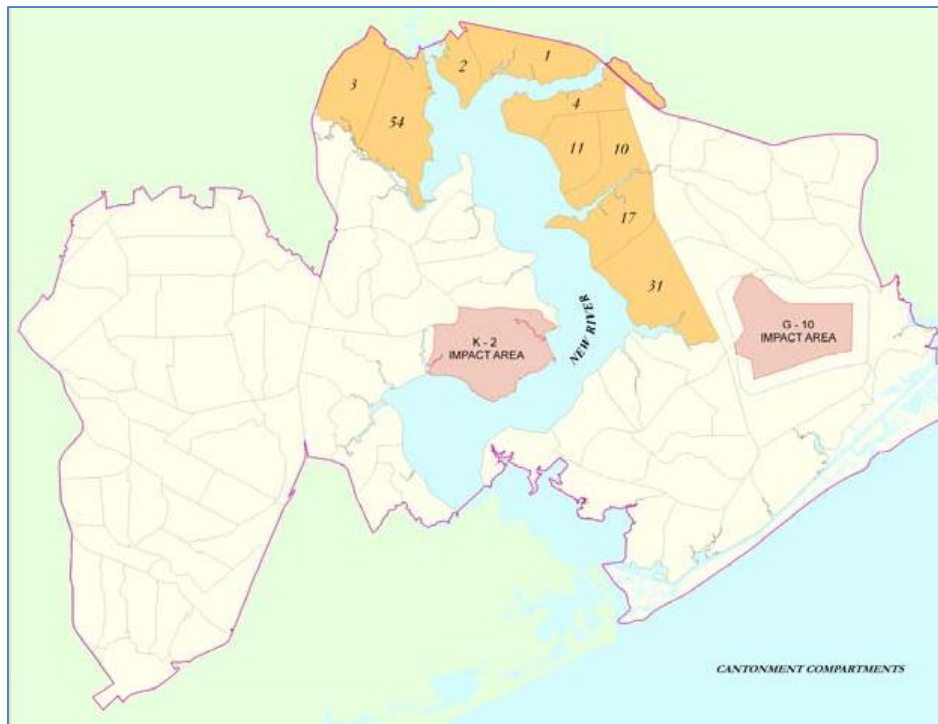


Figure 10. Compartments located in Cantonment Areas on MCB Camp Lejeune.

3.0 OTHER ANNUAL PRESCRIPTION GUIDELINES

3.1 TIMBER MARKING GUIDELINES

The Forest Management Section staff conducts timber marking at MCB Camp Lejeune. Salvage sales may be sold based on weight or marked shortly before harvesting because of the need to remove timber quickly and completely. Regularly planned sales use timber marking or cruising, to accomplish silvicultural objectives, and are done one or two years before harvesting so timely budget and sale preparation can be accomplished. The type of silvicultural treatment is determined during the compartment prescription process, as described above.



Figure 11. Measuring timber in a stand scheduled for a leavetree thin.

3.2 TIMBER SALES, CONTRACTING, AND COMPLIANCE

The timber sale contracting program is the dual responsibility of NAVFAC MIDLANT and the Forest Management Section, under the Director, Installations and Environment. The Forest

Management Section prepares timber volume estimates, writes the timber harvesting section of the specification and shows the sale to prospective bidders. The Forest Management Section also inspects the harvesting contractor to ensure that the silvicultural treatment being implemented is accomplishing the desired management objectives and that timber harvesting contract specifications are followed, and recommends contract closure after all work has been completed. NAVFAC MIDLANT administers contract assembly, advertisement, opens bids, collects payment and conducts all official correspondence with the bidders and contractors. There are two types of timber sales conducted at MCB Camp Lejeune:

- Scheduled Compartment Sales. Nine or ten compartment sales are scheduled annually. These sales have completed the NEPA requirements and may encompass a number of timber stands within a compartment and various silvicultural treatments. These sales generally close after two years with extensions being granted due to adverse weather conditions or training activity requirements.
- Salvage Sales. This type of sale is used whenever the immediate removal of timber is required. The salvage sale is used to remove merchantable timber from areas that have been damaged by wildland fire, wind storms, insect or disease infestation or when timber removal is required for construction or grounds maintenance. The completion time varies with the quantities of forest products to be removed and the urgency of the removal and the contracting company is required to begin harvesting immediately.

Volume Computation

Timber volume estimates are calculated using the data gathered by the timber marking crew or after the area has been cruised. The estimated quantity and quality of the forest products to be harvested determine the intensity of the cruise. Diameter class breakdowns are developed for each scheduled timber sale based on the stand level volume estimation. The stand volumes are consolidated into payment units and each payment unit can be paid for individually or in a one-time payment for the entire sale.

Contract Writing

The Forest Management Section develops the guidelines and constraints for each sale specification. The timber sale specification along with timber sale summary sheets, payment unit summary sheets, diameter class breakdown sheets, and maps showing the sale area are sent to NAVFAC MIDLANT where the contract is assembled, reviewed, and printed.

Contract Advertisement, Bidding and Award

NAVFAC MIDLANT is responsible for the advertising sales and conducting bid openings for timber sale contracts. A timber sale showing date is set and Forest Management Section

personnel show prospective bidders the sale area and discuss contract specifications. A government estimate is prepared by the Forest Management Section for the proposed sale. No minimum bid is required and all bids, regardless of whether above or below the government estimate, may be rejected. The high bid is normally accepted and the contract is awarded.

Timber Sale Compliance

After the contract has been awarded, the payment unit must be paid in full before any timber harvest can occur. Once harvesting has begun the Forest Management Section inspects the harvesting operation for contract compliance and informs NAVFAC MIDLANT when official action must be taken against the contractor for failure to comply with contract specifications.

Contract Closure and Follow-up

It is the responsibility of the Forest Management Section to notify NAVFAC MIDLANT, in writing, when the contract has been completed. The Administration and Finance Section, Environmental

Management Division totals all timber additions, deletions, and any monetary adjustments. NAVFAC MIDLANT concludes all financial transactions with the contractor. When all financial obligations have been completed, and the contract closed, the area may be opened for firewood collection.

3.3 TIMBER ACCESS ROADS

The construction and maintenance of roads that are required solely for the purpose of ingress and egress for timber harvesting are maintained and constructed utilizing Forest Management Section personnel, heavy equipment, and supplies. During timber harvesting operations the contractor is responsible for maintenance of haul roads and the contractor must return the road to its pre-sale condition upon completion of the harvest.



Figure 12. Forest access road repaired by Base Forestry personnel.

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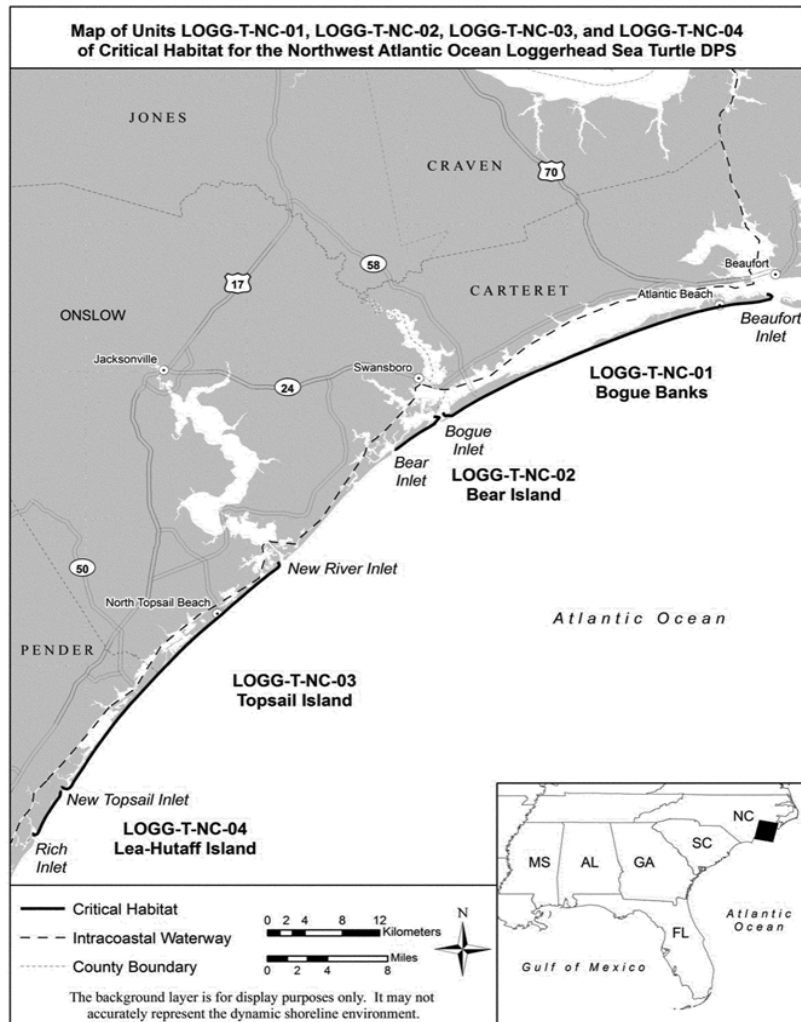
Appendix 9:

Sea Turtle Monitoring, Management, and Protective Measures

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Appendix 9: Sea Turtle Monitoring, Management and Protective Measures

The following document, with minor edits regarding referencing the 2007 Marine Corps Base Camp Lejeune Integrated Natural Resources Management Plan, sent to the USFWS on October 25, 2012, describes measures MCB Camp Lejeune will take to monitor, manage for, and protect sea turtle nests on Onslow Beach. These measures were determined by the USFWS to be sufficient to exempt Onslow Beach from critical habitat designation. This exemption is described in Federal Register document 74 FR 39755 – 39854 of July 10, 2014, “Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the Northwest Atlantic Ocean Distinct Population Segment of the Loggerhead Sea Turtle.” Browns Island was not considered in the original proposal to designate critical habitat, and is therefore not specifically mentioned in the exemption. However the installation was exempted as a whole, and the mapped critical habitat units do not include Onslow Beach or Browns Island. The map below is taken from 74 FR 39755-39854. MCB Camp Lejeune’s two barrier islands are located between New River Inlet and Bear Inlet.



PROTECTION, MONITORING, AND MANAGEMENT OF LOGGERHEAD SEA TURTLES ON ONSLOW BEACH, MARINE CORPS INSTALLATIONS EAST-MARINE CORPS BASE, CAMP LEJEUNE

The purpose of this document is to outline protective measures, monitoring and management actions carried out to promote conservation and recovery of sea turtles on Marine Corps Installations East-Marine Corps Base Camp Lejeune (MCIEAST-MCB CAMLEJ). With the recent designation of the Northwest Atlantic Distinct Population Segment of the loggerhead turtle, and listing as threatened, there is a requirement to designate critical habitat. The National Defense Authorization Act of 2004 allows for military lands to be granted an exemption from the designation of critical habitat for endangered species, provided that there is an Integrated Natural Resources Management Plan (INRMP) in place that provides a sufficient benefit to threatened and endangered species. This document will lay out the measures that MCIEAST-MCB CAMLEJ believe are sufficient to exempt the base from critical habitat designation. As MCIEAST-MCB CAMLEJ begins the process of revising our INRMP, we plan to continue the existing measures for sea turtles described below in the new INRMP.

This document has been organized in a way that addresses specific issues brought up by U.S. Fish and Wildlife Service Sea Turtle Biologist, Anne Marie Lauritsen in e-mails and telephone conversations with MCIEAST-MCB CAMLEJ biologists, Craig Ten Brink. The information below is intended to be a summary of our monitoring and protective measures. For more detailed descriptions of particular aspects of the program, MCIEAST-MCB CAMLEJ can provide the pertinent documents. More detail on the sea turtle protocol can be found in the Handbook for Sea Turtle Volunteers in North Carolina (NRCS, 2006).

Daily Sea Turtle Nest Season Monitoring

Sea turtle nesting has been monitored on Onslow Beach since 1979. The approximately 7 miles of Onslow Beach are monitored on the ground, while approximately 4 miles of Browns Island is monitored by air (Figure 1).

- From mid May through August, Base personnel conduct morning surveys on Onslow Beach every day, including weekends and holidays.
- Surveys begin before sunrise.
- When a crawl is encountered, Base personnel determine whether the crawl is a false crawl, or a nest, and fill out an Individual Crawl Report provided by the North Carolina Sea Turtle Project (Appendix A). Data sheets are submitted online through the North Carolina Sea Turtle Project's page on Seaturtle.org.
- Locations of nests are GPSed, marked, and protected with cages to prevent predation, and increase visibility to people using the beach.

- When military training is to take place on the beach at night, Base personnel will conduct periodic surveys during the duration of the training activity. If a crawl is encountered the same data described above is collected.
- If a nesting female is encountered during night surveys, Base personnel will allow the turtle to nest. Once nesting is in progress (at least 1/3 of eggs deposited) Base personnel will record individual tagging and size data, and allow for immediate protection of sea turtle nests. If the turtle is not tagged, Base personnel will tag the turtle using approved procedures.
- If a nest is laid in the amphibious training beach, below the high tide line, or in an area likely to be frequently inundated or eroded, the nest is relocated to a safe area. Nests found in the amphibious landing beach are relocated north of the recreational beach. Nest relocations are carried out in accordance with existing guidelines adapted from the Handbook for Sea Turtle Volunteers in North Carolina (NRCS, 2006).
- All nests are relocated no later than 9:00 a.m. the morning after eggs are deposited.
- Nests are excavated, and hatchlings are handled in accordance with guidelines in the Handbook for Turtle Volunteers in North Carolina (NRCS, 2006).

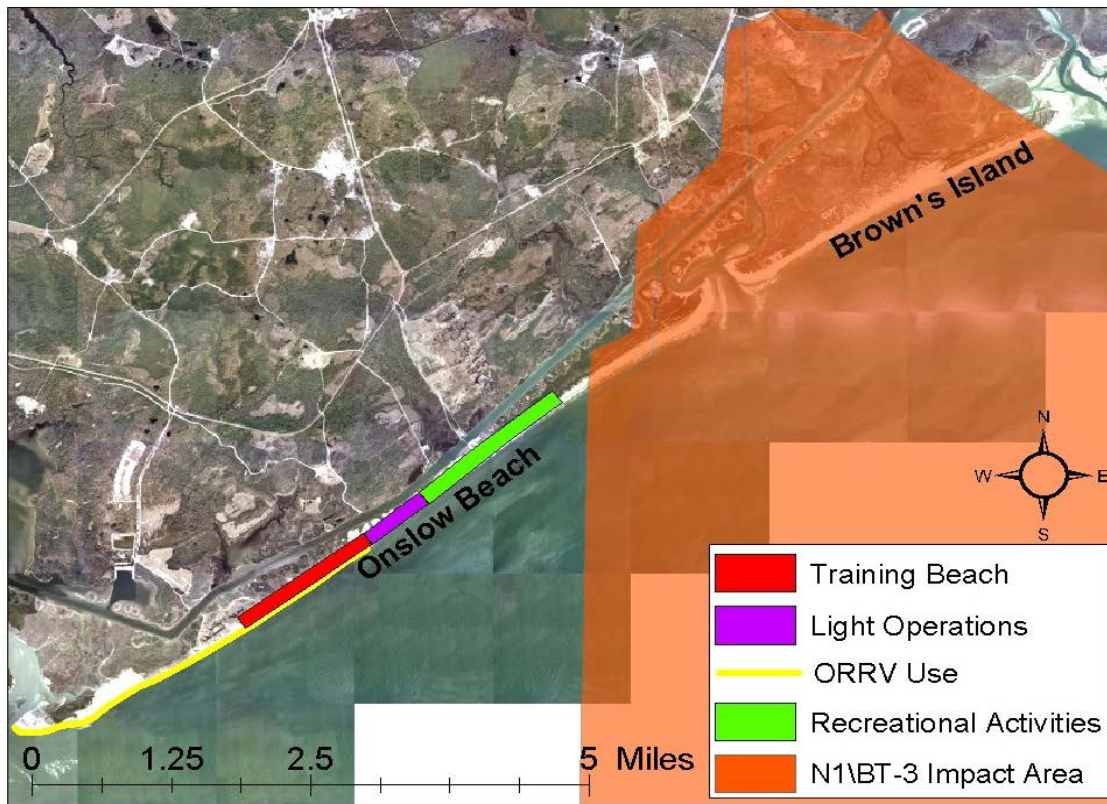


Figure 1. Map of Onslow Beach showing training recreational and special use areas.

Predator Control

Predation of turtle nests has periodically spiked, but in general has not been a major problem for Onslow Beach. In 2012, two nests out of 52 total nests (3.8%) were predated before they were located by Base personnel. A total of 57 eggs were lost; 12 from one nest, and 45 from another. No nests were predated after cages were installed.

In our 2007 INRMP, we stated in regards to shorebirds, that MCIEAST-MCB CAMLEJ has “actively removed predators from Onslow Beach, and will do so again as appropriate.” Since 2008, MCIEAST-MCB CAMLEJ has trapped every year but 2012 on Onslow Beach. Table 1 shows the predators removed from 2008-2011.

MCIEAST-MCB CAMLEJ maintains a contract with U.S. Department of Agriculture, Animal and Plant Health Inspection Service (USDA-APHIS) in order to control nuisance animals throughout the base. This contract is flexible, and allows wildlife managers to direct trapping efforts where it is needed most, including control of predators on Onslow Beach for the purpose of promoting conservation of sea turtles, shorebirds, and colonial nesting waterbirds.

In her email, Ms. Lauritsen suggested that we describe what would trigger predator control to minimize sea turtle predation, and suggested that we use Action 411 in the 2008 Recovery Plan for the Northwest Atlantic Population of the Loggerhead Sea Turtle as a guide. The goal of this action is to reduce the annual rate of mammalian predation to at or below 10% of sea turtle nests. Until now, mobilizing the trapping effort on Onslow Beach has not been triggered by an absolute number or percentage of nests, but MCIEAST-MCB CAMLEJ will begin using 10% as a trigger and will incorporate this into the revised INRMP.

Table 1. Predators trapped on Onslow Beach from 2008-2011

YEAR	OPOSSUM	RACCOON	BOBCAT	FERAL CAT	GRAY FOX
2008	21	1	0	3	2
2009	22	5	0	1	2
2010	32	8	4	0	0
2011	10	2	0	0	0

Education

Because Onslow Beach is a location for both military use and recreational use, MCIEAST-MCB CAMLEJ has developed educational materials targeted for Marines training in the field and patrons of the recreational beach.

Marine units using the Amphibious Landing portion of Onslow Beach must have a Range Safety Officer (RSO), who has gone through the Base's RSO course. Among other things, the RSO course includes sections on threatened and endangered species, and specifically sea turtles. Range Safety Officers are made aware of the potential presence of sea turtles during the nesting season, and the restrictions that are imposed on training. Training restrictions are based on conservation measures and terms and conditions of the 2002 Biological Opinion on the Effects of Current Use and Modification of Training Areas, Dune Stabilization, and Continued Recreational Use of Onslow Beach. These training restrictions have been incorporated into two MCIEAST-MCB CAMLEJ Orders, which all training units must comply with.

For recreational users of Onslow Beach, educational materials on sea turtles are provided in each of the beach rental units, and posters are hanging at each of the three "pavilions" on the beach. The pavilions house rest rooms, vending machines and covered picnic areas.

Predator proof trash receptacles

Predator-proof trash receptacles are not currently being used on Onslow Beach. However if use of this type of receptacle is necessary to meet the requirements of exemption from critical habitat designation, MCIEAST-MCB CAMLEJ will implement their use before next nesting season.

Lighting

MCIEAST-MCB CAMLEJ is committed to reducing and keeping lighting on Onslow Beach to acceptable levels for sea turtles. The 2002 Biological Opinion included a term and condition stating that "Exterior lights on all beach housing units will be converted to canister down lights or other system that reduce ambient light to acceptable levels. In addition, the 2002 Biological Assessment included the following conservation measure:

"Lighting on all new structures built on Onslow Beach will conform to guidelines contained in the Florida Marine Research Institute's Technical Reports on Understanding, Assessing and Resolving Light Pollution Problems on Sea Turtle Nesting Beaches (Witherington and Martin, 2000). Existing structures on Onslow Beach, as well as Risley Pier, will be evaluated for compliance with these standards within six months of receipt of a biological opinion."

Since receiving the 2002 Biological Opinion, MCIEAST-MCB CAMLEJ has converted all lighting on beach housing units to canister lights (Figure 2). In addition, all street lights on Onslow Beach have been converted to low-pressure sodium fixtures, which emit a wavelength that is less attractive to loggerheads. This action went beyond the requirements of the Biological Opinion. As discussed with Ms. Lauritsen, MCIEAST-MCB CAMLEJ will conduct a nighttime survey to determine if any of the street light bulbs are visible from the beach. If so, MCIEAST-MCB CAMLEJ will submit a plan for USFWS approval that addresses the remaining problem lights. Finally, the demolition of Risley Pier has undoubtedly improved the lighting situation for sea turtles on Onslow Beach.

For future facilities, projects are directed to the attention of the Threatened and Endangered Species Program Manager through the National Environmental Policy Act (NEPA) environmental review process. Any new facilities will be required to conform to the Witherington and Martin (2000) guidelines. The Threatened and Endangered Species Program Manager takes an active role working with project proponents to come up with a lighting system that meets the needs of the project, but is sea turtle friendly.



Figure 2. Onslow Beach housing unit showing canister lighting.

Recreational Driving

At the time of the 2002 Biological Opinion, MCIEAST-MCB CAMLEJ allowed off-road recreational driving on Onslow Beach from the former Risley Pier location southwest to the New River Inlet year round, with a prohibition on night driving during the sea turtle nesting season (May 15 - October 31).

In 2005 the base order addressing driving on Onslow Beach was revised to further restrict recreational driving on Onslow Beach. The revised base order restricts driving during the sea turtle nesting season to only training beach during daylight hours, when training is not scheduled. The rationale behind this decision was that sea turtle nests are already being relocated from the training beach, and therefore, recreational driving in this area would not threaten nests or hatchlings. The restriction to daylight hours ensures that Base personnel can find nests in the training beach before recreational users arrive on the beach. Figure 3 shows the different beach sections and when (if) recreational driving is allowed in each.

Conclusion

Based on the information above, we believe it is clear that Onslow Beach is, and will continue to be a high quality nesting beach for the loggerhead sea turtle. In addition to doing what is legally required, MCIEAST-MCB CAMLEJ has sought out ways to improve nesting habitat on Onslow Beach. Several of the measures described above, including conversion of street lights to low-pressure sodium, restriction of recreational driving to the training beach only during the sea turtle nesting season, and the predator trapping efforts go above and beyond the requirements of past

biological opinions, but were seen as good ways to improve stewardship in support of the military mission. In addition to these measures, MCIEAST-MCB CAMLEJ will conduct a nighttime survey of streetlights and submit a plan to the USFWS to address any lights where the bulb is visible from the beach.

It is essential to the military training mission of MCIEAST-MCB CAMLEJ that Onslow Beach is not designated as critical habitat for the loggerhead sea turtle. We believe that the measures described above, and which will be incorporated into the revision of our INRMP offer sufficient protection to the loggerhead to justify exempting Onslow Beach from critical habitat designation, and we seek USFWS concurrence on this matter.

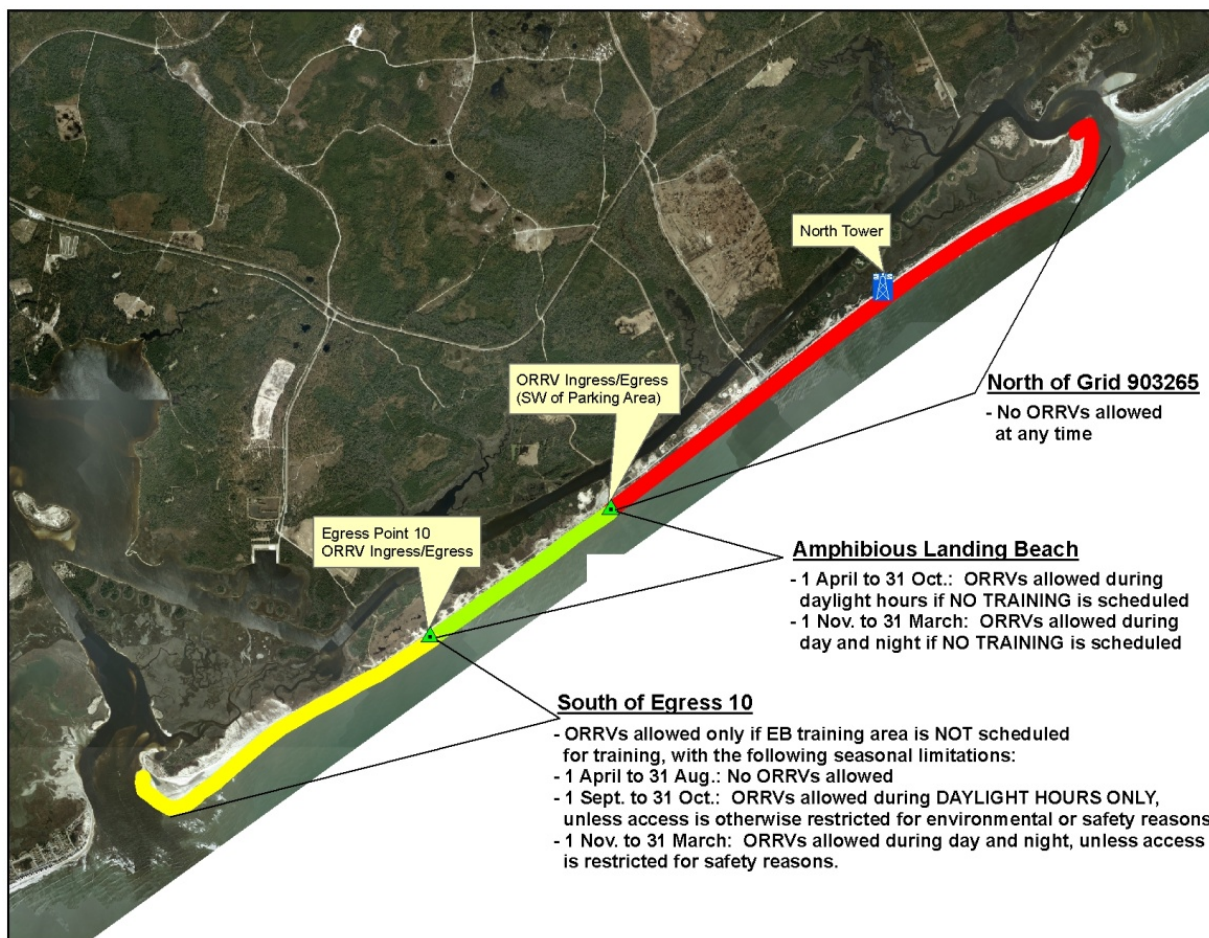


Figure 3. Schedule and locations for recreational driving on Onslow Beach.

References

North Carolina Wildlife Resources Commission (NCWRC). March, 2006. Handbook for Sea Turtle Volunteers in North Carolina. Coastal Faunal Diversity Program, Raleigh, North Carolina. Available at:
http://www.seaturtle.org/PDF/NCWRCNorthCarolinaWildlifeResourcesCommission_2006_HandbookforseaturtlevolunteersinNor.pdf.

Appendix 10:

Mitigation and Monitoring for Marine Mammals and Sea Turtles

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Appendix 10. Mitigation and Monitoring for Marine Mammals and Sea Turtles

The USMC and NMFS' Permits and Conservation Division have proposed the following mitigation and monitoring measures designed to avoid take of marine mammals and sea turtles during its training activities. NMFS' ESA, Interagency Cooperation Division's concurrence with a may affect, not likely to adversely affect determination is contingent on the following measures being implemented:

- Compliance with MCB Camp Lejeune 's Integrated Natural Resources Management Plan
- N-1/BT-3 Impact Area Monitoring — Monitoring of the N-1/BT-3 Impact Area will be conducted by Protected Species Observers (PSOs) with binoculars stationed in two towers (Bear and North Onslow) positioned at the land based targets, as described in MCB Camp Lejeune's Standard Operating Procedures. These towers allow for monitoring of waters surrounding the target. When operations are conducted at night, PSOs will monitor the N-1/BT-3 impact area with the use of night-vision goggles. Should a marine mammal or sea turtle be sighted within a firing area, operations will be suspended until the animals have left the area or have not been resighted within 15 minutes.

Firing of any small arms up to 50 cal and 40 mm inert practice rounds, direct fire 155 mm HE and Stinger missiles will be delayed should a marine mammal be sighted within the N- 1/BT-3 impact area. Additionally, firing from small vessels to land would be delayed should a marine mammal be present in a 500 m wide area between the vessel and the land housing the targets.

- Aerial Sweep — Prior to commencing live fire exercises in the N-1/BT-3 impact area and H-Range, an air sweep will be conducted to ensure there are no marine mammals or sea turtles in the impact area. Flyovers will be flown at 227 m (750 ft) and consist of at least two survey lines 2 nautical miles apart and parallel to the coast, with the first line 1.6-3.2 km (1-2 miles) off the beach, and the second 4.8-6.4 km (3-4 miles) off the beach. If a marine mammal or sea turtle is spotted in the N-1/BT-3 impact area, the Environmental Management Division must be notified and firing cannot commence until the animal clears the impact area. All aircrew that conduct range sweeps shall receive training on identification of marine mammals and procedures for collecting and reporting data.

All marine mammal and sea turtle sightings associated with range sweeps shall be documented by noting date, time, number, species, location, and direction. Any action taken related to suspension of training activities will be noted. If no marine mammal or

other protected species (e.g., sea turtles) are sighted, a negative report shall be submitted with all of the above information except species data.

- ICWW and New River Monitoring — The USMC will include monitoring for marine mammals in the ICWW and New River during vessel surveys designed to detect non-military vessels or citizens within water restricted areas. The Marine Corps blocks north and south bound vessel traffic in the ICWW during training events. Vessels stationed at these closure points will also monitor for marine mammals and relay any sightings to the commanding officer in charge of implementing training delay mitigation measures.

In addition to vessel-based PSOs, PSOs would be present in two towers positioned at the land based targets, as described in MCB Camp Lejeune's Standard Operating Procedures. These towers allow for monitoring of waters surrounding the target. Should a marine mammal or sea turtle be sighted within a firing area, operations will be suspended until the animals have left the area or have not been resighted within 15 minutes.

- Special Measures to Protect Right Whales — From 1 November through 30 April, when North Atlantic right whales may be present along the North Carolina coast, Range Control will issue the following daily warning order to training personnel:

Endangered North Atlantic right whales migrate along the North Carolina coast enroute to and from New England areas. Primarily Spring through Fall, and Georgia/Florida calving areas used during winter. Right whales, including mother/calf pairs, can be found 1/4 mile or more off Onslow Beach from 1 November to 30 April. Range Control requires range sweeps during this period in conjunction with live firing exercises into the BT-3 impact area.

- Coordination and Reporting — MCB Camp Lejeune will coordinate with the local NMFS Stranding Coordinator in the event of any unusual marine mammal behavior and any stranding, beached live/dead, or floating marine mammals.

The PSOs will record and document the dates, times, locations, species, number, distance, and behavior of marine mammals sighted during monitoring activities, as well as mitigation measures implemented.

- Vessel Operations — To avoid take during vessel operations, all USMC vessels shall abide by the following NMFS' Southeast Regional Viewing Guidelines (<http://www.nmfs.noaa.gov/pr/education/southeast/guidelines.htm>):
 - While in transit, vessels will be alert at all times, use caution, and proceed at a "safe speed" so that the vessel can take proper and effective action to avoid a collision with any marine animal and can be stopped within a distance appropriate to the prevailing circumstances and conditions.

- When whales have been sighted in the area, vessels will increase vigilance and take reasonable and practicable actions to avoid collisions and activities that might result in close interaction of Navy/Marine Corps assets and marine mammals. Actions include changing speed and/or direction and are dictated by environmental and other conditions (e.g., safety, weather).
- Vessels will maneuver to remain at least 460 m (1,500 ft) from any observed whale and avoid approaching whales head-on. This condition does not apply if a vessel's safety is threatened, such as when change of course will create an imminent and serious threat to a person, vessel, or aircraft, and to the extent vessels are restricted in their ability to maneuver. Where feasible and consistent with mission and safety, vessels will avoid closing to within 183 m (200 yd) of marine mammals other than whales.
- Floating weeds, algal mats, Sargassum rafts, clusters of seabirds, and jellyfish are good indicators of marine mammals; therefore, increased vigilance in watching for marine mammals will be taken when these are present.

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Appendix 11:

Hirst's Panicgrass Monitoring

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Dichanthelium hirstii population monitoring field data form

SITE INFORMATION						Page ____ of ____
Site Name:						
Date:						
Surveyors:						
GPS Unit:						
GPS Filename:						
Coordinate System:	<i>UTM</i>	<i>LatLong</i>	<i>State Plane</i>			
			<i>1983</i>			
Datum:	<i>18N</i>	<i>WGS 1984</i>				
Latitude:					<i>Post-processed</i>	<i>Latitude:</i>
Longitude:					<i>Post-processed</i>	<i>Longitude:</i>
Number of Satellites:						
PDOP:						
Precision:						
Notes on location:						
SPECIES METRICS						ECOLOGICAL MEASUREMENTS
PLANT OR CLUMP ID #:			<i>Former ID # & date:</i>			Depth of water at clump (cm):
Height of tallest culm (inflorescence):						Depth to soil saturation (no standing water):
Height of tallest culm (top leaf when no infl):						Trampling or soil disturbance:
Diameter of clump basal rosette(s):						Associated species within 1 meter of clump (list below):
Total # of culms per plant/clump:						

Total # of inflorescences per plant/clump:						
# of nodal sprouts:						
Age of plants in clump (circle all that apply):	<i>seedling</i>	<i>yearling</i>	<i>mature</i>			
Plant condition (circle one):	<i>healthy</i>	<i>depauperate</i>	<i>chlorotic (drought stress)</i>	<i>herbivory</i>	<i>Comments on plant condition:</i>	
Culm #	Total # Infl per Culm	Vernal	Autumnal 1	Autumnal 2		
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
TOTAL # of Inflorescences						

Appendix 12:

Bald Eagle

Incidental Take Permit

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FEDERAL FISH AND WILDLIFE PERMIT

2. AUTHORITY-STATUTES
16 USC 668a

REGULATIONS
50 CFR 13
50 CFR 22.26

1. PERMITTEE

US MARINE CORPS
dba MARINE CORPS BASE CAMP LEJEUNE
ATTN: G-F/EMD/ECON
12 POST LANE
CAMP LEJEUNE, NC 28547
U.S.A.

3. NUMBER
MB37632A-0

4. RENEWABLE
 YES
 NO

5. MAY COPY
 YES
 NO

6. EFFECTIVE
07/01/2014

7. EXPIRES
06/30/2019

8. NAME AND TITLE OF PRINCIPAL OFFICER *(If #1 is a business)*
MARTIN G. KORENEK
HEAD, ENVIRONMENTAL CONSERVATION BRANCH

9. TYPE OF PERMIT
EAGLE TAKE ASSOCIATED WITH BUT NOT THE PURPOSE OF AN
ACTIVITY

10. LOCATION WHERE AUTHORIZED ACTIVITY MAY BE CONDUCTED
See Condition D.

11. CONDITIONS AND AUTHORIZATIONS:

A. GENERAL CONDITIONS SET OUT IN SUBPART D OF 50 CFR 13, AND SPECIFIC CONDITIONS CONTAINED IN FEDERAL REGULATIONS CITED IN BLOCK #2 ABOVE, ARE HEREBY MADE A PART OF THIS PERMIT. ALL ACTIVITIES AUTHORIZED HEREIN MUST BE CARRIED OUT IN ACCORD WITH AND FOR THE PURPOSES DESCRIBED IN THE APPLICATION SUBMITTED. CONTINUED VALIDITY, OR RENEWAL, OF THIS PERMIT IS SUBJECT TO COMPLETE AND TIMELY COMPLIANCE WITH ALL APPLICABLE CONDITIONS, INCLUDING THE FILING OF ALL REQUIRED INFORMATION AND REPORTS.

B. THE VALIDITY OF THIS PERMIT IS ALSO CONDITIONED UPON STRICT OBSERVANCE OF ALL APPLICABLE FOREIGN, STATE, LOCAL, TRIBAL, OR OTHER FEDERAL LAW.

C. VALID FOR USE BY PERMITTEE NAMED ABOVE.

D. You are authorized to take bald eagles by means of disturbance, including loss of productivity due to abandonment, at (7) eagle nest locations situated within U.S. Marine Corps Base Camp Lejeune (USMC Camp Lejeune), North Carolina, property during the course of activities associated with USMC Camp Lejeune military tactical maneuver training for human health and safety.

The (7) bald eagle nest locations on USMC Camp Lejeune are identified and located by the following information:

LZ Nest- Compartment 15, Stand 5	latitude 34° 41' 29.3058" N longitude 77° 25' 13.0218" W
Sneads Creek Nest- Compartment 42, Stand 23	latitude 34° 35' 11.2776" N longitude 77° 23' 43.335" W
Traps Bay Nest- Compartment 51, Stand 15	latitude 34° 33' 54.5832" N longitude 77° 20' 06.1326" W
Traps Bay Alternate Nest	latitude 34° 33' 59.3316" N longitude 77° 20' 12.3216" W
Traps Bay Alternate Nest 2011	latitude 34° 38' 36.981" N longitude 77° 13' 55.3614" W
G-10 Nest	latitude 34° 33' 57.6432" N longitude 77° 20' 08.2104" W
Freeman's Creek Nest	latitude 34° 36' 9" N longitude 77° 15' 48" W

If a new eagle nest is built at or adjacent to the location described above, you must report that new eagle nest location within 10 days to the Southeast Region Eagle Biologist at (321) 972-9089. A permit amendment to authorize take (disturbance) at this new nest location may be required.

E. This permit does not authorize the killing or injury of any eagles, excluding take of eggs or young by nest abandonment as described in Condition D, nor does it authorize take of any bald eagle nest or tree containing a bald eagle nest.

ADDITIONAL CONDITIONS AND AUTHORIZATIONS ALSO APPLY

12. REPORTING REQUIREMENTS

Eagle reporting requirements are outlined in Conditions D and E and in Reporting Requirements. Requirements for monthly and annual monitoring reports are outlined in Monitoring Requirements.

ISSUED BY
Resee Collins

TITLE
CHIEF, MIGRATORY BIRD PERMIT OFFICE - REGION 4

DATE
06/30/2014

You must contact the migratory bird permit issuing office at (404) 679-4163 immediately upon discovery of any unanticipated take or regarding any apparent injury or death occurring to any eagle for any reason during project activities. You must immediately contact the South Carolina Center for Birds of Prey, 4872 Seewee Road, Awendaw, South Carolina, 29429, (843) 971-7474 to coordinate transportation of any injured eagle.

F. You are authorized to salvage eagle carcasses, feathers and parts found on the ground in the vicinity of the eagle nest. Any salvaged items found at the site must be shipped within 30 days to the National Eagle Repository. Contact: U.S. Fish and Wildlife Service, National Eagle and Wildlife Repository, RMA, Bldg. 128, 6550 Gateway Road, Commerce City, CO 80022, (303) 287-2110.

G. You must comply with the following avoidance, minimization, or other mitigation measures prescribed by this permit for the eagle(s) and eagle nest(s) identified in Condition D:

1. No training activities, either on foot and/or in wheeled and tracked vehicles may occur within 100 feet of any active bald eagle nest during the nesting season (October 1 - May 15 or until the eaglet(s) fledge, which may be before or after May 15). This restriction does not apply to established roads that are currently being used. Any blank ammunition and/or artillery fire must be directed away from any bald eagle nest.
2. You must continue to provide conservation benefits to bald eagles by complying with land management activities as outlined in the USMC Camp Lejeune Integrated Natural Resource Management Plan dated November 2006.
3. You must comply with the National Bald Eagle Management Guidelines regarding habitat management, including:
 - a. Utilizing prescribed fire, selective thinning and exotic vegetative species removal to ensure proper management of the timber stands containing any bald eagle nest.
 - b. Ensure crown fires do not occur by raking around the nest trees each year prior to nesting season or when eagles are not present at the nest site.
 - c. Use of smoke management and ignition techniques that minimize any flame and smoke impacts to any bald eagle nest.
4. No use or placement of heavy equipment within 50 feet of any eagle nest tree at anytime to prevent nest tree root damage. This minimization does not apply to existing roads, trails, or other linear facilities near an eagle nest or to nests built on artificial structures.
5. Shield new permanent exterior lighting so that lights do not shine directly onto any bald eagle nest.
6. Minimize or eliminate the use of lead ammunition for hunting purposes.
7. If applicable, coordinate the design and construction or retrofitting of new or existing utility lines to be in compliance with the Avian PowerLine Interaction Committee (APLIC) Guidelines found at www.aplic.org to reduce potential for electrocution, collision and nesting of avian species.

H. You must follow state and federal guidelines, laws and label instructions if using pesticides, herbicides, or other chemicals within 660 feet of any bald eagle nest tree(s) described in Condition D and any new bald eagle nest(s) that may be discovered on USMC Camp Lejeune property.

- I. Any person who is
1. employed by or under contract to you for the activities specified in this permit, or
 2. otherwise designated a subpermittee by you in writing, may exercise the authority of this permit.
- Any subpermittee who has been delegated this authority may not re-delegate to another individual/business.

**Standard Conditions
Eagle Take (Disturbance) Permit
50 CFR 22.26**

All of the provisions and conditions of the governing regulations at 50 CFR part 13 and 50 CFR part 22.26 are conditions of your permit. Failure to comply with the conditions of your permit could be cause for suspension of the permit and/or citation. The standard conditions below are a continuation of your permit conditions. If you have any questions regarding these conditions, refer to the regulations and forms, or to obtain contact information for your issuing office, visit: www.fws.gov/migratorybirds/mbpermits.html.

Monitoring Requirements:

1. A qualified monitor is required to monitor eagle use of up to a 1.5 mile radius of the bald eagle nest(s) identified in Condition D. on property that is accessible by you where the activities outlined in Condition D. occur. The monitor must be experienced in recognizing specific patterns and changes of eagle behavior and employed or contracted by the permittee, landowner, company or entity responsible for having the activity monitored.

If a new eagle nest is built at or adjacent to the location described in Condition D, you must report that new eagle nest location within 10 days to the Southeast Region Eagle Biologist at (321) 972-9089. Additional monitoring may be required based on the new nest location in relation to activities described in Condition D.

2. The required monitoring period is during each eagle nesting season from October 1 through May 15 (or until the eaglet(s) fledge, which may be before or after May 15) for each year the permit is valid and for 3 nesting seasons after the expiration date of the permit.
 3. Monitoring must occur at least once a month for 30-60 minutes during the nesting season to determine if eagles are observed. Monitoring must occur at a time of day when bald eagles are most likely to be in the area, (e.g., early morning, before sunrise, 7am-10am or late afternoon, just prior to sunset, 5pm-7pm EST). You must assess whether or not the eagles return to the nesting territory as identified in Monitoring Requirements No. 1 and continue to nest, roost and/or forage there, and/or if the eagles attempt to build or occupy another nest.
 4. Monitoring reports must provide the following information:
 - a. Date and length of time bald eagles were observed;
 - b. Time of day;
 - c. Number and age of bald eagles observed (i.e. juvenile, immature, subadult, adult); if age is not known, provide description;
 - d. Observed behavior (e.g. perching, feeding, sitting on or attending nest, in flight);
 - e. If a new bald eagle nest is built on or adjacent to your property, the new location and whether the bald eagles produced young at that site;
 - f. If any eagle nesting attempt was successful, failed or the eagles abandoned the area; and
 - g. A description of any human activity at the time eagles are observed during each month of the monitoring period (e.g. construction, road building, use of machinery, etc.).
- If nesting activity is observed, monitoring must continue until successful fledging or nest failure/abandonment is documented, which may be prior to or after May 15.
5. You may use Form 3-202-15 (Eagle Take Annual Report) found online at www.fws.gov/forms/3-202-15.pdf to report bald eagle monitoring activities.

Reporting Requirements:

6. Monthly monitoring reports must be submitted electronically to FW4eaglemonitoring@fws.gov at the end of each month during the required monitoring period outlined in Monitoring Requirements Condition Number 2 above. The email subject line for each report submittal must reference the project title or name, the permit number, and month/year of report.
7. An Annual Report of activities, which is an original signed summary of your monthly monitoring reports in accordance with the monitoring period outlined in Monitoring Requirements Condition Number 2 above, must be submitted every June 30 to the migratory bird permit issuing office at U.S. Fish and Wildlife Service, P.O. Box 49208, Atlanta, Georgia, 30359, and should include the following information:
 - a. Nest activity status at original and/or alternate nest locations (active, construction, inactive);
 - b. Nesting status (incubating bald eagle eggs, bald eaglets present);
 - c. Nest success (bald eaglets fledge, nest failed/abandonment); and
 - d. Any human activities occurring during that month of the monitoring period.

If no bald eagle activity is observed, a report indicating "no activity observed" is still required.

General Conditions:

8. The authorizations granted by this permit apply only to take that results from activities conducted in accordance with the description contained in the permit application and the terms of the permit. If the permitted activity changes, you must immediately contact the Southeast Region Eagle Biologist at (321) 972-9089 to determine whether a permit amendment is required in order to retain take authorization.
9. This permit does not authorize you to conduct activities on Federal, State, Tribal, or other public or private property other than your own without additional prior written permits or permission from the agency/landowner.
10. You remain responsible for all outstanding monitoring requirements and mitigation measures required under the terms of this permit for take that occurs prior to cancellation, expiration, suspension, or revocation of this permit.
11. Subpermittees must be at least 18 years of age. As the permittee, you are legally responsible for ensuring that your subpermittees are qualified to perform the work and adhere to the terms of your permit. You are also responsible for maintaining current records of anyone you have designated as a subpermittee, including copies of letters you have provided to the subpermittees authorizing them to conduct the permitted activities on your behalf.
12. You and any subpermittees must carry a legible copy of this permit and display it upon request whenever exercising its authority. Subpermittees must also carry your written subpermittee designation letter.

13. You and subpermittees may not conduct the activities authorized by this permit if doing so would violate laws of any State, county, municipal, tribal, or other government that apply to the permitted activity, and none of the privileges of this authorization are valid unless the permittee possesses all applicable permits, or other authorizations, if required.
14. You must maintain records as required in 50 CFR 13.46 and 50 CFR 22. Your records must also include the data gathered for monitoring and reporting purposes. All records relating to the permitted activities must be kept at the location indicated in writing by you to the migratory bird permit issuing office.
15. Acceptance of this permit authorizes the U.S. Fish and Wildlife Service to inspect any wildlife held or any activities authorized by this permit, and to audit or copy any permits, books, or records required to be kept by the permit and governing regulations.
16. You must allow Service personnel or other qualified persons designated by the Service access to the areas where eagles are likely to be affected by project activities outlined in Condition D., at any reasonable hour, and with reasonable notice from the Service, for purposes of monitoring bald eagles at the site while the permit is valid and for up to (3) years after it expires.
17. This permit is not transferable or assignable to another individual, business, government or tribal entity whether or not the property described in Condition D. transfers ownership from the permittee, except as provided by rite of succession as outlined in 50 CFR 13.24. As the permittee, you are ultimately legally responsible for compliance with the terms and conditions of this permit and that responsibility may not be delegated.
18. To renew this permit if the activities described in Condition D have not been completed by the expiration date of this permit, permittee must meet issuance criteria at the time of renewal and must also have been in compliance with permit conditions, including all monitoring and reporting requirements of the original permit. Permit conditions may be modified based on changes in eagle or human use of the property surrounding the project described in Condition D.
19. The U.S. Fish and Wildlife Service is not liable for any damage or injury to any person(s), wildlife, or property that occurs as the result of carrying out the activities associated with this permit.

Appendix 13:

Species at Risk Known or with Potential to Occur at MCB Camp Lejeune

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Appendix 13: Species at Risk Known or with Potential to Occur at MCB Camp Lejeune

COMMON NAME	SCIENTIFIC NAME	TAXON	LEJEUNE PRIORITY	KNOWN OR POTENTIAL	USFWS ¹	GOBAL ²	IUCN ³	NC ⁴	HABITAT COMMENTS
Pine Barrens Treefrog	<i>Hyla andersonii</i>	Amphibian	3	Potential		G4	NT	NL	pocosins, bay forests, boggy areas
Carolina Gopher Frog	<i>Lithobates capito</i>	Amphibian	1	Known	FSC	G3	NT	T	breeds in temporary fish-free pools; forages in sandy woods, especially pine-oak sandhills
Saltmarsh Sparrow	<i>Ammodramus caudacutus</i>	Bird	3	Known		G4	VU	NL	saltmarsh
Eastern Henslow's Sparrow	<i>Ammodramus henslowii susurrans</i>	Bird	1	Known	FSC	G4	NT	SC	clearcut pocosins and other damp weedy fields [breeding season only]
Brown Creeper	<i>Certhia americana</i>	Bird	4	Known		G5	LC	SC	mature open hardwood and mixed pine-hardwood forests
Wilson's Plover	<i>Charadrius wilsonia</i>	Bird	4	Known		G5	LC	SC	beaches, island-end flats, estuarine islands [breeding evidence only]
Northern Bobwhite	<i>Colinus virginianus</i>	Bird	4	Known		G5	NT	NL	savannas and thickets
Little Blue Heron	<i>Egretta caerulea</i>	Bird	4	Known		G5	LC	SC	marshes [breeding season only]
Snowy Egret	<i>Egretta thula</i>	Bird	4	Known		G5	LC	SC	marshes [breeding season only]
Tricolored Heron	<i>Egretta tricolor</i>	Bird	4	Known		G5	LC	SC	marshes [breeding season only]
Rusty Blackbird	<i>Euphagus carolinus</i>	Bird	3	Known		G4	VU	NL	mesic grasslands, wet thickets, and swampy forest edges
Peregrine Falcon (American)	<i>Falco peregrinus anatum</i>	Bird	4	Known		G5	LC	E	beaches and grasslands
Gull-billed Tern	<i>Gelochelidon nilotica</i>	Bird	4	Known		G5	LC	T	sand flats on maritime islands [breeding sites only]
American Oystercatcher	<i>Haematopus palliatus</i>	Bird	4	Known		G5	LC	SC	estuaries, oyster beds, mudflats [breeding evidence only]
Least Bittern	<i>Ixobrychus exilis</i>	Bird	4	Potential		G5	LC	SC	marshes [breeding season only]

Appendix 13: Species at Risk Known or with Potential to Occur at MCB Camp Lejeune

COMMON NAME	SCIENTIFIC NAME	TAXON	LEJEUNE PRIORITY	KNOWN OR POTENTIAL	USFWS ¹	GOBAL ²	IUCN ³	NC ⁴	HABITAT COMMENTS
Loggerhead Shrike (Continental)	<i>Lanius ludovicianus ludovicia</i>	Bird	4	Potential		G5	LC	SC	grasslands and savannas
Black Rail	<i>Laterallus jamaicensis</i>	Bird	1	Potential	FSC	G3G4	NT	SC	brackish marshes, rarely fresh marshes [breeding season only]
Eastern Painted Bunting	<i>Passerina ciris ciris</i>	Bird	1	Known	FSC	G5T3T4	NT	SC	maritime shrub thickets and forest edges [breeding season only]
Bachman's Sparrow	<i>Peucaea aestivalis</i>	Bird	1	Known	FSC	G3	NT	SC	open longleaf pine forests, old fields [breeding season only]
Glossy Ibis	<i>Plegadis falcinellus</i>	Bird	4	Potential		G5	LC	SC	forests or thickets on maritime islands [breeding sites only]
Vesper Sparrow	<i>Poocetes gramineus</i>	Bird	4	Known		G5	LC	SC	grasslands
Black Skimmer	<i>Rynchops niger</i>	Bird	4	Known		G5	LC	SC	sand flats on maritime islands [breeding sites only]
Wayne's Black-throated Green Warbler	<i>Setophaga virens waynei</i>	Bird	1	Potential	FSC	G5T3	LC	NL	Unflooded bottomland hardwood forest, often mixed with Atlantic white cedar or cypress
Yellow-bellied Sapsucker	<i>Sphyrapicus varius</i>	Bird	4	Known		G5	LC	SC	mature open hardwood and mixed pine-hardwood forests
Common Tern	<i>Sterna hirundo</i>	Bird	4	Known		G5	LC	SC	sand flats on maritime islands [breeding sites only]
Least Tern	<i>Sternula antillarum</i>	Bird	3	Known		G4	LC	SC	beaches, sand flats, open dunes, gravel rooftops [breeding sites only]
Bucholz's Dart Moth	<i>Agrotis buchholzi (carolina)</i>	Butterfly/Moth	1	Known	FSC	G2G3Q	NYA	NL	flatwoods with pyxie-moss (Pyxidantha)
Crystal Skipper	<i>Atrytonopsis new species 1</i>	Butterfly/Moth	1	Potential	FSC	G1Q	NYA	NL	found along primary and secondary sand dunes with its hostplant, seaside little bluestem (Schizachyrium littorale)

Appendix 13: Species at Risk Known or with Potential to Occur at MCB Camp Lejeune

COMMON NAME	SCIENTIFIC NAME	TAXON	LEJEUNE PRIORITY	KNOWN OR POTENTIAL	USFWS ¹	GOBAL ²	IUCN ³	NC ⁴	HABITAT COMMENTS
Venus Flytrap Moth	<i>Hemipachnobia subporphyrea</i>	Butterfly/Moth	1	Potential	FSC	G1	NYA	NL	Longleaf pine uplands in large "stands" of Venus fly traps
Roanoke Slabshell	<i>Elliptio roanokensis</i>	Freshwater Bivalve	2	Potential		G3	VU	T	most Atlantic drainages
Star-nosed Mole	<i>Condylura cristata parva</i>	Mammal	4	Potential		G5	LC	SC	moist meadows, bogs, swamps, bottomlands
Big-eared Bat (Eastern)	<i>Corynorhinus rafinesquii macrotis</i>	Mammal	2	Potential		G3	LC	SC	roosts in hollow trees, old buildings, and beneath bridges, usually near water
Southeastern Myotis	<i>Myotis austroriparius</i>	Mammal	2	Potential		G3	LC	SC	roosts in buildings, hollow trees; forages near water
Florida Eastern Woodrat	<i>Neotoma floridana floridana</i>	Mammal	4	Known		G5T5	LC	T	forests, mainly in moist areas
Spotted Turtle	<i>Clemmys guttata</i>	Reptile	4	Known		G5	EN	NL	pocosins, bay forests, boggy areas
Eastern Diamondback Rattlesnake	<i>Crotalus adamanteus</i>	Reptile	1	Known	FSC	G4	LC	E	pine flatwoods, savannas, pine-oak sandhills
Timber Rattlesnake	<i>Crotalus horridus</i>	Reptile	3	Known		G4	LC	SC	wetland forests in the Coastal Plain; rocky, upland forests elsewhere
Southern Hog-nosed Snake	<i>Heterodon simus</i>	Reptile	1	Known	FSC	G2	VU	SC	sandy woods, particularly pine-oak sandhills
Diamondback Terrapin	<i>Malaclemys terrapin</i>	Reptile	1	Known	FSC	G4	NT	SC	salt or brackish marshes, estuaries
Harlequin Coralsnake	<i>Micrurus fulvius</i>	Reptile	4	Known		G5	LC	E	pine-oak sandhills, sandy flatwoods, maritime forests
Mimic Glass Lizard	<i>Ophisaurus mimicus</i>	Reptile	1	Potential	FSC	G3	LC	SC	pine flatwoods, savannas, pine/oak sandhills
Pigmy Rattlesnake	<i>Sistrurus miliarius</i>	Reptile	4	Known		G5	LC	SC	pine flatwoods, pine/oak sandhills, other pine/oak forests
Eastern Box Turtle	<i>Terrapene carolina</i>	Reptile	4	Known		G5	VU	NL	longleaf pine and other forest

Appendix 13: Species at Risk Known or with Potential to Occur at MCB Camp Lejeune

COMMON NAME	SCIENTIFIC NAME	TAXON	LEJEUNE PRIORITY	KNOWN OR POTENTIAL	USFWS ¹	GOBAL ²	IUCN ³	NC ⁴	HABITAT COMMENTS
Branched Gerardia	<i>Agalinis virgata</i>	Vascular Plant	2	Known		G3G4Q	NYA	T	savannas and depression pond shores
Savanna Onion	<i>Allium sp. 1</i>	Vascular Plant	1	Potential	FSC	G1G2	NYA	NL	wet savannas
Bog Bluestem	<i>Andropogon mohrii</i>	Vascular Plant	3	Known		G4?	NYA	T	wet savannas
Chapman's Three-awn	<i>Aristida simpliciflora</i>	Vascular Plant	2	Potential		G3G4	NYA	E	wet savannas
Savanna Indian-plantain	<i>Arnoglossum ovatum</i>	Vascular Plant	4	Known		G4G5	NYA	E	wet savannas
Savanna Milkweed	<i>Asclepias pedicellata</i>	Vascular Plant	3	Known		G4	NYA	SC	dry savannas and moist flatwoods
Carolina Spleenwort	<i>Asplenium heteroresiliens</i>	Vascular Plant	1	Potential	FSC	G2	NYA	E	coquina limestone outcrops
Many-flower Grass-pink	<i>Calopogon multiflorus</i>	Vascular Plant	1	Known	FSC	G2G3	NYA	E	savannas
Carolina Thistle	<i>Cirsium carolinianum</i>	Vascular Plant	4	Known		G5	NYA	E	forests and disturbed areas, mostly on basic soils
Leconte's Thistle	<i>Cirsium lecontei</i>	Vascular Plant	2	Known		G2G3	NYA	SC	savannas
Roughleaf Dogwood	<i>Cornus asperifolia</i>	Vascular Plant	3	Known		G4	NYA	E	wet marl forests
Leconte's Flatsedge	<i>Cyperus lecontei</i>	Vascular Plant	3	Known		G4?	NYA	T	limesink ponds
Four-angled Flatsedge	<i>Cyperus tetragonus</i>	Vascular Plant	3	Known		G4?	NYA	SC	maritime forests and barrier island grasslands
Tennessee Bladder-fern	<i>Cystopteris tennesseensis</i>	Vascular Plant	4	Known		G5	NYA	E	calcareous rock outcrops
Blue Witch Grass	<i>Dichanthelium caeruleascens</i>	Vascular Plant	2	Known		G2G3	NYA	E	wet savannas with a calcareous influence
Venus Flytrap	<i>Dionaea muscipula</i>	Vascular Plant	1	Known	FSC	G3	NYA	SC	savannas, seepage bogs, pocosin edges
Gulfcoast Spikerush	<i>Eleocharis cellulosa</i>	Vascular Plant	4	Known		G4G5	NYA	E	interdune ponds, brackish marshes & tidal freshwater marshes
Florida Spikerush	<i>Eleocharis elongata</i>	Vascular Plant	4	Known		G5?	NYA	E	limesink ponds

Appendix 13: Species at Risk Known or with Potential to Occur at MCB Camp Lejeune

COMMON NAME	SCIENTIFIC NAME	TAXON	LEJEUNE PRIORITY	KNOWN OR POTENTIAL	USFWS ¹	GOBAL ²	IUCN ³	NC ⁴	HABITAT COMMENTS
Robbins' Spikerush	<i>Eleocharis robbinsii</i>	Vascular Plant	4	Known		G4G5	NYA	SC	limesink ponds, clay-based Carolina bays, peat-burn lakes, millponds, beaver ponds, artificial lakes
Viviparous Spikerush	<i>Eleocharis vivipara</i>	Vascular Plant	4	Known		G5	NYA	E	bogs and pools
Bay Boneset	<i>Eupatorium paludicola</i>	Vascular Plant	1	Known	FSC	G2	NYA	T	cypress savannas, clay-based bays, and small depressions ponds
Coastal Plain St. John's-wort	<i>Hypericum brachyphyllum</i>	Vascular Plant	4	Known		G5	NYA	SC	wet pine savannas
Beach Morning-glory	<i>Ipomoea imperati</i>	Vascular Plant	4	Known		G5	NYA	T	sea beaches and foredunes
Thin-wall Quillwort	<i>Isoetes microvela</i>	Vascular Plant	1	Potential	FSC	G1	NYA	T	emergent riverbanks, calcareous influenced riverbanks
Brown Bogbutton	<i>Lachnocaulon minus</i>	Vascular Plant	2	Known		G3G4	NYA	T	depression ponds and ditches
Yellow-fruited Flax	<i>Linum floridanum var. chrysocarpum</i>	Vascular Plant	4	Known		G5?T3?	NYA	T	pine savannas
Pondspice	<i>Litsea aestivalis</i>	Vascular Plant	1	Known	FSC	G3?	NYA	SC	limesink ponds, other pools
Boykin's Lobelia	<i>Lobelia boykinii</i>	Vascular Plant	1	Known	FSC	G2G3	NYA	E	depression ponds and meadows and clay-based cypress savannas
Golden-crest	<i>Lophiola aurea</i>	Vascular Plant	3	Known		G4	NYA	E	very wet, mucky habitats in pine savannas
Flaxleaf Seedbox	<i>Ludwigia linifolia</i>	Vascular Plant	3	Known		G4	NYA	T	limesink ponds
Shrubby Seedbox	<i>Ludwigia suffruticosa</i>	Vascular Plant	4	Known		G5	NYA	T	limesink ponds, clay-based Carolina bays
Pinebarren Smokegrass	<i>Muhlenbergia torreyana</i>	Vascular Plant	2	Known		G3	NYA	SC	cypress savannas
Loose Water-milfoil	<i>Myriophyllum laxum</i>	Vascular Plant	1	Known	FSC	G3	NYA	E	limesink ponds, waters of natural lakes
Large-seed Pellitory	<i>Parietaria praetermissa</i>	Vascular Plant	2	Potential		G3G4	NYA	SC	shell middens, disturbed sites, maritime forests

Appendix 13: Species at Risk Known or with Potential to Occur at MCB Camp Lejeune

COMMON NAME	SCIENTIFIC NAME	TAXON	LEJEUNE PRIORITY	KNOWN OR POTENTIAL	USFWS ¹	GOBAL ²	IUCN ³	NC ⁴	HABITAT COMMENTS
Carolina Grass-of-parnassus	<i>Parnassia caroliniana</i>	Vascular Plant	1	Potential	FSC	G3	NYA	T	wet savannas
Hairy Smartweed	<i>Persicaria hirsuta</i>	Vascular Plant	2	Potential		G3G4	NYA	E	limesink ponds, clay-based Carolina bays, drawdown zones of blackwater riverbanks
Small Butterwort	<i>Pinguicula pumila</i>	Vascular Plant	3	Known		G4	NYA	E	savannas
Longleaf Pine	<i>Pinus palustris</i>	Vascular Plant	4	Known		G5	EN	NL	savannas
Pineland Plantain	<i>Plantago sparsiflora</i>	Vascular Plant	1	Potential	FSC	G3	NYA	T	wet savannas
Yellow Fringeless Orchid	<i>Platanthera integra</i>	Vascular Plant	2	Known		G3G4	NYA	SC	savannas
Hooker's Milkwort	<i>Polygala hookeri</i>	Vascular Plant	2	Known		G3	NYA	SC	savannas
Shadow-witch	<i>Ponthieva racemosa</i>	Vascular Plant	4	Known		G4G5	NYA	T	blackwater forests and swamps, especially over marl
Awned Meadow-beauty	<i>Rhexia aristosa</i>	Vascular Plant	1	Known	FSC	G3G4	NYA	SC	clay-based Carolina bays and limesink ponds
Swamp Forest Beaksedge	<i>Rhynchospora decurrens</i>	Vascular Plant	1	Potential	FSC	G3G4	NYA	T	swamp forests
Harper's Beaksedge	<i>Rhynchospora harperi</i>	Vascular Plant	3	Known		G4?	NYA	SC	limesink ponds and cypress savannas
Coastal Beaksedge	<i>Rhynchospora pleiantha</i>	Vascular Plant	1	Known	FSC	G2G3	NYA	T	limesink ponds
Thorne's Beaksedge	<i>Rhynchospora thornei</i>	Vascular Plant	1	Known	FSC	G3	NYA	SC	wet savannas
Tracy's Beaksedge	<i>Rhynchospora tracyi</i>	Vascular Plant	3	Known		G4	NYA	T	clay-based Carolina bays, limesink ponds
Small-flowered Buckthorn	<i>Sageretia minutiflora</i>	Vascular Plant	3	Known		G4	NYA	T	shell middens
Chapman's Arrowhead	<i>Sagittaria chapmanii</i>	Vascular Plant	4	Known		G5T3?	NYA	E	limesink ponds

Appendix 13: Species at Risk Known or with Potential to Occur at MCB Camp Lejeune

COMMON NAME	SCIENTIFIC NAME	TAXON	LEJEUNE PRIORITY	KNOWN OR POTENTIAL	USFWS ¹	GOBAL ²	IUCN ³	NC ⁴	HABITAT COMMENTS
Grassleaf Arrowhead	<i>Sagittaria weatherbiana</i>	Vascular Plant	1	Potential	FSC	G3G4	NYA	E	fresh to slightly brackish marshes, streams, swamps, and pond margins
Drooping Bulrush	<i>Scirpus lineatus</i>	Vascular Plant	3	Known		G4	NYA	T	low rich woods over marl
Netted Nutrush	<i>Scleria reticularis</i>	Vascular Plant	3	Known		G4	NYA	T	clay-based Carolina bays, limesink ponds
Smooth-seeded Hairy Nutrush	<i>Scleria sp. 1</i>	Vascular Plant	1	Potential	FSC	G2G3	NYA	NL	pine savannas over limestone, diabase glades
Spring-flowering Goldenrod	<i>Solidago verna</i>	Vascular Plant	1	Potential	FSC	G3	NYA	NL	mesic to moist pinelands, pocosin ecotones
Coastal Goldenrod	<i>Solidago villosicarpa</i>	Vascular Plant	1	Known	FSC	G1	NYA	E	edges and openings in maritime upland forests
Eaton's Ladies'-tresses	<i>Spiranthes eatonii</i>	Vascular Plant	2	Known		G2G4	NYA	E	pine savannas and pine-oak sandhills
Lace-lip Ladies'-tresses	<i>Spiranthes laciniata</i>	Vascular Plant	4	Known		G4G5	NYA	SC	moist wet habitats
Giant Spiral Orchid	<i>Spiranthes longilabris</i>	Vascular Plant	2	Potential		G3	NYA	E	savannas
Carolina Clover	<i>Trifolium carolinianum</i>	Vascular Plant	4	Known		G5	NYA	SC	savannas, sandy open areas
Carolina Least Trillium	<i>Trillium pusillum var. pusillum</i>	Vascular Plant	1	Potential	FSC	G3T2	NYA	E	ecotones between savannas and nonriverine wet hardwood forests, over marl
Dwarf Bladderwort	<i>Utricularia olivacea</i>	Vascular Plant	3	Known		G4	NYA	T	limesink ponds, beaver ponds
Florida Yellow-eyed-grass	<i>Xyris floridana</i>	Vascular Plant	4	Known		G5T4T5	NYA	T	savannas

1. USFWS: FSC = Federal Species of Concern
2. Global Rank: G1=Critically Imperiled, G2=Imperiled, G3=Vulnerable, G4=Apparently Secure, G5=Secure, ?=Status uncertain
3. IUCN: EN=Endangered, VU=Vulnerable, NT=Near-Threatened, LC=Least Concern, NYA=Not Yet Assessed
4. NC State Status: E=Endangered, T=Threatened, SC=Species of Concern, NL=Not Listed

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Appendix 14:

Memorandum of Understanding to Promote the Conservation of Migratory Birds

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**MEMORANDUM OF UNDERSTANDING
BETWEEN THE**

**U.S. DEPARTMENT OF DEFENSE
AND THE
U.S. FISH AND WILDLIFE SERVICE**

TO PROMOTE THE CONSERVATION OF MIGRATORY BIRDS

This Memorandum of Understanding (MOU) is entered into between the U.S. Department of Defense (DoD) and the U.S. Fish and Wildlife Service (FWS) (hereinafter “the Parties”).

A. Purpose and Scope

This MOU is entered into pursuant to Executive Order 13186, *Responsibilities of Federal Agencies to Protect Migratory Birds* (66 FR 3853 [January 17, 2001]). The purpose of this MOU is to promote the conservation of migratory bird populations while sustaining the use of military managed lands and airspace for testing, training, and operations.

This MOU does not address incidental take resulting from military readiness activities or active DoD airfield operations. Military readiness activities are covered by 50 CFR 21.15 (Authorization of take incidental to military readiness activities). Bird-related management activities with a potential to affect airfield operations or safety will be managed according to DoDI 4165.57 and the airfield’s Bird/Wildlife Aircraft Strike Hazards (BASH) Program.

Installation commanders responsible for military airfields will not implement wildlife conservation prescriptions set forth in this MOU if they conclude that such actions will negatively impact military mission or combat capability, or if such action will increase the possibility of aircraft-wildlife strikes. Should installation commanders choose to implement wildlife conservation measures, they must follow BASH guidelines, and consider military mission impacts and elevated risk to aircraft and aircrew.

This MOU specifically pertains to the following categories of DoD activities:

- 1) Natural resource management activities, including, but not limited to, habitat management, erosion control, forestry activities, hunting, fishing, agricultural outleasing, conservation law enforcement, invasive-weed management, and prescribed burning;¹
- 2) Installation support activities, including, but not limited to, administration, retail sales, food service, health care, water and sewage treatment, supply and storage, education, housing, equipment maintenance, base transportation, laundry and dry cleaning, recreation, and religious activities;
- 3) Operation of industrial activities;

¹ Vegetation management within the airfield environment shall be governed by the installation Integrated Natural Resource Management Plans (INRMP) and associated Bird/Wildlife Aircraft Strike Hazard (BASH) Plan.

- 4) Construction, maintenance, renovation, or demolition of facilities that support the activities described in items 1 through 3; and
- 5) Prevention or abatement of pollution or detrimental alteration of the environment for the benefit of migratory birds, as practicable.

This MOU identifies specific activities where cooperation between the Parties will contribute substantially to the conservation of migratory birds and their habitats. This MOU does not alter or waive any responsibilities of DoD or FWS, as applicable, under the Migratory Bird Treaty Act (MBTA), the Bald and Golden Eagle Protection Act (Eagle Act), and the Endangered Species Act (ESA); nor does it authorize the take of migratory birds.

B. Authorities

The Parties' responsibilities under the MOU are authorized by provisions of the following laws and authorities:

- Alaska National Interest Lands Conservation Act of 1980 (16 U.S.C. 410hh-3233)
- Bald and Golden Eagle Protection Act of 1940, as amended (16 U.S.C. 668-668d)
- Endangered Species Act of 1973, as amended (16 U.S.C. 1531-1544)
- Executive Order 13186: Responsibilities of Federal Agencies to Protect Migratory Birds, 2001 (66 FR 3853 [January 17, 2001])
- Fish and Wildlife Act of 1956, as amended (16 U.S.C. 791a *et seq.*)
- Fish and Wildlife Conservation Act of 1980, as amended (16 U.S.C. 2901-2911)
- Fish and Wildlife Coordination Act of 1980, as amended (16 U.S.C. 661-667)
- Migratory Bird Conservation Act of 1929, as amended (16 U.S.C. 715 *et seq.*)
- Migratory Bird Treaty Act, of 1918, as amended (16 U.S.C. 703-711)
- National Environmental Policy Act of 1969 (42 U.S.C. 4321-4347)
- Sikes Act Improvement Act of 1997 (16 U.S.C. 670a-670o)
- Agreements to limit encroachments and other constraints on military training, testing, and operations (10 U.S.C. 2684a)

C. Background

Department of Defense

The DoD mission is to provide for the Nation's defense. DoD's Natural Resources Program works to ensure continued access to land, air, and water resources for realistic military training and testing, while ensuring that the natural and cultural resources entrusted to DoD's care are sustained in a healthy condition.

The DoD is an active participant in international bird conservation partnerships including Partners in Flight (PIF) and the North American Bird Conservation Initiative (NABCI). Through PIF and NABCI, DoD works in partnership with numerous federal and state agencies and nongovernmental organizations to conserve migratory and resident birds and to enhance their survival. Military lands frequently provide some of the best remaining habitat for migratory and resident bird species, and DoD plans to continue supporting bird conservation activities.

Integrated Natural Resources Management Plans (INRMPs) offer a coordinated approach for incorporating habitat conservation efforts into installation management. INRMPs provide significant baseline information that can be used when preparing National Environmental Policy Act (NEPA) documents for all DoD management activities. This linkage helps to ensure that appropriate conservation and mitigation measures are identified in NEPA documents and committed to, when appropriate, in final decision documents.

The DoD develops INRMPs cooperatively with the FWS and appropriate state fish and wildlife agencies. DoD's strategy focuses on inventorying and long-term monitoring to determine changes in migratory bird populations on DoD installations. Effective on-the-ground management may then be applied to those areas identified as having the highest conservation value. DoD's goal is to support military training and testing by providing for no net loss of an installation's military readiness capability and capacity. DoD implements cooperative projects and programs on military lands to benefit the health and well-being of birds and their habitats, when consistent with the military mission, military readiness, and the safety of DoD personnel.

The DoD has a cooperative network of natural resources personnel and others from military installations across the United States that provides technical assistance, including how to incorporate landbird, shorebird, and waterbird habitat management efforts into INRMPs. These bird conservation experts work collaboratively to conserve migratory and resident birds and their habitats on DoD lands.

The DoD implements bird inventories and monitoring programs in numerous ways, including Next Generation Radar (NEXRAD) for studying bird movements in the atmosphere, and maintains an integrated pest management (IPM) program designed to reduce the use of pesticides, herbicides, fungicides, etc. In addition, the management of natural resources on DoD properties benefits migratory birds through efforts such as invasive-species control, habitat enhancement/restoration, water-quality improvement, and wetland conservation.

Fish and Wildlife Service

As a federal agency within the U.S. Department of the Interior, the FWS mission is to work with others to conserve, protect, manage, and enhance fish, wildlife, plants, and their habitats for the continuing benefit of the American people. The FWS Migratory Bird Program serves as a focal point in the United States for policy development and strategic planning, program implementation, and evaluation of actions designed to conserve migratory birds and their habitats.

The FWS is legally mandated to implement the conservation provisions of the MBTA, which includes responsibilities for managing migratory bird populations, domestic and international coordination, and the development and enforcement of regulations that govern authorized take of migratory birds. The Migratory Bird Conservation Act established the Migratory Bird Conservation Commission to approve land acquisition with Migratory Bird Conservation Funds. The Fish and Wildlife Coordination Act (FWCA) requires consultation under certain circumstances and added provisions to recognize the important contribution of wildlife resources to the Nation. The FWCA requires consideration and coordination of wildlife conservation, including habitat protection, through acquisition, enhancement, and/or management and avoidance and minimization of avian stressors related to federal activities.

The following FWS programs have responsibilities with regards to bird conservation activities:

- 1) The Division of Migratory Bird Management and the Migratory Bird Programs in FWS Regional Offices serve as focal points for policy development and strategic planning. These offices develop and implement monitoring and management initiatives that help maintain healthy populations of migratory birds and their habitats, and provide continued opportunities for citizens to enjoy bird-related recreation.
- 2) The Division of Bird Habitat Conservation is instrumental in supporting habitat conservation partnerships through the administration of bird conservation grant programs and development of Joint Ventures that serve as major vehicles for implementing the various bird conservation plans across the country.
- 3) Ecological Services Field Offices across the country serve as the primary contacts for technical assistance and environmental reviews involving migratory bird issues. The Field Offices coordinate with the Regional Migratory Bird Offices, as necessary, regarding permits and overall migratory bird conservation coordination.
- 4) The Office of Law Enforcement is the principal FWS program that enforces the legal provisions of the MBTA, Eagle Act, ESA, and other laws pertaining to migratory birds.
- 5) The National Wildlife Refuge (NWR) System manages NWRs and Waterfowl Production Areas across the country, many of which were established to protect and conserve migratory birds. NWRs not only protect important bird habitat, but also focus on monitoring migratory bird populations, restoring and maintaining native habitats, and educating the public on recreational and economic benefits of migratory birds.
- 6) The Science Applications program works with other FWS programs and partners to ensure that the necessary science, tools, and capacity are available for planning and implementing the most efficient and effective conservation actions to protect fish and wildlife, including migratory birds. The office facilitates regional self-directed science management partnerships called Landscape Conservation Cooperatives to develop and apply shared science capacity to conservation.

D. Statement of Mutual Interest and Benefit

The Parties have a common interest in the conservation and management of America's natural resources. The Parties agree that migratory birds are important components of biological diversity, and that the conservation of migratory birds will help sustain ecological systems and help meet the public demand for conservation education and outdoor recreation, such as wildlife viewing and hunting opportunities. The Parties also agree that it is important to focus on reducing stressors on bird populations, restore and enhance habitat where actions can benefit specific ecosystems and migratory birds dependent upon them, and recognize that actions taken to benefit some migratory bird populations may adversely affect other migratory bird populations. The Parties also agree that while it is the FWS' aim to ensure biologically diverse, thriving habitat for migratory birds away from airfields, it is DoD's aim to ensure flight safety by making airfield environments as unattractive as possible to migratory birds while supporting FWS' efforts away from airfields.

E. Responsibilities of Both Parties

The Parties agree that this MOU shall be implemented to the extent permitted by law and in harmony with evolving requirements of agency missions, subject to the availability of appropriations and budgetary limits. Both Parties shall:

- 1) Support the conservation intent of Executive Order 13186, and the migratory bird conventions by:
 - a) Integrating bird conservation principles, measures, and practices into agency planning and actions; and
 - b) Avoiding or minimizing, to the extent practicable, the exposure of birds and their resources to avian stressors that result in take.
- 2) Emphasize an interdisciplinary, collaborative approach to migratory bird conservation in cooperation with other governments, state and federal agencies, and non-federal partners within the geographic framework of the NABCI Bird Conservation Regions.
- 3) Work to protect, restore, and enhance migratory bird habitats, as practicable, on DoD-managed lands, in ways that do not conflict with or impede military training and testing, by:
 - a) Designing and executing actions to minimize, to the extent practicable and consistent with the military mission, avian stressors on migratory bird populations, including impacts to breeding, migration, or wintering habitats; and by developing and implementing, as appropriate, conservation measures that could reduce the take of migratory birds or enhance the quality of the habitats they use;
 - b) Working to identify, conserve, and manage significant bird conservation sites that occur on DoD-managed lands;
 - c) Preventing or abating pollution or detrimental alteration of the environment for the benefit of migratory birds, as practicable; and
 - d) Preventing the introduction and establishment of, and controlling and reducing the spread of existing, non-native invasive species that may be harmful to native flora and fauna, including migratory bird populations, as required by Executive Order 13112 on Invasive Species.
- 4) Work with willing landowners to prevent or minimize the loss or degradation of migratory bird habitats on lands adjacent or near military installation boundaries. This cooperative conservation may include:
 - a) Participating in efforts to identify, protect, and conserve important migratory bird habitats or other significant bird conservation sites and ecological conditions that occur in landscapes or watersheds that may be of conservation value to migratory

birds found on DoD lands, and that also buffer one or more installations from adverse impacts to DoD mission or resource-management activities;

- b) Providing information on migratory bird resources found on DoD lands for partners to include and integrate into their outreach and education materials and activities; and
 - c) Using available authorities to enter into agreements with federal, state, tribal, or other governmental entities, or nongovernmental organizations to conserve and enhance habitats in a manner compatible with military operations.
- 5) Promote collaborative projects such as:
- a) Developing or using existing inventory and monitoring programs, at appropriate scales, with national or regional standardized protocols, to assess the status and trends of bird populations and habitats, including migrating, breeding, and wintering birds;
 - b) Designing management studies and research/monitoring projects using national or regional standardized protocols and programs to identify the habitat conditions needed by applicable species of concern, to understand interrelationships of co-existing species, and to evaluate the effects of management activities on habitats and populations of migratory birds;
 - c) Sharing inventory, monitoring, research, and study data for breeding, migrating, and wintering bird populations and habitats in a timely fashion with national data repositories such as the Avian Knowledge Network, National Point Count Database, and Monitoring Avian Productivity and Survivorship (MAPS);
 - d) Working in conjunction with each other and federal and state agencies to develop reasonable and effective conservation measures for actions that reduce the exposure of birds and their habitats to avian stressors;
 - e) Participating in or promoting the implementation of existing regional or national inventory and monitoring programs such as Breeding Bird Survey (BBS), Christmas Bird Counts, bird atlas projects, or game-bird surveys (e.g., mid-winter waterfowl surveys) on DoD lands where practicable and feasible;
 - f) Using existing partnerships and exploring opportunities for expanding and creating new partnerships to facilitate combined funding for inventory, monitoring, management studies, and research; and
 - g) Improving habitat on lands adjacent to DoD-managed lands through programs such as the DoD Readiness and Environmental Protection Integration and Land and Water Conservation Fund programs.
- 6) Work cooperatively to identify and utilize existing conservation measures to avoid or minimize the effects of avian stressors, and develop new conservation measures as

needed.

- 7) Per Executive Order 13186 (Sec. 3(12)), provide training opportunities to appropriate personnel on responsibilities under the MBTA, the Eagle Act, and other regulations protecting birds, current processes for coordination on bird conservation issues, strategies for properly assessing how actions effect bird populations, and recommended approaches on how to avoid or minimize the exposure of birds and their habitats to avian stressors.
- 8) Participate annually in the interagency Council for the Conservation of Migratory Birds. The duties of the Council include the following:
 - a) Sharing resource information to help conserve and manage migratory birds;
 - b) Fostering partnerships to further the goals of Executive Order 13186;
 - c) Reporting annually on Executive Order accomplishments and recommendations; and
 - d) Selecting an annual recipient of a Presidential Migratory Bird Federal Stewardship Award.
- 9) Promote migratory bird conservation nationally and internationally through activities such as National Public Lands Day and International Migratory Bird Day.

F. Department of Defense Responsibilities

- 1) Follow all migratory bird permitting requirements for intentional take under 50 CFR 21.22 (banding or marking), 21.23 (scientific collecting), 21.26 (special Canada Goose permit), 21.27 (special purposes), or 21.41 (depredation). Though no permit is required to take birds in accordance with 50 CFR 21.43 - 21.47 (depredation orders), follow all regulatory requirements set forth in those sections when applicable.
- 2) Consistent with military mission requirements, encourage incorporation of comprehensive migratory bird management objectives into relevant DoD planning documents, including INRMPs, Integrated Pest Management Plans (IPMPs), Installation Master Plans, NEPA analyses, and other relevant documents. Comprehensive planning efforts for migratory birds include PIF Bird Conservation Plans, the North American Waterfowl Management Plan, U.S. Shorebird Conservation Plan, North American Waterbird Conservation Plan, and associated regional plans where available.
- 3) Consistent with current and emerging mission requirements, manage military lands and non-military readiness activities in a manner that supports migratory bird conservation, habitat protection, restoration, and enhancement.
- 4) Inventory and monitor bird populations on DoD lands to the extent feasible to facilitate decisions about the need for, and effectiveness of, conservation efforts
- 5) In accordance with DoD *INRMP Implementation Manual* (DoDM 4715.03, 2013), work

cooperatively with FWS and state and fish and wildlife agencies to promote timely development, effective review, and revisions of INRMPs, including any potential revisions to promote the conservation of migratory birds.

- 6) Incorporate conservation measures addressed in regional or state bird conservation plans in the INRMP development process.
- 7) Consistent with safety and security requirements, allow the FWS and other partners reasonable access to military lands for conducting sampling or survey programs, including but not limited to MAPS, BBS, International Shorebird Survey, game-bird surveys, and breeding bird atlases.
- 8) Consistent with safety and security requirements and bird conservation responsibilities, support the economic and recreational benefits of bird-related activities by allowing public access to military lands for recreational uses, such as bird watching and other non-consumptive activities.
- 9) Develop policies and procedures for facilities design that will promote the conservation of migratory bird populations and habitat, including:
 - a) Mitigating the negative impacts of reflective glass in building design by considering building location and orientation with respect to migratory bird areas, and use of other mitigation techniques, such as reducing the amount of reflective glass on buildings;
 - b) Maximizing the use of native landscaping to promote migratory bird habitat, except in areas subject to BASH hazards.
 - c) Turning off interior building lighting at night, especially lighting in offices with exterior windows that face outward to exterior building surfaces that may be visible to migratory or resident birds.
- 10) Prior to implementing any activity that has, or is likely to have, a measurable negative effect on migratory bird populations:
 - a) Identify the migratory bird species likely to occur in the area of the proposed action, and determine if any species of concern could be affected by the activity;
 - b) Assess and document, through the project planning process (e.g., NEPA), the potential effects of the proposed action on species of concern. Use best available demographic, population, or habitat-association data in the assessment of effects upon species of concern; and
 - c) Engage in early planning and scoping with the FWS to proactively address migratory bird conservation, and to initiate appropriate actions to avoid or minimize the exposure of birds and their habitats to avian stressors that may result in the take of migratory birds.
- 11) Continue to promote the conservation of migratory birds on military lands, to the extent

permitted by law, subject to the availability of appropriations, within Administration budgetary limits, and where in harmony with DoD missions.

- a) Fire and fuels-management practices. Fire plays an important role in shaping plant and animal communities, and is a valuable tool in restoring habitats altered by decades of fire suppression. Fire management may include fire suppression, fire prevention, fuels treatment, and prescribed burning. Prescribed burning is one of the most effective tools in managing grassland and longleaf pine/wiregrass ecosystems. Fire-management planning efforts will consider the effects of fire management strategies on the conservation of migratory bird populations, and should be combined with monitoring to properly assess fire management on relevant habitats and species.
- b) Management practices for invasive and aquatic nuisance species. Invasive and aquatic nuisance species are a threat to native plants and wildlife throughout the United States, including on military lands. Efforts to prevent, control, and contain these species must take into account both the impacts from invasive species and the effects of the control efforts on migratory bird populations. Invasive species that can threaten migratory birds and their habitats include, but are not limited to, exotic grasses, trees and weeds, terrestrial and aquatic insects and organisms, non-native birds, and stray and feral cats.
- c) Communications towers, utilities, and energy development. Increased communications demands, changes in technology, and the development of alternative energy sources have resulted in additional exposure of migratory birds and their resources to avian stressors. DoD will review best practices outlined in FWS Guidance, and consult with FWS as needed when considering the development of these technologies on military lands. Construction of new utility and energy systems and associated infrastructure should avoid or minimize the exposure of birds and their resources to avian stressors. Consideration also may be given to retrofitting existing utilities to reduce impacts. Available guidance includes (but is not limited to):
 - i. Avian Power Line Interaction Committee - *Suggested Practices for Avian Protection on Power Lines* (2006)
 - ii. Avian Power Line Interaction Committee - *Reducing Avian Collisions with Power Lines* (2012)
 - iii. U.S. Fish and Wildlife Service *Land-based Wind Energy Guidelines* (2012)
 - iv. U.S. Fish and Wildlife Service *Guidance on the Siting, Construction, Operation, and Decommissioning of Communication Towers* (2000) and FWS comments to the FCC on towers and lighting (2007)

12) To the extent reasonable and practicable, use a best-practices approach for routine maintenance, retrofitting, and management actions to the extent they do not diminish military readiness, including:

- a) Turning out lights in buildings, especially multiple-story buildings, at night,

except where needed for safety or security reasons;

- b) Reducing or eliminating activities that can attract invasive species, including feeding or managing outdoor or feral cats;
- c) Minimizing or eliminating the use of pesticides (e.g., insecticides, herbicides, rodenticides);
- d) Covering open pipes in which birds may be able to enter but not escape (e.g., in-ground pipes, outhouses, roofs);
- e) Minimizing exposure to hazardous chemicals, including covering or removing open pits containing oil or other chemicals; and
- f) Minimizing vegetation removal and manipulation during the breeding season, as practicable and when not in conflict with airfield BASH management.

G. Responsibilities of the Fish and Wildlife Service

- 1) Work with DoD by providing recommendations to minimize the effects of avian stressors on migratory birds from DoD actions.
- 2) Through the Division of Migratory Bird Management, maintain a Web page of permits that provides links to all offices responsible for issuing migratory bird take permits and permit applications.
- 3) Provide essential background information to DoD, when requested, to ensure sound management decisions. This may include information on migratory bird distributions, status, key habitats, conservation guidelines, and risk factors within each BCR. FWS will regularly update its *Birds of Conservation Concern* publication so it can be reliably referenced.
- 4) Work to identify special migratory bird habitats (e.g., nesting, stopover, migration corridors), and the ecological conditions important in those habitats.
- 5) Using the Points of Contact list (Appendix A), the FWS will continue to provide general guidance and information regarding migratory birds and their habitats to DoD, upon request. This guidance includes technical assistance for avoiding or minimizing project-related impacts on migratory birds.
- 6) The Migratory Bird Program will develop and provide FWS guidance to the Ecological Services Field Offices to ensure consistency in the interpretation and implementation of the MBTA as it applies to all federal actions.
- 7) In accordance with FWS Guidelines for Coordination with DoD and Implementation of the 1997 Sikes Act, promote timely and effective review of INRMPs, including any potential recommendations and revisions related to the conservation of migratory birds.
- 8) Review and comment on NEPA and other planning documents forwarded by military

installations.

- 9) Notify installations of any proposed or current actions that may result in a significant take of migratory birds.

H. Dispute Resolution

Preventing potential conflicts or resolving disagreements between the Parties will be attempted first at staff levels and elevated through the respective organizational levels if necessary. If staff level resolution is not possible, the conflict will be addressed through Alternative Dispute Resolution processes.

I. Mutual Agreement

- 1) This MOU will not change or alter requirements associated with the MBTA, Eagle Act, ESA, NEPA, Sikes Act, or other statutes or legal authority. This MOU is intended to provide internal guidance to federal agency staff.
- 2) The discretionary responsibilities established by this MOU may be incorporated into planned DoD actions; however, DoD may not be able to implement these discretionary responsibilities until DoD has successfully included them in formal planning, programming, and budgeting processes. This MOU is intended to be implemented when new actions are initiated as well as when INRMPS, IPMPs, and BASH plans are initiated or revised, and if the MOU's discretionary responsibilities are successfully included in formal planning, programming, and budgeting processes.
- 3) This MOU in no way restricts either Party from participating in similar activities with other public or private agencies, governments, organizations, or individuals.
- 4) This MOU is neither a fiscal nor a funds-obligation document. Any endeavor involving reimbursement, contribution of funds, or transfer of anything of value between the Parties will be handled in accordance with applicable laws, regulations, and procedures, including those for government procurement and printing. Such endeavors will be outlined in separate agreements that shall be made in writing by representatives of the Parties, and shall be independently authorized by appropriate statutory authority.
- 5) The Parties shall schedule periodic meetings to review progress and identify opportunities for advancing the principles of this MOU.
- 6) This MOU is intended to improve the internal management of the executive branch, and does not create any right or benefit, substantive or procedural, separately enforceable as law or equity by a party against the United States, its agencies or instrumentalities, its officers or employees, or any other person.
- 7) Modifications to the MOU's scope shall be made by the Parties' mutual consent, through issuance of a written modification, signed and dated by the Parties, prior to any changes.
- 8) Either Party may terminate this MOU, in whole or in part, at any time before the

expiration date by providing the other Party with a written statement to that effect.

F. Definitions

Action – a program, activity, project, official policy, rule, regulation, or formal plan directly carried out by one of the Parties.

Airfield Environment – UFC 3-260-01 defines what an airfield is and all of its component parts, and defines clearance criteria. DoDI 4165.57 AICUZ describes the acceptable land uses for component parts of the airfield. The Airfield’s BASH Program is responsible for maintaining hazard-free airfields.

Avian Knowledge Network – an international organization of government and non-government institutions focused on understanding the patterns and dynamics of bird populations across the Western Hemisphere (www.avianknowledge.net).

Avian Stressor – any alteration of or addition to the environment that affects birds or their resources.

Bird/Wildlife Aircraft Strike Hazard (BASH) – an actual or potential collision between wildlife (i.e., a bird, mammal, or reptile) and an aircraft (e.g., plane or helicopter).

Breeding Bird Survey (BBS) – a standardized international survey that provides information on population trends of breeding birds, through volunteer observations located along randomly selected roadside routes in the United States, Canada and Mexico (www.mbr-pwrc.usgs.gov/bbs/bbs.html).

Bird Conservation Region (BCR) – a geographic unit used to facilitate bird conservation actions under the North American Bird Conservation Initiative (www.nabci-us.org/bcrs.htm).

Birds of Conservation Concern – a list that is published and periodically updated by the FWS Division of Migratory Bird Management intended to identify the migratory and non-migratory bird species that-- in addition to species already listed under the ESA, proposed or candidate-- represent the FWS’s highest conservation priorities, including ESA candidate species. The most current version of the list, Birds of Conservation Concern 2008, is available at www.fws.gov/migratorybirds/CurrentBirdIssues/Management/BCC.html.

Cantonment Area – the principal built-up area of a DoD installation, typically containing housing, barracks, military organizational areas, and community support infrastructure.

Comprehensive Planning Efforts for Migratory Birds – includes Partners in Flight, North American Waterfowl Management Plan, U.S. Shorebird Conservation Plan, Western Hemisphere Shorebird Reserve Network, North American Waterbird Conservation Plan, and other partnership planning efforts integrated through the North American Bird Conservation Initiative.

Conservation Measure – any action undertaken to address project-related stressors/impacts that ultimately improve the conservation status of one or more migratory bird species. Conservation measures split into two categories: Ecological/Habitat measures (driven by EO 13186) and Avian

Mortality measures (driven by MBTA). Conservation measures work to avoid or minimize an impact, reduce the impact over time, or rectify or compensate for the impact. Conservation Measures are also referred to as Mitigation, Best Practices, and Best Management Practices.

Conservation Planning – strategic and tactical planning of agency activities for the long-term conservation of migratory birds and their habitats.

Council for the Conservation of Migratory Birds – an interagency council established by the Secretary of the Interior to oversee the implementation of Executive Order 13186.

Ecological Condition – the composition, structure, and processes of ecosystems over time and space. This includes the diversity of plant and animal communities, the productive capacity of ecological systems and species diversity, ecosystem diversity, disturbance processes, soil productivity, water quality and quantity, and air quality. Often referred to in terms of ecosystem health, which is the degree to which ecological factors and their interactions are reasonably complete and functioning for continued resilience, productivity, and renewal of the ecosystem.

Effect (adverse or beneficial) – the biological consequences of an impact or the implementation of a conservation measure. Effects can be adverse (habitat avoidance) or beneficial (improved habitat quality). The effect is determined by the exposure of the bird or resource to the stressor/impact and the response to the impact. Effects may be direct, indirect, or cumulative, and refer to effects from actions or categories of actions on migratory birds, their populations, habitats, ecological conditions, and significant bird conservation sites.

Impact – the combined result of an action/project, all of its associated activities and components, and the stressors (see below) produced by those actions.

Integrated Natural Resources Management Plan (INRMP) – an integrated plan based, to the maximum extent practicable, on ecosystem management that shows the interrelationships of individual components of natural resources management (e.g., fish and wildlife, forestry, land management, outdoor recreation) to military mission requirements and other land use activities affecting an installation's natural resources. INRMPs are required for all DoD installations with significant natural resources, pursuant to the Sikes Act.

International Shorebird Survey – a monitoring program started in 1974 to survey shorebirds (sandpipers, plovers, etc.) across the Western Hemisphere (www.pwrc.usgs.gov/iss/iss.html).

International Migratory Bird Day (IMBD) – IMBD celebrates, brings attention to, and educates people about the migration of nearly 350 species of migratory birds that nest and breed throughout the Western Hemisphere. IMBD is celebrated in Canada, the United States, Mexico, Central and South America, and the Caribbean (<http://birdday.org/birdday>).

Management Action – an activity by a government agency that could cause a positive or negative impact to migratory bird populations or habitats. Conservation measures to mitigate potential activity-related stressors may be required.

Migratory Bird – an individual of any species protected by the Migratory Bird Treaty Act (MBTA) as listed in 50 CFR § 10.13.

Military Readiness Activity – all Armed Forces training and operations that relate to combat, including but not limited to the adequate and realistic testing of military equipment, vehicles, flight operations, weapons, and sensors for proper operation and suitability for use in combat.

Monitoring Avian Productivity and Survivorship (MAPS) – a program that uses the banding of birds during the breeding season to track the changes and patterns in the number of young produced, and the survivorship of adults and young (www.birdpop.org/maps.htm).

National Environmental Policy Act (NEPA) – a federal statute that requires federal agencies to prepare a detailed analysis of the environmental impacts of a proposed action and alternatives, and to include public involvement in the decision making process for major federal actions significantly affecting the quality of the human environment 42 U.S.C. 4321, et seq.

North American Bird Conservation Initiative (NABCI) – a partnership to align the avian conservation community to implement bird conservation through regionally-based, biologically driven, landscape-oriented partnerships across the North American continent. NABCI includes federal agencies of Canada, Mexico and the United States, as well as most landbird, shorebird, waterbird, and waterfowl conservation initiatives (www.nabci-us.org).

North American Waterbird Conservation Plan – a partnership of federal and state government agencies, non-governmental organizations, and private interests focusing on the conservation of waterbirds, primarily including marshbirds and inland, coastal, and pelagic colonial waterbirds (www.waterbirdconservation.org/plans.html). The partnership's vision is that the distribution, diversity, and abundance of breeding, migratory, and nonbreeding waterbirds are sustained throughout the lands and waters of North America, Central America, and the Caribbean.

North American Waterfowl Management Plan – a partnership of federal and state agencies, non-governmental organizations, and private interests focusing on the restoration of waterfowl populations through habitat restoration, protection, and enhancement (<http://birdhabitat.fws.gov/NAWMP/nawmphp.htm>).

Partners in Flight (PIF) – a cooperative partnership of more than 300 partners including federal and state government agencies, non-governmental organizations, conservation groups, foundations, universities, and industry focusing on the conservation of landbirds. DoD was an original signatory to the 1991 PIF Federal Agencies' MOA (www.partnersinflight.org).

Ranges & Training Areas (RTAs) – as defined within each installation's INRMP.

Species of Concern – refers to several categories of birds including: 1) species listed in the periodic report, *Birds of Conservation Concern*, published by the FWS Division of Migratory Bird Management (www.fws.gov/migratorybirds); 2) priority migratory bird species documented in the comprehensive bird conservation plans (North American Waterbird Conservation Plan, United States Shorebird Conservation Plan, Partners in Flight Bird Conservation Plans); 3) species or populations of waterfowl identified as high, or moderately high, continental priority in

the North American Waterfowl Management Plan; 4) listed threatened and endangered bird species in 50 CFR § 17.11; and 5) MBTA-listed gamebirds of management concern, as listed in the *Birds of Management Concern* list (www.fws.gov/migratorybirds/CurrentBirdIssues/Management/BMC.html).

Take – to pursue, hunt, shoot, wound, kill, trap, capture or collect or attempt to pursue, hunt, wound, kill, trap, capture or collect (50 CFR § 10.12). The Executive Order 13186 further defines “take” to include intentional take, meaning take that is the purpose of the activity in question, and unintentional (incidental) take, meaning take that results from, but is not the purpose of, the activity in question. Both intentional and unintentional take constitute take as defined by the MBTA. The regulations implementing the Eagle Act define take to mean pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, destroy, molest, or disturb bald and golden eagles (50 CFR § 22.3).

U.S. Shorebird Conservation Plan – a partnership of federal and state government agencies, non-governmental organizations, and private interests focusing on restoring and protecting stable and self-sustaining populations of all shorebird species (www.shorebirdplan.org).

K. Agreement Contacts and Execution

The principal contacts for this instrument are as follows:

Brad Bortner, Chief
Division of Migratory Bird Management
US Fish and Wildlife Service

L. Peter Boice, Deputy Director
Natural Resources Program
Office of the Secretary of Defense

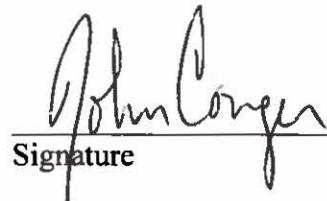
This MOU is executed as of the last date signed below and expires no later than five (5) years thereafter, at which time it is subject to review and renewal, or expiration.

The Parties hereto have executed this agreement as of the date shown below:

Dan Ashe
Director
US Fish and Wildlife Service

John Conger
Acting, Deputy Under Secretary of
Defense (Installations & Environment)
US Department of Defense

 9.5.2014
Signature Date

 7/10/2014
Signature Date

Appendix A: FWS Points of Contact list

Contact Information for Headquarters and Regional U.S. Fish and Wildlife Service Migratory Bird and Ecological Services Offices. For a complete listing of field offices see <http://www.fws.gov/offices/>.

FWS Region	States Covered	Migratory Bird Office	Migratory Bird Permits	Endangered Species
Headquarters		703-358-1714	703-358-1825	703-358-2171
Region 1	Hawaii, Idaho, Oregon, Washington	503-231-6164	503-872-2715	503-231-6151
Region 2	Arizona, New Mexico, Oklahoma Texas	505-248-6875	505-248-7882	505-248-6920
Region 3	Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, Ohio Wisconsin	612-713-5473	612-713-5436	612-713-5350
Region 4	Alabama, Arkansas Florida, Georgia Kentucky, Louisiana Mississippi, North Carolina, South Carolina, Tennessee	404-679-7070	404-679-7070	404-679-7140
Region 5	Connecticut, Delaware, Maine Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania Rhode Island, Vermont, Virginia West Virginia	413-253-8643	413-253-8643	413-253-8304
Region 6	Colorado, Kansas Montana, Nebraska North Dakota, South Dakota, Utah Wyoming	303-236-4409	303-236-8171	303-236-4252
Region 7	Alaska	800-368-8890	907-786-3693	907-786-3856
Region 8	California, Nevada	916-414-6464	916-414-6464	916-414-6464

Appendix 15:

Checklist of Birds for MCB Camp Lejeune

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Table 1. Checklist of Birds for MCB Camp Lejeune

Common Name	Scientific Name	Mar- May	Jun- Aug	Sep- Nov	Dec- Feb
Brant	<i>Branta bernicla</i>			r	r
Canada Goose	<i>Branta canadensis</i>	c*	c	c	c
Tundra Swan	<i>Cygnus columbianus</i>			r	r
Wood Duck	<i>Aix sponsa</i>	c*	c	c	c
Gadwall	<i>Anas strepera</i>	o		o	o
American Wigeon	<i>Anas americana</i>	o		o	o
American Black Duck	<i>Anas rubripes</i>	o		o	o
Mallard	<i>Anas platyrhynchos</i>	u*	u	u	u
Mottled Duck	<i>Anas fulvigula</i>	r			
Blue-winged Teal	<i>Anas discors</i>	o	o	o	r
Northern Shoveler	<i>Anas clypeata</i>	o		o	r
Green-winged Teal	<i>Anas crecca</i>	o		o	o
Canvasback	<i>Aythya valisineria</i>	o		o	o
Redhead	<i>Aythya americana</i>	o		o	o
Ring-necked Duck	<i>Aythya collaris</i>	o		o	o
Greater Scaup	<i>Aythya marila</i>	o		o	o
Lesser Scaup	<i>Aythya affinis</i>	u	r	u	a
Common Eider	<i>Somateria mollissima</i>	r		r	r
Harlequin Duck	<i>Histrionicus histrionicus</i>	r			r
Surf Scoter	<i>Melanitta perspicillata</i>	u		u	u
White-winged Scoter	<i>Melanitta fusca</i>	o		o	o
Black Scoter	<i>Melanitta americana</i>	u	r	u	c
Long-tailed Duck	<i>Clangula hyemalis</i>	o		o	o
Bufflehead	<i>Bucephala albeola</i>	u		o	c
Common Goldeneye	<i>Bucephala clangula</i>	o		o	o
Hooded Merganser	<i>Lophodytes cucullatus</i>	u		u	c
Red-breasted Merganser	<i>Mergus serrator</i>	u		u	c
Ruddy Duck	<i>Oxyura jamaicensis</i>	u	r	u	c
Northern Bobwhite	<i>Colinus virginianus</i>	c*	c	u	u
Wild Turkey	<i>Meleagris gallopavo</i>	u*	u	u	u
Red-throated Loon	<i>Gavia stellata</i>	u		o	a
Common Loon	<i>Gavia immer</i>	c	o	u	c
Pied-billed Grebe	<i>Podilymbus podiceps</i>	u	o	u	c
Horned Grebe	<i>Podiceps auritus</i>	u		o	c
Red-necked Grebe	<i>Podiceps grisegena</i>	r			r
Eared Grebe	<i>Podiceps nigricollis</i>				r
Cory's Shearwater	<i>Calonectris diomedea</i>		r		
Great Shearwater	<i>Puffinus gravis</i>		r		
Sooty Shearwater	<i>Puffinus griseus</i>	o	o		

Table 1. Checklist of Birds for MCB Camp Lejeune

Common Name	Scientific Name	Mar-May	Jun-Aug	Sep-Nov	Dec-Feb
Audubon's Shearwater	<i>Puffinus lherminieri</i>		r		
Wilson's Storm-Petrel	<i>Oceanites oceanicus</i>	o	o		
Leach's Storm-Petrel	<i>Oceanodroma leucorhoa</i>	r	r		
Magnificent Frigatebird	<i>Fregata magnificens</i>	r	r	r	r
Northern Gannet	<i>Morus bassanus</i>	c	r	u	a
Double-crested Cormorant	<i>Phalacrocorax auritus</i>	c	c	c	a
Great Cormorant	<i>Phalacrocorax carbo</i>	o	r	o	u
Anhinga	<i>Anhinga anhinga</i>	r	r	r	r
American White Pelican	<i>Pelecanus erythrorhynchos</i>	r	r	r	r
Brown Pelican	<i>Pelecanus occidentalis</i>	c	c	c	c
American Bittern	<i>Botaurus lentiginosus</i>	o		o	o
Least Bittern	<i>Ixobrychus exilis</i>	o*	o	o	
Great Blue Heron	<i>Ardea herodias</i>	u*	c	c	c
Great Egret	<i>Ardea alba</i>	c	c	c	c
Snowy Egret	<i>Egretta thula</i>	c	c	c	u
Little Blue Heron	<i>Egretta caerulea</i>	u	c	u	o
Tricolored Heron	<i>Egretta tricolor</i>	c	c	c	c
Reddish Egret	<i>Egretta rufescens</i>		r	r	
Cattle Egret	<i>Bubulcus ibis</i>	o	o	o	
Green Heron	<i>Butorides virescens</i>	c*	c	u	r
Black-crowned Night-Heron	<i>Nycticorax nycticorax</i>	u	u	u	u
Yellow-crowned Night-Heron	<i>Nyctanassa violacea</i>	o*	u	o	
White Ibis	<i>Eudocimus albus</i>	c	c	c	c
Glossy Ibis	<i>Plegadis falcinellus</i>	o	o	o	r
Black Vulture	<i>Coragyps atratus</i>	c*	c	c	c
Turkey Vulture	<i>Cathartes aura</i>	c*	c	c	c
Osprey	<i>Pandion haliaetus</i>	c*	c	c	u
Swallow-tailed Kite	<i>Elanoides forficatus</i>	r	r		
Mississippi Kite	<i>Ictinia mississippiensis</i>	o*	o	r	
Bald Eagle	<i>Haliaeetus leucocephalus</i>	u*	u	u	u
Northern Harrier	<i>Circus cyaneus</i>	u	r	c	c
Sharp-shinned Hawk	<i>Accipiter striatus</i>	o		c	c
Cooper's Hawk	<i>Accipiter cooperii</i>	u*	o	c	c
Red-shouldered Hawk	<i>Buteo lineatus</i>	c*	c	c	c
Broad-winged Hawk	<i>Buteo platypterus</i>	o*	o	r	
Red-tailed Hawk	<i>Buteo jamaicensis</i>	u*	u	c	c
Rough-legged Hawk	<i>Buteo lagopus</i>			r	r
American Kestrel	<i>Falco sparverius</i>	u		c	c
Merlin	<i>Falco columbarius</i>	o		u	u

Table 1. Checklist of Birds for MCB Camp Lejeune

Common Name	Scientific Name	Mar-May	Jun-Aug	Sep-Nov	Dec-Feb
Peregrine Falcon	<i>Falco peregrinus</i>	o		u	o
Black Rail	<i>Laterallus jamaicensis</i>	r*	r		
Clapper Rail	<i>Rallus longirostris</i>	c*	c	c	c
King Rail	<i>Rallus elegans</i>	r		r	r
Virginia Rail	<i>Rallus limicola</i>	u*	o	u	u
Sora	<i>Porzana carolina</i>	o		u	o
Common Gallinule	<i>Gallinula galeata</i>	r	r	r	r
American Coot	<i>Fulica americana</i>	o	r	u	u
Sandhill Crane	<i>Grus canadensis</i>	r		r	r
Black-bellied Plover	<i>Pluvialis squatarola</i>	c	u	c	c
American Golden-Plover	<i>Pluvialis dominica</i>			r	
Wilson's Plover	<i>Charadrius wilsonia</i>	c*	c	u	
Semipalmated Plover	<i>Charadrius semipalmatus</i>	c	u	c	u
Piping Plover	<i>Charadrius melodus</i>	u*	o	u	o
Killdeer	<i>Charadrius vociferus</i>	c*	c	c	c
American Oystercatcher	<i>Haematopus palliatus</i>	c*	c	u	u
American Avocet	<i>Recurvirostra americana</i>			r	
Spotted Sandpiper	<i>Actitis macularius</i>	u	u	o	r
Solitary Sandpiper	<i>Tringa solitaria</i>	o	o	o	
Greater Yellowlegs	<i>Tringa melanoleuca</i>	c	u	c	u
Willet	<i>Tringa semipalmata</i>	c*	c	c	c
Lesser Yellowlegs	<i>Tringa flavipes</i>	u	u	o	
Whimbrel	<i>Numenius phaeopus</i>	u	u	o	
Marbled Godwit	<i>Limosa fedoa</i>	o	o	o	o
Ruddy Turnstone	<i>Arenaria interpres</i>	c	u	c	c
Red Knot	<i>Calidris canutus</i>	u	o	o	u
Sanderling	<i>Calidris alba</i>	c	u	c	c
Semipalmated Sandpiper	<i>Calidris pusilla</i>	u	u	o	
Western Sandpiper	<i>Calidris mauri</i>	u	u	c	c
Least Sandpiper	<i>Calidris minutilla</i>	u	u	o	o
White-rumped Sandpiper	<i>Calidris fuscicollis</i>	o	o	o	
Pectoral Sandpiper	<i>Calidris melanotos</i>	o	o	o	
Dunlin	<i>Calidris alpina</i>	c	o	c	c
Stilt Sandpiper	<i>Calidris himantopus</i>	o	o	o	
Short-billed Dowitcher	<i>Limnodromus griseus</i>	c	c	c	c
Long-billed Dowitcher	<i>Limnodromus scolopaceus</i>	r	r	r	
Wilson's Snipe	<i>Gallinago delicata</i>	u		u	u
American Woodcock	<i>Scolopax minor</i>	o*	o	o	u
Bonaparte's Gull	<i>Chroicocephalus philadelphia</i>	c	r	o	c

Table 1. Checklist of Birds for MCB Camp Lejeune

Common Name	Scientific Name	Mar-May	Jun-Aug	Sep-Nov	Dec-Feb
Laughing Gull	<i>Leucophaeus atricilla</i>	c	c	a	u
Ring-billed Gull	<i>Larus delawarensis</i>	c	o	c	c
Herring Gull	<i>Larus argentatus</i>	c	u	c	c
Iceland Gull	<i>Larus glaucoides</i>	r			r
Lesser Black-backed Gull	<i>Larus fuscus</i>	o	o	u	o
Glaucous Gull	<i>Larus hyperboreus</i>	r			r
Great Black-backed Gull	<i>Larus marinus</i>	u	u	c	c
Sooty Tern	<i>Onychoprion fuscatus</i>		r	r	
Bridled Tern	<i>Onychoprion anaethetus</i>		r	r	
Least Tern	<i>Sternula antillarum</i>	c*	c	o	
Gull-billed Tern	<i>Gelochelidon nilotica</i>	o*	o	o	
Caspian Tern	<i>Hydroprogne caspia</i>	o	o	c	
Black Tern	<i>Chlidonias niger</i>	o	u	o	
Roseate Tern	<i>Sterna dougallii</i>	r	r		
Common Tern	<i>Sterna hirundo</i>	u*	u	o	
Arctic Tern	<i>Sterna paradisaea</i>	r			
Forster's Tern	<i>Sterna forsteri</i>	c*	c	c	c
Royal Tern	<i>Thalasseus maximus</i>	c	c	c	u
Sandwich Tern	<i>Thalasseus sandvicensis</i>	c	c	c	
Black Skimmer	<i>Rynchops niger</i>	c*	c	c	u
Pomarine Jaeger	<i>Stercorarius pomarinus</i>	o	o	o	o
Parasitic Jaeger	<i>Stercorarius parasiticus</i>	o	o	o	o
Long-tailed Jaeger	<i>Stercorarius longicaudus</i>	r	r		
Dovekie	<i>Alle alle</i>				r
Razorbill	<i>Alca torda</i>	r			r
Rock Pigeon	<i>Columba livia</i>	c*	c	c	c
Eurasian Collared-Dove	<i>Streptopelia decaocto</i>	r	r	r	r
White-winged Dove	<i>Zenaida asiatica</i>	r		r	
Mourning Dove	<i>Zenaida macroura</i>	c*	c	c	c
Common Ground-Dove	<i>Columbina passerina</i>	r	r	r	r
Yellow-billed Cuckoo	<i>Coccyzus americanus</i>	u*	c	u	
Black-billed Cuckoo	<i>Coccyzus erythrophthalmus</i>	o*	o	o	
Barn Owl	<i>Tyto alba</i>	r		r	r
Eastern Screech-Owl	<i>Megascops asio</i>	c*	c	c	c
Great Horned Owl	<i>Bubo virginianus</i>	c*	c	c	c
Barred Owl	<i>Strix varia</i>	c*	c	c	c
Short-eared Owl	<i>Asio flammeus</i>			r	r
Northern Saw-whet Owl	<i>Aegolius acadicus</i>			r	r
Common Nighthawk	<i>Chordeiles minor</i>	c*	c	o	

Table 1. Checklist of Birds for MCB Camp Lejeune

Common Name	Scientific Name	Mar-May	Jun-Aug	Sep-Nov	Dec-Feb
Chuck-will's-widow	<i>Antrostomus carolinensis</i>	c*	c	o	
Eastern Whip-poor-will	<i>Antrostomus vociferus</i>	c*	c	u	r
Chimney Swift	<i>Chaetura pelagica</i>	c*	c	u	
Ruby-throated Hummingbird	<i>Archilochus colubris</i>	u*	c	o	
Belted Kingfisher	<i>Megaceryle alcyon</i>	u*	c	c	c
Red-headed Woodpecker	<i>Melanerpes erythrocephalus</i>	c*	c	c	c
Red-bellied Woodpecker	<i>Melanerpes carolinus</i>	c*	c	c	c
Yellow-bellied Sapsucker	<i>Sphyrapicus varius</i>	u		u	c
Downy Woodpecker	<i>Picoides pubescens</i>	c*	c	c	c
Hairy Woodpecker	<i>Picoides villosus</i>	c*	c	c	c
Red-cockaded Woodpecker	<i>Picoides borealis</i>	c*	c	c	c
N. (Yellow-shafted) Flicker	<i>Colaptes a. auratus</i>	c*	c	c	c
Pileated Woodpecker	<i>Dryocopus pileatus</i>	c*	c	c	c
Eastern Wood-Pewee	<i>Contopus virens</i>	c*	c	u	
Acadian Flycatcher	<i>Empidonax virescens</i>	c*	c	u	
Empidonax Flycatcher	<i>Empidonax (spp)</i>			o	
Eastern Phoebe	<i>Sayornis phoebe</i>	u		c	c
Great Crested Flycatcher	<i>Myiarchus crinitus</i>	c*	c	u	
Western Kingbird	<i>Tyrannus verticalis</i>			r	r
Eastern Kingbird	<i>Tyrannus tyrannus</i>	c*	c	u	
Gray Kingbird	<i>Tyrannus dominicensis</i>	r	r		
Loggerhead Shrike	<i>Lanius ludovicianus</i>	r*	r	r	r
White-eyed Vireo	<i>Vireo griseus</i>	c*	c	c	o
Yellow-throated Vireo	<i>Vireo flavifrons</i>	c*	c	o	
Blue-headed Vireo	<i>Vireo solitarius</i>	u		u	c
Warbling Vireo	<i>Vireo gilvus</i>			r	
Philadelphia Vireo	<i>Vireo philadelphicus</i>			o	
Red-eyed Vireo	<i>Vireo olivaceus</i>	c*	c	u	
Blue Jay	<i>Cyanocitta cristata</i>	c*	c	c	c
American Crow	<i>Corvus brachyrhynchos</i>	c*	c	c	c
Fish Crow	<i>Corvus ossifragus</i>	c*	c	c	c
Horned Lark	<i>Eremophila alpestris</i>			r	r
Purple Martin	<i>Progne subis</i>	c*	c	o	
Tree Swallow	<i>Tachycineta bicolor</i>	o	o	c	u
N. Rough-winged Swallow	<i>Stelgidopteryx serripennis</i>	u*	u	o	
Bank Swallow	<i>Riparia riparia</i>	o	u	o	
Cliff Swallow	<i>Petrochelidon pyrrhonota</i>	o*	o	r	
Cave Swallow	<i>Petrochelidon fulva</i>			r	r
Barn Swallow	<i>Hirundo rustica</i>	c*	c	u	

Table 1. Checklist of Birds for MCB Camp Lejeune

Common Name	Scientific Name	Mar-May	Jun-Aug	Sep-Nov	Dec-Feb
Carolina Chickadee	<i>Poecile carolinensis</i>	c*	c	c	c
Tufted Titmouse	<i>Baeolophus bicolor</i>	c*	c	c	c
Red-breasted Nuthatch	<i>Sitta canadensis</i>	o		o	o
White-breasted Nuthatch	<i>Sitta carolinensis</i>	c*	c	c	c
Brown-headed Nuthatch	<i>Sitta pusilla</i>	c*	c	c	c
Brown Creeper	<i>Certhia americana</i>	o		u	c
Carolina Wren	<i>Thryothorus ludovicianus</i>	c*	c	c	c
House Wren	<i>Troglodytes aedon</i>	u*	o	c	c
Winter Wren	<i>Troglodytes hiemalis</i>	u		u	c
Sedge Wren	<i>Cistothorus platensis</i>	u		c	c
Marsh Wren	<i>Cistothorus palustris</i>	u*	o	c	c
Blue-gray Gnatcatcher	<i>Poliophtila caerulea</i>	c*	c	u	r
Golden-crowned Kinglet	<i>Regulus satrapa</i>	u		u	c
Ruby-crowned Kinglet	<i>Regulus calendula</i>	u		c	c
Eastern Bluebird	<i>Sialia sialis</i>	c*	c	c	c
Veery	<i>Catharus fuscescens</i>	o		o	
Gray-cheeked Thrush	<i>Catharus minimus</i>	o		o	
Swainson's Thrush	<i>Catharus ustulatus</i>	o		o	
Hermit Thrush	<i>Catharus guttatus</i>	u		u	c
Wood Thrush	<i>Hylocichla mustelina</i>	u*	u	o	
American Robin	<i>Turdus migratorius</i>	c*	c	c	a
Gray Catbird	<i>Dumetella carolinensis</i>	c*	c	c	c
Northern Mockingbird	<i>Mimus polyglottos</i>	c*	c	c	c
Brown Thrasher	<i>Toxostoma rufum</i>	c*	c	c	c
European Starling	<i>Sturnus vulgaris</i>	c*	c	c	c
American Pipit	<i>Anthus rubescens</i>			u	o
Cedar Waxwing	<i>Bombycilla cedrorum</i>	u	r	u	c
Snow Bunting	<i>Plectrophenax nivalis</i>			r	r
Ovenbird	<i>Seiurus aurocapilla</i>	c*	c	o	r
Worm-eating Warbler	<i>Helmitheros vermivorum</i>	u*	u	o	
Louisiana Waterthrush	<i>Parkesia motacilla</i>	o*	o		
Northern Waterthrush	<i>Parkesia noveboracensis</i>	o	o	u	
Blue-winged Warbler	<i>Vermivora cyanoptera</i>			o	
Black-and-white Warbler	<i>Mniotilta varia</i>	u*	u	u	
Prothonotary Warbler	<i>Protonotaria citrea</i>	c*	c	o	
Swainson's Warbler	<i>Limnithlypis swainsonii</i>	u*	u	o	
Tennessee Warbler	<i>Oreothlypis peregrina</i>			o	
Orange-crowned Warbler	<i>Oreothlypis celata</i>	u		u	c
Nashville Warbler	<i>Oreothlypis ruficapilla</i>			o	

Table 1. Checklist of Birds for MCB Camp Lejeune

Common Name	Scientific Name	Mar-May	Jun-Aug	Sep-Nov	Dec-Feb
Connecticut Warbler	<i>Oporornis agilis</i>			r	
Mourning Warbler	<i>Geothlypis philadelphia</i>			r	
Kentucky Warbler	<i>Geothlypis formosa</i>	o*	o	o	
Common Yellowthroat	<i>Geothlypis trichas</i>	c*	c	c	u
Hooded Warbler	<i>Setophaga citrina</i>	c*	c	o	
American Redstart	<i>Setophaga ruticilla</i>	o*	u	u	
Cape May Warbler	<i>Setophaga tigrina</i>			u	
Northern Parula	<i>Setophaga americana</i>	c*	c	u	
Magnolia Warbler	<i>Setophaga magnolia</i>			u	
Bay-breasted Warbler	<i>Setophaga castanea</i>			o	
Blackburnian Warbler	<i>Setophaga fusca</i>			o	
Yellow Warbler	<i>Setophaga petechia</i>	o	u	u	
Chestnut-sided Warbler	<i>Setophaga pensylvanica</i>			o	
Blackpoll Warbler	<i>Setophaga striata</i>	u		o	
Black-throated Blue Warbler	<i>Setophaga caerulescens</i>	u		u	
Palm Warbler	<i>Setophaga palmarum</i>	o		c	u
Pine Warbler	<i>Setophaga pinus</i>	c*	c	c	c
Yellow-rumped Warbler	<i>Setophaga coronata</i>	c		c	c
Yellow-throated Warbler	<i>Setophaga dominica</i>	c*	c	o	r
Prairie Warbler	<i>Setophaga discolor</i>	c*	c	c	r
Black-throated Green Warbler	<i>Setophaga virens</i>	u*	o	o	
Canada Warbler	<i>Cardellina canadensis</i>			r	
Wilson's Warbler	<i>Cardellina pusilla</i>			o	
Yellow-breasted Chat	<i>Icteria virens</i>	c*	c	u	r
Eastern Towhee	<i>Pipilo erythrophthalmus</i>	c*	c	c	c
Bachman's Sparrow	<i>Peucaea aestivalis</i>	c*	c	c	c
Chipping Sparrow	<i>Spizella passerina</i>	c*	c	c	c
Clay-colored Sparrow	<i>Spizella pallida</i>			o	r
Field Sparrow	<i>Spizella pusilla</i>	o*	o	u	u
Vesper Sparrow	<i>Pooecetes gramineus</i>			o	r
Lark Sparrow	<i>Chondestes grammacus</i>			r	r
Savannah Sparrow	<i>Passerculus sandwichensis</i>	c		c	c
Grasshopper Sparrow	<i>Ammodramus savannarum</i>			r	r
Henslow's Sparrow	<i>Ammodramus henslowii</i>	o*	r	o	u
Le Conte's Sparrow	<i>Ammodramus leconteii</i>			r	r
Nelson's Sparrow	<i>Ammodramus nelsoni</i>	u		c	u
Saltmarsh Sparrow	<i>Ammodramus caudacutus</i>	u		c	u
Seaside Sparrow	<i>Ammodramus maritimus</i>	u*	u	u	u
Fox Sparrow	<i>Passerella iliaca</i>			o	c

Table 1. Checklist of Birds for MCB Camp Lejeune

Common Name	Scientific Name	Mar- May	Jun- Aug	Sep- Nov	Dec- Feb
Song Sparrow	<i>Melospiza melodia</i>	u		u	c
Lincoln's Sparrow	<i>Melospiza lincolni</i>			o	o
Swamp Sparrow	<i>Melospiza georgiana</i>	u		u	c
White-throated Sparrow	<i>Zonotrichia albicollis</i>	c		u	c
White-crowned Sparrow	<i>Zonotrichia leucophrys</i>			o	r
Dark-eyed Junco	<i>Junco hyemalis</i>	u		u	c
Summer Tanager	<i>Piranga rubra</i>	c*	c	u	
Scarlet Tanager	<i>Piranga olivacea</i>	o		o	
Northern Cardinal	<i>Cardinalis cardinalis</i>	c*	c	c	c
Rose-breasted Grosbeak	<i>Pheucticus ludovicianus</i>	o		o	
Blue Grosbeak	<i>Passerina caerulea</i>	c*	c	u	
Indigo Bunting	<i>Passerina cyanea</i>	c*	c	u	r
Painted Bunting	<i>Passerina ciris</i>	c*	c	u	r
Dickcissel	<i>Spiza americana</i>			o	r
Bobolink	<i>Dolichonyx oryzivorus</i>	o	o	c	
Red-winged Blackbird	<i>Agelaius phoeniceus</i>	c*	c	c	c
Eastern Meadowlark	<i>Sturnella magna</i>	c*	c	c	c
Yellow-headed Blackbird	<i>Xanthocephalus xanthocephalus</i>			r	
Rusty Blackbird	<i>Euphagus carolinus</i>	o		o	o
Common Grackle	<i>Quiscalus quiscula</i>	c*	c	c	c
Boat-tailed Grackle	<i>Quiscalus major</i>	c	c	c	c
Shiny Cowbird	<i>Molothrus bonariensis</i>	r	r		
Brown-headed Cowbird	<i>Molothrus ater</i>	c*	c	c	c
Orchard Oriole	<i>Icterus spurius</i>	c*	c	o	
Baltimore Oriole	<i>Icterus galbula</i>	o		u	o
Purple Finch	<i>Carpodacus purpureus</i>	r		r	r
House Finch	<i>Carpodacus mexicanus</i>	c*	c	c	c
Pine Siskin	<i>Spinus pinus</i>	r		r	r
American Goldfinch	<i>Spinus tristis</i>	u*	u	u	c
Evening Grosbeak	<i>Coccothraustes vespertinus</i>	r			r
House Sparrow	<i>Passer domesticus</i>	c*	c	c	c

a - abundant: common species that is very numerous
 c - common: certain to be seen in suitable habitat
 u - uncommon: present but not certain to be seen
 o - occasional: seen only a few times during a season
 r - rare: seen at intervals of 2 to 5 years
 * - nests on study area

Appendix 16:

Funding Class

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Appendix 16: Funding Class

Actions (or projects) listed in this INRMP fall within two categories: those that must be implemented ("must fund"), and those that may be implemented if circumstances are favorable (e.g., mission requirements allow access to land to conduct the action and/or funding is available). Must fund actions are those that are required to meet recurring natural and cultural resources conservation management requirements (Class 0) or current compliance (Class 1) needs. Class 0 and Class 1 actions are of the highest priority. All other valid, natural resource-related projects that do not fall into Class 0 or Class 1 are categorized as Class 2 and Class 3 actions. While all Class 0 and Class 1 actions are usually funded, Class 2 and 3 actions are almost totally dependent on the availability of funding and will be implemented only when circumstances are favorable. However, from time to time, resources are made available from non-traditional sources to satisfy lower priority installation natural resources management objectives. Both lists describe and define natural resources management activities for MCB Camp Lejeune and will serve the proposed action for MCB Camp Lejeune over the course of the next five years.

Action ID	Funding Class	Action Title
4.1-01	0	MCB Camp Lejeune will manage for RCW habitat at the partition level, both within and outside of the normal silvicultural prescription cycle.
4.1-02	1	Restore longleaf pine within the guidelines of the 2003 Recovery Plan for the RCW on Mainside. Longleaf pine restoration in the GSRA will be reevaluated upon completion of the TVMC range planning and development process.
4.1-03	0	Make progress toward burning all existing and potential RCW habitat on a three-year rotation, and increasing growing season burning to greater than 50%.
4.1-04	1	Implement monitoring and protection plan for RCW.
4.1-05	0	Maintain minimum growth rate of 5% per year (avg. over 10 years).
4.1-06	1	Monitor 100% RCW population annually.
4.1-07	1	Survey annually for new cavities.
4.1-08	0	Apply RCW population model to forecast impacts to demographic stability from range and facility development.

Action ID	Funding Class	Action Title
4.1-09	0	Implement management strategy which allows for removal of training restriction as population milestones are met.
4.1-10	0	Maintain 200 ft cluster buffer.
4.1-11	0	Direct RCW management to allow for future mechanized maneuver corridors through RCW habitat.
4.1-12	1	Implement a study to monitor the effects of mechanized maneuver in the BCTMC corridors.
4.1-13	0	Protect sensitive habitat at South Onslow Beach (sea turtle).
4.1-14	0	Enter sea turtle data into NCWRC database via seaturtle.org.
4.1-15	0	Continue to implement protective measures for sea turtles in-water (see Appendix 10 for in-water training protocol for sea turtles and marine mammals).
4.1-16	0	Implement MCB Camp Lejeune sea turtle protocol.
4.1-17	0	Continue to reduce sources of artificial lighting on Onslow Beach.
4.1-18	0	Continue to implement reduced RLL ¹ monitoring protocol.
4.1-19	0	Update GIS layer for RLL on a yearly basis.
4.1-20	1	Survey high-probability RLL habitat in areas to be affected by management or development actions to include the entire GSRA.
4.1-21	0	Prescribe-burn RLL habitat every two-to-three years.
4.1-22	0	Maintain and update buffer areas around RLL sites.
4.1-23	0	Protect RLL sites from soil disturbance and changes to hydrology.
4.1-24	0	Protect sensitive habitat at South Onslow Beach (seabeach amaranth).
4.1-25	0	Annually survey potential seabeach amaranth habitat on Onslow Beach.
4.1-26	0	Mark and protect seabeach amaranth sites.

Action ID	Funding Class	Action Title
4.1-27	0	Conduct bi-weekly surveys for piping plover and during the breeding season census window.
4.1-28	0	Protect piping plover nests and habitat from training and outdoor recreation impacts.
4.1-29	0	Report plover sightings to NCWRC.
4.1-30	0	Cooperate with any State surveys in the New River and tributaries.
4.1-31	0	Annually implement monitoring protocol for Hirst’s panic grass.
4.1-32	0	Conduct habitat management actions to maintain and enhance Hirst’s panic grass sites at MCB Camp Lejeune when necessary.
4.1-33	0	Protect sensitive habitats on the south end of Onslow Beach (shorebirds).
4.1-34	0	Conduct biweekly shorebird surveys.
4.1-35	0	Maintain protective measures required as a condition of the BGEPA take permit.
4.1-36	0	Monitor each nest according to conditions of the BGEPA permit.
4.1-37	2	Conduct periodic surveys for potential nests along the New River corridor.
4.1-38	2	Conduct SAR inventories prior to land-disturbing activities that may threaten their occurrence. When consistent with the military mission, avoid and minimize impacts to SAR through the NEPA process.
4.1-39	0	Monitor SAR populations on the Installation, in collaboration with the USFWS and NCWRC.
4.1-40	0	Implement ecosystem management practices that support the conservation and management of habitat for SAR.
4.1-41	0	Minimize impacts on endangered species and marine mammals through involvement with the project planning and design process.
4.1-42	0	Evaluate the relative impacts of project alternatives on federally-listed species/marine mammals and identify potential impact mitigation measures.

Action ID	Funding Class	Action Title
4.1-43	0	Solicit NMFS/USFWS input during the planning and design phases through ESA/MMPA consultations.
4.2-01	0	Develop and implement the ASPP.
4.2-02	2	Restore and manage longleaf pine to its historic range, in accordance with the 2003 RCW Recovery Plan, when appropriate and consistent with the military mission.
4.2-03	0	Align forest management practices with the military mission through coordination and planning, ensuring forest management practices are accomplished while eliminating or minimizing negative impacts to the military mission.
4.2-04	0	Follow Best Management Practices (2006 NC Div Forest Resources) for all forestry-related activities.
4.2-05	0	Monitor timber harvest and restoration operations to ensure contract requirements are met.
4.2-06	0	Provide a forested environment that meets the needs of the military mission and provides accessibility for recreation opportunities, while ensuring compliance with applicable laws, regulations, and orders.
4.2-07	0	Provide an optimum yield of sustainable forest products.
4.3-01	0	Implement annual prescribed burn plan.
4.3-02	0	Monitor long-term changes in landscape conditions.
4.3-03	0	Implement Wildland Fire Management Plan.
4.3-04	0	Support the annual table-top exercise to coordinate incident management strategies in response to wildland fires at MCB Camp Lejeune.
4.4-01	0	Manage food plots in support of the game management program.
4.4-02	0	Manage freshwater fishing ponds.
4.4-03	0	Conduct annual surveys for game species, including wild turkey, American woodcock, and northern bobwhite and contribute data to state resource managers.

Action ID	Funding Class	Action Title
4.4-04	0	Continue antler-restriction harvest strategy in Hunting Zone 2 to reduce the harvest of immature bucks, and increase hunter opportunity for taking mature deer.
4.4-05	0	Retain mast-producing trees when harvesting timber, where it does not conflict with other habitat management requirements.
4.4-06	0	Continue programs that benefit non-game wildlife including nest box programs for species such as eastern blue birds and purple martins, cover board surveys for reptiles, and calling amphibian survey routes.
4.4-07	0	Perform annual surveys and monitor population trends for non-game wildlife.
4.4-08	0	Trap and remove nuisance wildlife.
4.4-09	0	Coordinate depredation actions required for nuisance wildlife management with the NCWRC and USFWS.
4.4-10	0	Provide guidance to installation personnel to assist them in solving problems associated with nuisance wildlife.
4.5-01	0	Conduct annual migratory bird surveys, including planning level surveys that support long range master planning efforts and migratory bird conservation initiatives.
4.5-02	0	Protect priority migratory bird habitats where such protections provide a benefit to species and can be integrated with training activities.
4.6-01	0	Continue wildlife management programs, including survey, harassment, and relocation of BASH species as well as maintenance of permits for Migratory Bird Depredation, Special Airport Depredation, and Bald Eagle Depredation, and other permits.
4.6-02	0	Manage habitat on and around air fields and landing zones in a manner that minimizes bird-animal strike hazards.
4.7-01	1	Delineate wetlands and update MCB Camp Lejeune’s GIS wetland layer.
4.7-02	1	Comply with Section 404 CWA permits issued by the USACE for DOD action on MCB Camp Lejeune
4.7-03	0	Perform Annual Inspections of the GSRA Mitigation Bank.

Action ID	Funding Class	Action Title
4.7-04	0	Implement standard operating procedures for off-road vehicle movement to minimize impacts to wetlands. Monitor sensitive wetland areas to ensure impacts are minimized/mitigated.
4.7-05	0	Use Best Management Practices when maintaining vegetation on live-fire ranges, helicopter landing zones, parachute drop zones, runway clear zones, and other mission-support openings.
4.8-01	0	Support oyster management in the NRE by providing NCDMF access to store oyster shell (at Mile Hammock Bay) used for oyster cultch planting in sites at selected locations in the NRE and support public access to existing DMF Shellfish Management Areas for shellfishing and fishing consistent with the military mission .
4.8-02	1	Implement living shoreline stabilization projects along the New River where site conditions support shoreline protection and habitat restoration designs.
4.8-03	1	Stabilize, enhance, protect and restore coastal dunes using native vegetation and other approved methods within the training section of the beach.
4.8-04	0	Implement and monitor seasonal beach driving restrictions.
4.8-05	0	Participate in the planning process for range development projects in the coastal zone to help avoid and minimize impacts to coastal resources.
4.8-06	3	Develop a monitoring program for the purpose of evaluating the effect of “splash points” on the surrounding wetlands and to develop measures to counter those effects.
4.8-07	0	Evaluate the feasibility of a “Thin Layer Disposal Project” to restore saltmarsh and promote barrier island stabilization.
4.9-01	0	Monitor training effects on inland soils and in coastal areas, and use results to provide recommendations for restoration of eroded sites/soil conservation.
4.9-02	0	Place selected eroded sites in a closed or limited use status during restoration/rehabilitation and maintenance repair projects.
4.9-03	0	Use an interdisciplinary approach to review proposed actions at MCB Camp Lejeune for all land-disturbing projects that will impact 1 acre or more of land.

Action ID	Funding Class	Action Title
4.9-04	1	Improve the maneuver trails network including splashpoints and other hardened sites to facilitate mechanized training requirements.
4.10-01	0	Monitor non-native and exotic invasive plant and animal species on MCB Camp Lejeune.
4.10-02	1	Implement necessary control actions on known populations of non-native and exotic infestations of invasive species.
4.11-01	0	Serve as the permitting agent for the sale/issuance of permits for hunting, fishing, trapping, ORRV use, and firewood collection on the Installation.
4.11-02	1	Ensure conservation law enforcement officers maintain all certifications, licenses, and training necessary to meet MCB Camp Lejeune conservation law enforcement program requirements.
4.11-03	0	Schedule and coordinate organized annual sporting events, including the COIDH and Youth Fishing Day.
4.11-04	0	Plan and host special hunts for disabled veterans and other persons with disabilities.
4.11-05	0	Continue participation in conservation outreach initiatives through natural resource-based lectures and presentations at MCB Camp Lejeune Dependent Schools, local community schools and colleges, conservation groups, and special events.
4.11-06	0	Provide instruction to authorized personnel on hunter-based educational programs, including hunter safety courses and archery skills training.
4.11-07	0	Continue to support the MCB Camp Lejeune CVP by providing opportunities for volunteers to participate in projects that are consistent with the Installation’s INRMP and mission objectives.

1.RLL = Rough-leaved Loosestrife

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Appendix 17:

Agency Coordination and Comment Response Matrix

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UNITED STATES MARINE CORPS
MARINE CORPS INSTALLATIONS EAST-MARINE CORPS BASE
PSC BOX 20005
CAMP LEJEUNE NC 28542-0005

5090
BEMD
24 MAR 2014

Ms. Cynthia K. Dohner
Regional Director
Southeast Region
U.S. Fish and Wildlife Service
1875 Century Boulevard Northeast
Suite 400
Atlanta, GA 30345

Dear Ms. Dohner:

The Marine Corps Installations East-Marine Corps Base, Camp Lejeune (MCIEAST-MCB CAMLEJ) proposes to revise its 2007 through 2011 Integrated Natural Resources Management Plan. A stakeholder kickoff meeting will be held April 30, 2014, with representatives invited from the following cooperating agencies: National Marine Fisheries Service, North Carolina Wildlife Resources Commission, and the North Carolina Division of Marine Fisheries.

MCIEAST-MCB CAMLEJ has a long history of successful natural resource stewardship and values its effective relationship with your agency and your support of our efforts to integrate natural resources management activities with military mission requirements and training land use unique to MCB CAMLEJ.

This kickoff meeting is an important milestone in our effort to ensure military training and readiness requirements are being accomplished within the constraints of our limited training lands. With your shared support, we can meet the intent of the Sikes Act Improvement Act as it relates to military training and our obligations under the Endangered Species Act.

We respectfully request that you confirm your attendance, and any other designee you wish to attend, within 15 days of receipt.

The point of contact for this project is Mr. Martin Korenek, Environmental Conservation Branch, Environmental Management Division, G-F, at (910)451-9384 or email martin.korenek@usmc.mil.

Sincerely,

R. F. CASTELLVI
Brigadier General, U. S. Marine Corps
Commanding General
Marine Corps Installations East-
Marine Corps Base, Camp Lejeune

Copy to:
FWS Raleigh, NC Field Office

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UNITED STATES MARINE CORPS
MARINE CORPS INSTALLATIONS EAST-MARINE CORPS BASE
PSC BOX 20005
CAMP LEJEUNE NC 28542-0005

T
4715
G-F/G-3/5
06 Aug 2014

Mr. Pete Benjamin
Field Supervisor
United States Fish and Wildlife Service
Raleigh Office
P.O. Box 33726
Raleigh, N.C. 27636-3726

Dear Mr. Benjamin:

In an effort to ensure that the critical discussion points of our meeting of 29 July 2014 are accurately captured and permit us to continue with the INRMP development based on these agreed upon points, we are providing a summary of what we believe were the salient points. We appreciate the time and advice provided by you and John Hammond and look forward to meeting with you again in November. Please let us know if your take-away was different than what is presented below.

GSRA Fire Management Incidental Take Authorization

In order to maximize the availability of unconstrained training lands on Camp Lejeune, it is critical that off-road tactical vehicle maneuver capabilities on GSRA and main-side be developed and maintained to the maximum extent practical. While threatened and endangered species are not currently a significant impediment to training on GSRA, the application of prescribed burning for ecosystem management, wildfire prevention, and range vegetation management may encourage new occurrences by creating suitable habitat. MCBCL is concerned that new threatened and endangered species occurrences on GSRA will result in additional training constraints, thereby further impacting mission capabilities. In response to this concern, you indicated that the USEFWS could provide assurances that any new threatened and endangered species appearing as a result of beneficial fire management and other natural resource management effects would not result in additional constraints on training or range development. Such an agreement would cover species currently listed under the ESA, as well as species such as the Eastern Diamondback Rattlesnake and Carolina Gopher Frog that may become federally listed in the future. In the specific case of the RCW, this agreement would cover all RCW clusters that may become established on GSRA, and would not be limited to a specific number of clusters based on habitat availability. This agreement would apply to all training activities and range development projects, as well as any supporting infrastructure and facility development projects. All consultation requirements associated with this agreement would be completed during the USEFWS INRMP review and approval process. Subsequent to the INRMP consultation, any listed species that appear as a result of fire and other natural resource management activities could be taken without further USEFWS approval or consultation. Camp Lejeune would notify USEFWS of any incidental take, potentially in annual INRMP update reports.

GSRA Longleaf Pine

The ongoing process of planning and designing tactical vehicle maneuver ranges on GSRA precludes the identification of suitable longleaf pine restoration sites at this time. In order to avoid inefficient and ineffective resource allocation, longleaf pine restoration on GSRA will be put on hold pending completion of the range planning and design process. Potential longleaf restoration sites on GSRA will be reevaluated upon completion of the planning/design process or at the end of the five-year INRMP period, whichever comes first.

GSRA Pocosin as RCW Benefit

The concept that the pocosin habitat in the GSRA provides a conservation benefit to the red-cockaded woodpecker has not previously been recognized. The pocosins and pocosin fringes may serve as dispersal habitat as well as marginal nesting and foraging habitat. In the past, only the uplands that support or could potentially support longleaf pine were seen as providing a benefit to the species. However, observations of birds using non-typical habitat have shown that pocosin habitat can still provide a benefit. This recognition will be helpful when looking at potential impacts to uplands in GSRA from mechanized maneuver and future range projects.

CAAAC Phase 1

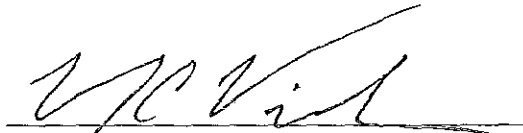
Within the main-side area of Camp Lejeune, the operational requirement exists to provide tactical vehicle maneuver corridors/areas for transit of tracked and wheeled vehicles from the beach to tactical objectives located inland. These corridors/areas are intended to be developed to incorporate existing tank trails to the maximum extent possible, but they will also be expanded in some areas to include lanes of travel that permit tactical maneuver. Corridors will be classified as speed and mobility corridors (SM) or cover and concealment (CC) corridors. Corridors may appear as open maneuver areas with little vegetation or three lanes separated by significant vegetation. Camp Lejeune does not believe that mechanized maneuver is compatible with RCW management. The period of this INRMP will be used to validate or invalidate that assumption and will provide the basis for future determinations as to whether these maneuver corridors can continue to be included as manageable RCW habitat. There will be "take" associated with these corridors, but all feasible precautions will be used to minimize the "take" and ensure that the overall RCW recovery plan is not adversely impacted.

Vegetation Management Within Impact Areas

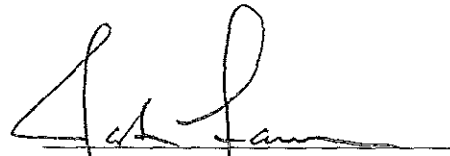
The impact areas of Camp Lejeune are critical to the accomplishment of live-fire training for air, ground, and naval forces. Visibility of targets is essential for target acquisition by forward observers, pilots, and personnel using direct fire weapons in order to evaluate live fire with regard to target hits and proximity of munitions delivery. Maintenance of the impact areas to provide that necessary visibility requires vegetation management that will maintain ground cover below a height specified in the Vegetation Management Environmental Assessment. Fires resulting from munitions generally maintain ground cover within the desired threshold in portions of the impact areas. However, many portions of the impact area require additional vegetation management. Due to the danger of unexploded ordnance (UXO) and the high cost of UXO removal, mechanical means and prescribed burns on a routine basis are not practical. Consequently, aerial

application of herbicides within the impact areas will be a method of control in accordance with the EA. It is Camp Lejeune's intent to maximize vegetation control in this manner, with anticipation that the RLL population within the impact area will be affected. We also agreed that we will not be consulting on any impacts to "high probability habitat" areas that are not known to contain listed species. The full details of this proposed action will be made available in the Vegetation Management EA and consultation. The cleared areas of the G-10/K-2 impact areas will not be managed for T&E species or species of concern. Other areas of the G-10/K-2 impact areas that have RCW or other protected species, in order to be managed, will require escort by certified UXO technicians and Range Control Officer's approval.

The MCIEAST-MCB staff looks forward to additional discussions and reviews with the USFWS as we bring this INRMP to completion.



BRAD VICKERS
Colonel, US Marine Corps
AC/S, G-3/5
By direction



JASON FAUNCE
Captain, US Navy
AC/S, G-F
By direction

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United States Department of the Interior

FISH AND WILDLIFE SERVICE

Raleigh Field Office
Post Office Box 33726
Raleigh, North Carolina 27636-3726

September 18, 2014

Col. Brad Vickers
Assistant Chief of Staff, Base Operations
Marine Corps Installations East - Marine Corps Base
PSC 20005
Camp Lejeune, North Carolina 28542-0005

Capt. Jason Faunce
Assistant Chief of Staff, Facilities
Marine Corps Installations East - Marine Corps Base
PSC 20005
Camp Lejeune, North Carolina 28542-0005

Dear Sirs:

Thank you for your August 6, 2014 letter summarizing discussion points essential to the development of Marine Corps Base Camp Lejeune's revised Integrated Natural Resources Management Plan (INRMP). The Fish and Wildlife Service (Service) met with Marine Corps Base Camp Lejeune and Marine Corps Installations East (MCIE) representatives on July 29, 2014 to discuss the upcoming INRMP revision. The meeting gave Range Planners the opportunity to present the Marine Corps' vision for how Camp Lejeune and the adjacent Greater Sandy Run Area (GSRA) would be managed to support the Marine Corps' extensive and dynamic training mission. Your August 6, 2014 letter was forwarded to solidify key components of our discussion into gaining further land use flexibility for maneuver training while ensuring protected species conservation requirements are met.

The Marine Corps views range development on GSRA as essential to meeting mission training requirements. Prior to the GSRA's acquisition by the Marine Corps, the property was broadly manipulated as timberland, leaving much of the land ecologically altered. When the Marine Corps acquired the property, surveys revealed the presence of several rough-leaved loosestrife (RLL) populations on the GSRA, especially within the power line corridor running parallel to U.S. Highway 17. However, no other threatened or endangered species, including active red-cockaded woodpecker (RCW) clusters have been found.

For the uses presented to the Service in our July 29, 2014 meeting (specifically the Tactical Vehicle Maneuver Course), it is clear that GSRA has sizable potential to elevate accomplishment of the installation's training objectives. Despite significant ground disturbance before GSRA was purchased by the Department of Defense, the 40,000+ acre property continues to support a large acreage of forests and natural features that are adapted to periodic, naturally-occurring fire. Live fire target engagement and other training-related activities expose the GSRA to increased potential for fires to start.

While prescribed fire and controlled burning are processes that promote range sustainability and reduce the risk of major catastrophic fire, the Marine Corps believes that fire may create suitable habitat for federally protected species on the GSRA and that new records for threatened or endangered taxa might be established. The Marine Corps is concerned that such new records would result in additional training constraints. Camp Lejeune seeks a reasonable level of confidence that complete range development and subsequent training use of GSRA will not require significant involvement with constraints that might limit development of warfighting skills. In our July 29, 2014 meeting, we expressed our desire to assist Camp Lejeune in maximizing the value of GSRA to facilitate realistic military training.

We want to encourage the Marine Corps to continue to implement good sound forest habitat management practices within the GSRA. Such practices will help sustain the landscape for training purposes and could also promote conservation of fish and wildlife resources including listed species. In particular, as we have noted management related benefits to listed species in the GSRA would be over and above those that have been identified as necessary to meet installation ESA obligations. As such, we are confident that the INRMP can be developed to completely de-conflict present and future training needs with any ESA mandates. It is our view that any benefits to listed species and other wildlife that could be achieved within GSRA could only provide greater flexibility in addressing environmental concerns that may arise from development within GSRA or elsewhere on the installation.

For the five-year term of the revised INRMP (or pending completion of the range planning and design process, whichever comes first), the Marine Corps has determined that the Base would not be putting effort into reforesting GSRA with longleaf pine. Camp Lejeune indicated that since the Base is in the planning and development phase for ranges on the property, it may not be prudent to invest money and effort into re-establishing pine forest onto sites that will ultimately be maintained as open land for maneuver and live-fire training. Further, the Marine Corps is concerned that re-establishment of site-appropriate pine species (longleaf) would also contribute to creation of suitable habitat for protected species not currently present on the GSRA. The Service appreciates the efficiency shown by the Marine Corps in minimizing financial costs as well as the unnecessary loss of resources (specifically containerized seedlings) that can be appropriately applied in due time. We hope that as the revised INRMP is completed and range designs are finalized, concerns regarding protected species constraints on GSRA will be fully addressed and the installation can utilize reforestation with site appropriate pine species which will provide benefits by enabling Camp Lejeune to protect the property from wildland fire, stabilize the training landscape, and demonstrate the Marine Corps' commitment to good land stewardship. We are confident that this can be done in concert with actions needed to meet Marine Corps mission needs.

In our April 30, 2014 and July 29, 2014 meetings, MCIE and Camp Lejeune demonstrated the value of supporting the Marine Corps' ability to use more acreage of the installation in support of range and training area modernization. Camp Lejeune has expressed concern that the development of more advanced mechanized maneuver training capabilities may not be compatible with RCW management. While the Marine Corps seeks to maximize the utility of the training environment on the main-side of Camp Lejeune, MCIE/Camp Lejeune intends to exercise all feasible precautions to limit incidental take such that prescribed recovery goals expressed in the Recovery Plan for the

Red-cockaded Woodpecker can still be achieved. For this reason, the Marine Corps has chosen the 2015-2020 INRMP cycle to explore options for expanding maneuver capabilities in these areas.

Your August 4, 2014 letter emphasized the importance of creating corridors for tactical maneuver within main-side training areas on Camp Lejeune to meet identified operational requirements. The corridors, also referred to as maneuver boxes, would enable transit of wheeled and tracked vehicles from the shore to tactical objectives within the installation. The maneuver boxes would include existing tank trails but would expand more broadly within training areas, facilitating more realistic ingress/egress to field objectives. Corridors would be classified as speed and mobility (SM) corridors or cover and concealment (CC) corridors. These corridors may be sparsely vegetated or they may appear as three lanes passing through thick shrub and tree cover.

Establishment and use of the maneuver boxes would take place throughout forested land containing foraging and nesting habitat for RCWs. The mechanized maneuver areas on main-side Camp Lejeune contain a network of recognized paths and improved trails. These would be incorporated into maneuver course development. However these trails would not be sufficient to accommodate the volume and rate of access to meet training requirements.

Since the early 1990's Camp Lejeune's RCW population has continued to grow even though managers expected a diminishing growth rate due to habitat saturation and immaturity of future recruitment locations. Research conducted on Camp Lejeune and other Department of Defense installations with RCWs has been used to reduce the acreage of military lands to which protective training restrictions apply. The Service has worked broadly with U.S. Army installations in the Southeastern United States to identify the aspects of military training that are compatible and those that are incompatible with RCW biology, allowing the removal of training restrictions incrementally, as RCW population objectives have been reached. For example, upon Fort Bragg achieving its RCW population goal, the Army post is in the process of unmarking over 90 percent of its RCW clusters, making these resources virtually invisible to training. Installation regulations still prohibit unauthorized pine tree removal and other activities that permanently damage the environment and negatively alter ecological function. Fort Bragg retains the discretion to re-mark specific clusters if it is determined that training activities are having a measurable impact on affected RCW groups.

Appendix H of Camp Lejeune's 2007 INRMP outlines a similar system in which training restrictions can be removed from an increasing proportion of protected RCW clusters as population milestones are reached. Based on annual INRMP reports, the number of active clusters on Camp Lejeune surpassed the 100-cluster mark in 2012. According to the "Population Milestones and Removal of Restrictions" section of Appendix H, the installation has the standing to identify and unmark up to 45 percent of currently marked clusters located in high-use training areas.

In our July 29, 2014 meeting, Camp Lejeune acknowledged awareness that through the provisions of Appendix H, landscape access limitations directly associated with RCW habitat protection and marked sites can be rolled back. However, the Base is cognizant that habitat used by woodpeckers is not restricted to the clusters but extends away from the cavity trees throughout forested land in the training areas. Off-road access, particularly in the "F," "G," "H," and "I" training areas has potential to damage native ground cover which in turn has indirect but measureable impacts to

RCWs. Creation of new trails could also result in indirect impacts to standing pine trees which are important foraging and nesting habitat for the woodpeckers.

Off-road maneuver training impacts to soils and vegetation would not be limited to RCW habitat but would extend to water quality, soil retention and the sustainability of the training environment. Soil disturbance can be expected to affect the ability of the Base Environmental Conservation Branch to use prescribed fire/controlled burning for range maintenance, hazard reduction and overall forest health. To address these issues Camp Lejeune/MCIE suggested that where soils and ecological damage reached specified threshold levels, the Base would cease use of heavily affected areas and start using an alternate site until the original site is effectively restored.

A useful approach to accomplish these objectives would include documentation of current ecological conditions within areas that will receive expanded use by wheeled and tracked vehicles beyond historical levels, prior to the proposed changes in range use doctrine. Camp Lejeune would work with the Service to develop a reproducible process for identifying important natural resource values (e.g., areal extent of native ground cover in the project location in comparison with areas that are bare or populated with non-native species; tracking fire return intervals and percent of area burned per unit of time; tracking biological statistics of surrogate species such as Bachman's sparrow, etc.) within the involved training areas. Thresholds would be established below which the Base would discontinue use for vehicle training. The Marine Corps would switch maneuver training to an alternate site (or sites) within the installation and begin efforts to ecologically restore the affected landscape. The Service and Marine Corps agree that the expansion of mechanized maneuver areas into previously un-traversed acreage on the main-side installation may have adverse impacts on the RCW. However, we also believe there are effective means for minimizing these effects that can be applied in the training areas to ensure Camp Lejeune would be able to sustain its role in supporting recovery of the Coastal North Carolina Primary Core Population.

In your August 6, 2014 letter you also reference preparation of a Vegetation Management Environmental Assessment (EA) for a proposed action to promote the utility of the Base impact areas through vegetation management. To effectively train Marines, Sailors and Soldiers in ordnance delivery, forward observers, pilots and personnel using direct-fire weapons require that they are able to see the targets they are engaging. Although compartments around the impact areas are prescribe-burned and live fire training in the impact areas causes fire, these events are insufficient to maintain the uniform level of openness required in target areas. Due to the presence of unexploded ordnance, it is not practical to use mechanical techniques to reduce vegetation height. Therefore, Camp Lejeune proposes to use aerial application of herbicide to reduce and maintain visibility to targets.

Camp Lejeune previously consulted with the Service on the use of herbicides in the G-10 Impact Area and potential impacts on the rough-leaved loosestrife (RLL) in 2007. The discrete application area addressed in the 2007 consultation totaled about 44.9 acres of suitable and potentially suitable RLL habitat. To our knowledge, the herbicide use planned at that time went forward. However, there was no requirement established in the consultation to review post-application of herbicide on RLL or suitable habitat.

Your August 6, 2014 letter indicates that the future pesticide application will also have effects on known RLL contained in the G-10 Impact Area. In the interest of safety and operational security the Marine Corps also desires to forego future requirements to survey cleared portions of the G-10/K-2 impact areas that contain high probability habitat which has not been shown to contain RLL populations. The Service recognizes the importance of the impact areas in the way they contribute to the overall combined arms training mission and seeks to support their availability to the Marine Corps. However, we will request an opportunity to review and comment on the effects of the action as they would be presented in the forthcoming EA to ensure our mutual compliance with NEPA requirements.

We look forward to working with you on the preparation of Camp Lejeune's 2015 INRMP revision. If you have any questions regarding this matter, please contact Mr. John Hammond at (919) 856-4520 (ext. 28). Thank you for your continued cooperation with our agency.

Sincerely,

Pete Benjamin
Field Supervisor

Cc: Mr. Will McDearman, U.S. Fish and Wildlife Service

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UNITED STATES MARINE CORPS
MARINE CORPS INSTALLATIONS EAST-MARINE CORPS BASE
PSC BOX 20005
CAMP LEJEUNE NC 28542-0005

5090
BEMD

Mr. Pete Benjamin
Ecological Services Supervisor
United States Fish and Wildlife Service
Raleigh Field Office
Post Office Box 33726
Raleigh, NC 27636-3726

NOV 13 2014

Dear Mr. Benjamin:

Enclosed, please find a copy of Camp Lejeune's Draft 2015-2020 Integrated Natural Resource Management Plan (INRMP) and Draft Biological Assessment (BA) for your review. We are providing these documents to solicit your comments in accordance with the Sikes Act Improvement Act (16 U.S.C. 670(a), *et seq.*). We respectfully request you provide a review of this document.

Upon our receipt of your comments, we will begin the preparation of our Pre-Final INRMP. Additionally, an Environmental Assessment (EA) will be prepared for approval by the Commanding General, Marine Corps Installations East-Marine Corps Base.

Cooperative development of the Draft INRMP began on April 30, 2014 at a stakeholder kickoff meeting including representatives from the following cooperating agencies, and bureaus: United States Fish and Wildlife Service (USFWS), National Marine Fisheries Service (NMFS), North Carolina Wildlife Resource Commission (NCWRC), North Carolina Division of Marine Fisheries (NCDMF), and North Carolina Department of Environment and Natural Resources (NCDENR).

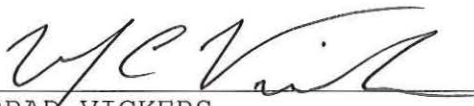
All stakeholder comments on the Draft INRMP will be considered in developing the Pre-Final INRMP and Pre-Final BA, both of which will be provided to you for additional review. A Draft EA will also be published or public comment at that time.


As detailed in Chapter 4, this INRMP is intended to satisfy USFWS and NMFS criteria for exempting Camp Lejeune from any possible critical habitat designation, including open water habitat for those federally listed and at risk species occurring on or in near-shore waters of MCB Camp Lejeune.

Camp Lejeune has a long history of successful natural resource stewardship and values its effective relationship with your staff, especially those involved with endangered species recovery. We, along with your staff and other stakeholders, developed this draft as a means to aggressively recover Camp Lejeune's RCW population and simultaneously reduce Camp Lejeune's military restrictions. This is an important milestone in our collective on-going effort to integrate natural resources management with the primary military mission of the United States Marine Corps.

We would appreciate your sending a written acknowledgement of receipt for our records. We request you submit your comments, if any, by December 12, 2014. If you intend to submit comments, but are unable to meet this date, please feel free to suggest an alternate review timeline for our consideration.

Our point of contact is Mr. Martin Korenek, Environmental Conservation Branch, Environmental Management Division, G-F at (910) 451-9384 or email martin.korenek@usmc.mil.


BRAD VICKERS
Colonel, US Marine Corps
AC/S, G-3/5
By direction


JASON FAUNCE
Captain, US Navy
AC/S, G-F
By direction

- Enclosures:
1. Integrated Natural Resources Management Plan Draft Report November 2014
 2. Biological Assessment (Draft) Marine Corps Base Camp Lejeune 2015-2020 Integrated Natural Resources Management Plan (INRMP) November 7, 2014



United States Department of the Interior

FISH AND WILDLIFE SERVICE

Raleigh Field Office
Post Office Box 33726
Raleigh, North Carolina 27636-3726

December 23, 2014

Col. Brad Vickers
Assistant Chief of Staff, Base Operations
Marine Corps Installations East - Marine Corps Base
PSC 20005
Camp Lejeune, North Carolina 28542-0005

Capt. Jason Faunce
Assistant Chief of Staff, Facilities
Marine Corps Installations East - Marine Corps Base
PSC 20005
Camp Lejeune, North Carolina 28542-0005

Dear Sirs:

The Fish and Wildlife Service (Service) has reviewed the November 2014 Draft Integrated Natural Resource Management Plan (INRMP) and associated Draft Biological Assessment (BA) forwarded to this office under your cover letter dated November 13, 2014. The INRMP would guide natural resource conservation programs on Marine Corps Installations East – Marine Corps Base Camp Lejeune (MCB Camp Lejeune), Onslow County, North Carolina and ensure that the Base’s lands remain environmentally viable in support of the installation’s military mission. The INRMP was developed to meet the requirements of the Sikes Act of 1973 (16 USC 670a et seq.), as amended. The expressed purpose of the INRMP “...is to ensure that installation natural resources are managed and conserved for long-term mission sustainability. This INRMP also ensures that natural resources management and other mission activities are conducted in accordance with the Endangered Species Act (ESA) (16 USC 1531 et seq.), Migratory Bird Treaty Act (MBTA) (16 USC 703–712), Clean Water Act (CWA) (33 USC 1251 et seq.), and a suite of additional federal laws and regulations governing natural resource protection and management on military installations.” The Draft INRMP represents a revision of the 2007 INRMP. The 2014 revised INRMP will guide implementation of the natural resources management program on MCB Camp Lejeune over the next five years (2015 - 2019).

The INRMP references a provision of the National Defense Authorization Act of 2004 that enables Department of Defense installations to work with the Secretary of Interior to preclude critical habitat designation on their lands if acceptable conservation measures are written into the approved INRMP. Such an INRMP would need to provide a benefit to threatened and endangered species; the installation would need to provide certainty that the conservation expressed in the plan would be implemented; the plan must be effective in achieving the stated conservation objectives; and should be developed with cooperating agencies including the Service.

MCB Camp Lejeune provides habitat for seven federally listed species, including the red-cockaded woodpecker (*Picoides borealis*; RCW)(Endangered), green sea turtle (*Chelonia mydas*)(Threatened) loggerhead sea turtle (*Caretta caretta*)(Threatened), rough-leaved loosestrife (*Lysimachia asperulaefolia*) (Endangered), seabeach amaranth (*Amaranthus pumilus*)(Threatened), and piping plover (*Charadrius melodus*)(Threatened). The Service published a final rule in the Federal Register on December 11, 2014 to list the rufa red knot (*Calidris canutus rufa*) as threatened. The rule will become effective January 12, 2015. A record of the federally listed plant, pondberry (*Lindera melissifolia*) was detected in 2004 but was not confirmed during the 2005 growing season. Of these species only the piping plover and loggerhead turtle have had critical habitat designated by the Service in the State of North Carolina.

The closest critical habitat designated for piping plover in relation to MCB Camp Lejeune was identified at New Topsail Inlet, just south of the installation. No critical habitat for the piping plover has been designated on MCB Camp Lejeune. A final rule designating areas in the terrestrial environment as critical habitat for the Northwest Atlantic Ocean Distinct Population Segment of the loggerhead sea turtle was published in the Federal Register on July 10, 2014 and became effective on August 11, 2014. Critical habitat was designated for the loggerhead sea turtle both north (Bear Island/Hammocks Beach State Park) and south (Topsail Island) of the installation. No terrestrial critical habitat for loggerhead turtles was designated on MCB Camp Lejeune.

MCB Camp Lejeune believes that the INMRP provides the sufficient conservation benefits to preclude the necessity to designate critical habitat on the installation for any species currently known to occur there. We concur with MCB Camp Lejeune's determination that the requirements for precluding the designation of critical habitat, as provided for under the National Defense Authorization Act of 2004 have been met. This determination must be revisited if: (1) new information reveals impacts of this identified action that may affect listed species in a manner not previously considered; (2) this action is subsequently modified in a manner that was not considered in this review; or, (3) a new species is listed that may be affected by the identified action.

The following comments are provided to support the Draft INRMP and BA in addressing the effects analysis to be conducted through section 7 consultation. High-use training areas were identified in the 2007 INRMP and graphically presented in Figure 6 of that document. As discussed in the 2007 INRMP, RCW clusters that form in high-use training areas would not be marked and would be subject to incidental take specified for military training activities. It would be helpful to verify that the locations and distribution of the high-use training areas have not changed. A map showing MCB Camp Lejeune's high-priority training areas in the 2015 INRMP would also be helpful.

Reestablishing longleaf pine, partition sizes, and GQFH objective

The RCW management plan prescribes conversion of offsite loblolly pine stands back to native longleaf pine, contingent upon a number of relevant factors. No regeneration of offsite loblolly pine is planned at longleaf sites (Appendix 6, line 199). Since most of MCB Camp Lejeune's forest is loblolly pine (Appendix 6, line 201), the conversion back to longleaf could be a substantial task – although no further data are provided in the management plan on the acres or extent of loblolly pine in RCW partitions. Figure 4 of Appendix 6 depicting longleaf pine stands and longleaf pine sites with offsite pine clearly indicates there is a substantial coverage and restoration challenge. MCB

Camp Lejeune recognized a variety of factors to consider when establishing future recruitment clusters and their partition sizes (Appendix 6, lines 216 – 224) where the maximum partition area is stated to be up to 200 acres. Given the INRMP's objective to establish and sustain 120 acres of good quality foraging habitat (GQFH), additional consideration is required to recognize that loblolly pine partitions greater than 200 acres may be needed to establish or sustain 120 acres of GQFH during the conversion process. Also, MCB Camp Lejeune should assess and evaluate the age-class structure of loblolly pine in stands and partitions. Loblolly is not as long-lived as longleaf. Uncertainty exists for the age at which a loblolly stand with prevailing even-age attributes will decline due to tree mortality and natural senescence to a state when suitable foraging habitat no longer is available. The interaction or extent of loblolly in partitions, the anticipated age of loblolly senescence, and the partition area will affect the ability to establish and sustain 120 acres of GQFH.

A loblolly pine partition with a theoretical even distribution of all age-classes, up to 120 years old, would require 240 acres to sustain 120 acres of 60+ year old pine for GQFH during conversion to longleaf. If the risk of loblolly senescence is unacceptable in stands greater than 100 years old, then the same sort of partition would require 300 acres. Of course, the nature of loblolly pine stands and partitions will virtually never consist of all age-classes. The actual age-class distribution of loblolly pine and the age of anticipated senescence should be an evaluation factor. If dominant loblolly pine stands in a partition are 60 – 80 years old, for example, then the future period for converting to longleaf without a high risk of loblolly senescence may be only 40 – 60 years – assuming senescence would begin at ~120 years of age.

The ability to control the partition area for existing RCW clusters will be extremely limited. MCB Camp Lejeune intends to retain 120 acres of GQFH in occupied partitions during the longleaf pine restoration process (Appendix 6, lines 251 – 257). This is a good objective, but it may not be possible or desirable depending on partition area, acres of loblolly pine in a partition, loblolly pine age-classes, and anticipated loblolly pine age at senescence. Certain partitions with loblolly pine may require conversion to longleaf without sustaining 120 acres of GQFH at the partition-level to avoid a future risk of a greater reduction in partition foraging habitat due to natural stand senescence and decline. In such cases, the applicable objective would be to minimally sustain habitat at the managed stability standard (MSS) while restoring habitat and moving toward GQFH.

Longleaf pine regeneration with patch clearcuts

Management options for regenerating longleaf pine are stated to include patch clearcuts (Appendix 6, lines 294 – 317). MCB Camp Lejeune also states that all silvicultural management methods will be consistent with those in the RCW Recovery Plan (Appendix 6, line 434). However, silvicultural guidelines for managing habitat as outlined in the Recovery Plan do not include patch clearcuts. Recovery Plan guidelines are limited to modified even-aged methods (two-age) and uneven-aged methods using single-tree selection or group selection. And when group selection is employed, the size of regenerated patches is described as less than two acres.

No empirical definition exists in the literature or by silvicultural practice to distinguish when the area or size of a group selection harvest becomes a patch clearcut. However, the overall trend in practice and recommendations indicates group selection as applied to longleaf typically is up to two

acres.^a Patch harvests greater than two acres for longleaf regeneration as proposed in the INRMP would appear to be appropriately considered as a patch clearcut and not a form of group selection. This is not consistent with Recovery Plan guidelines for foraging habitat management.

The Recovery Plan strategy using uneven-aged methods is to sustain stand-level and landscape-level habitat for foraging and cavity trees. The maximum size of group selection harvests in the 2003 Recovery Plan continues to reflect prevalent recommendations today. Ecologically, this is considered compatible with RCWs because the patch size up to two acres, although perhaps greater than that with single-tree selection, should be sufficiently small so as not to disrupt RCW foraging habitat use and selection within the stand or partition under such treatments. Available data on RCW foraging habitat resource use and selection in uneven-aged conditions are limited and this is a conservative strategy until more information is available.

Small patch clearcuts for loblolly pine

Small patch clearcuts up to five acres also are listed as an option for regenerating loblolly pine in partitions where loblolly will not be converted to longleaf (Appendix 6, lines 318 - 333). The same concerns described for patch clearcuts for longleaf apply here for loblolly in RCW partitions. The Recovery Plan silvicultural guidelines for modified even-aged (two- aged) management and uneven-aged management apply to loblolly as well as longleaf. The seedtree option (Appendix 6, lines 324 – 326) as described would more accurately be classified as a modified or irregular shelterwood due to the residual stocking of retained loblolly.

Loblolly pine 100-year rotation and regeneration management

Areas slated for loblolly pine management for RCWs are areas that “do not typically support longleaf, but can support loblolly” (Appendix 6, lines 487 – 489). Are these loblolly sites identified in the ecological classification system? Loblolly sites and stands are slated for regeneration on a minimum 100-year rotation (Appendix 6, lines 318 – 320). Increasing the rotation interval to 120 or more years will reduce the partition area required to sustain 120 or more acres of GQFH. This could be important, particularly for existing RCW partitions with loblolly pine, to enhance management flexibility and sustain 120 acres of GQFH in affected partitions. The previous comment on small patch clearcuts also is applicable here, relative to regeneration methods.

Prescribed fire and wildfire and incidental take

The RCW management plan includes good provisions to rake fuels from the base of cavity trees to reduce and avoid cavity tree fire damage. However, no data are provided on the extent prescribed or wildfire has destroyed cavity trees in the past, as a predictor of future effects. MCBCCL should possess monitoring data to assess unavoidable fire impacts. These data should be evaluated also for the purposes of authorized take incidental to prescribed fire and wildfire control in the BiOp.

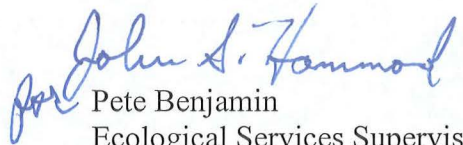
^a Brockway, D.G. K.W. Outcalt, and W.D. Boyer. 2006. Longleaf pine regeneration ecology and methods. Pp. 95 – 134. In S. Jose, E.J. Jokela, and D.L. Miller. Eds. The longleaf pine ecosystem: ecology, silviculture, and restoration. Springer. Guldin, J.M. 2006. Uneven-aged silviculture of longleaf pine. Pp. 217 – 241. In S. Jose, E.J. Jokela, and D.L. Miller. Eds. The longleaf pine ecosystem: ecology, silviculture, and restoration. Springer.

Installation RCW partitions

The partition management focus by MCB Camp Lejeune is very good. The installation map illustrating the location of current and future partitions (Appendix 6, Figure 5) also demonstrates consideration and allocations of habitat to attain the objective of 173 active clusters.

Thank you for the opportunity to review and comment on the MCB Camp Lejeune draft INRMP and the associated RCW management plan and biological assessment. The Service recognizes the substantial roles MCB Camp Lejeune performs both in providing the environment for military training essential for the combat readiness of expeditionary forces, and as a steward of high-quality natural resources for the benefit of Marines, Sailors and the American people. If you have any questions regarding this matter, please contact Mr. John Hammond at (919) 856-4520 (ext. 28). Thank you for your continued cooperation with our agency.

Sincerely,


Pete Benjamin
Ecological Services Supervisor

cc: Will McDearman, USFWS
Jerry Ziewitz, USFWS

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United States Department of the Interior

FISH AND WILDLIFE SERVICE

Raleigh ES Field Office

Post Office Box 33726

Raleigh, North Carolina 27636-3726

April 8, 2015

Col. Brad Vickers
Assistant Chief of Staff, Base Operations
Marine Corps Installations East - Marine Corps Base
PSC 20005
Camp Lejeune, North Carolina 28542-0005

Capt. Jason Faunce
Assistant Chief of Staff, Facilities
Marine Corps Installations East - Marine Corps Base
PSC 20005
Camp Lejeune, North Carolina 28542-0005

Dear Sirs:

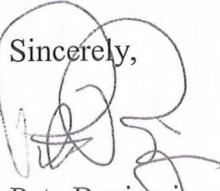
This letter acknowledges the U.S. Fish and Wildlife Service's (Service) March 3, 2015, receipt of your February 27, 2015, letter requesting initiation of formal section 7 consultation under the Endangered Species Act. The consultation concerns the possible effects of implementing the 2015-2020 Integrated Natural Resource Management Plan (INRMP) on Marine Corps Base, Camp Lejeune in Onslow County on federally listed species, including the red-cockaded woodpecker (*Picoides borealis*; RCW)(Endangered), green turtle (*Chelonia mydas*)(Threatened) loggerhead turtle (*Caretta caretta*)(Threatened) rough-leaved loosestrife (*Lysimachia asperulaefolia*) (Endangered), seabeach amaranth (*Amaranthus pumilus*)(Threatened), piping plover (*Charadrius melodus*)(Threatened) and rufa subspecies of the red knot (*Calidris canutus rufa*; red knot)(Threatened).

All information required of you to initiate consultation is contained in the pre-final draft INRMP or is otherwise accessible for our consideration and reference. We have assigned log number 2015-I-0251 to this consultation. Please refer to that number in future correspondence on this consultation. Section 7 allows the Service up to 90 calendar days to conclude formal consultation with your agency and an additional 45 calendar days to prepare our biological opinion (unless we mutually agree to an extension). Therefore, we expect to provide you with our biological opinion no later than July 16, 2015.

As requested in your February 27, 2015 letter, we also acknowledge receipt of the Pre-final 2015-2020 INRMP. The Service has reviewed the previous draft INRMP and provided comments in our letter dated December 12, 2014. At this time we expect to meet the delivery date set for our agency signature, which is May 1, 2015.

The Service recognizes the substantial roles Marine Corps Base Camp Lejeune performs both in providing the environment for military training essential for the combat readiness of expeditionary forces, and as a steward of high-quality natural resources for the benefit of Marines, Sailors and the American people.

If you have any questions regarding this matter, please contact Mr. John Hammond at (919) 856-4520 (ext. 28). Thank you for your continued cooperation with our agency.

Sincerely,


Pete Benjamin
Ecological Services Supervisor

cc: Jeffrey Herod, U.S. Fish and Wildlife Service



UNITED STATES MARINE CORPS
MARINE CORPS INSTALLATIONS EAST-MARINE CORPS BASE
PSC BOX 20005
CAMP LEJEUNE NC 28542-0005

5090
BEMD
24 MAR 2014

Mr. David Bernhart
Director, Protected Resources Division
National Oceanic Atmospheric Administration
National Marine Fisheries, Southeast Region
263 13th Avenue South
St. Petersburg, Florida 33701-5505

Dear Mr. Bernhart:

The Marine Corps Installations East-Marine Corps Base, Camp Lejeune (MCIEAST-MCB CAMLEJ) proposes to revise its 2007 through 2011 Integrated Natural Resources Management Plan. A stakeholder kickoff meeting will be held April 30, 2014, with representatives invited from the following cooperating agencies: U.S. Fish and Wildlife Service, North Carolina Wildlife Resources Commission, and the North Carolina Division of Marine Fisheries.

MCIEAST-MCB CAMLEJ has a long history of successful natural resource stewardship and values its effective relationship with your agency and your support of our efforts to integrate natural resources management activities with military mission requirements and training land use unique to Camp Lejeune.

This kickoff meeting is an important milestone in our effort to ensure military training and readiness requirements are being accomplished within the constraints of our limited training lands. With your shared support, we can meet the intent of the Sikes Act Improvement Act as it relates to military training and our obligations under the Endangered Species Act.

We respectfully request that you confirm your attendance, and any other designee you wish to attend, within 15 days of receipt.

The point of contact for this project is Mr. Martin Korenek, Environmental Conservation Branch, Environmental Management Division, G-F, at (910)451-9384 or email martin.korenek@usmc.mil.

Sincerely,

R. F. CASTELLVI
Brigadier General, U. S. Marine Corps
Commanding General
Marine Corps Installations East-
Marine Corps Base, Camp Lejeune

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UNITED STATES MARINE CORPS
MARINE CORPS INSTALLATIONS EAST-MARINE CORPS BASE
PSC BOX 20005
CAMP LEJEUNE NC 28542-0005

5090
BEMD

NOV 13 2014

Mr. Robert Hoffman
Protected Resources Division
National Oceanic Atmospheric Administration
National Marine Fisheries, Southeast Region
263 13th Avenue South
St. Petersburg, FL 33701-5505

Dear Mr. Hoffman:

Enclosed, please find a copy of Camp Lejeune's Draft 2015-2020 Integrated Natural Resource Management Plan (INRMP) and Draft Biological Assessment (BA) for your review. We are providing these documents to solicit your comments in accordance with the Sikes Act Improvement Act (16 U.S.C. 670(a), *et seq.*). We respectfully request you provide a review of this document.

Upon our receipt of your comments, we will begin the preparation of our Pre-Final INRMP. Additionally, an Environmental Assessment (EA) will be prepared for approval by the Commanding General, Marine Corps Installations East-Marine Corps Base.

Cooperative development of the Draft INRMP began on April 30, 2014 at a stakeholder kickoff meeting including representatives from the following cooperating agencies, and bureaus: United States Fish and Wildlife Service (USFWS), National Marine Fisheries Service (NMFS), North Carolina Wildlife Resource Commission (NCWRC), North Carolina Division of Marine Fisheries (NCDMF), and North Carolina Department of Environment and Natural Resources (NCDENR).

All stakeholder comments on the Draft INRMP will be considered in developing the Pre-Final INRMP and Pre-Final BA, both of which will be provided to you for additional review. A Draft EA will also be published or public comment at that time.


As detailed in Chapter 4, this INRMP is intended to satisfy USFWS and NMFS criteria for exempting Camp Lejeune from any possible critical habitat designation, including open water habitat for those federally listed and at risk species occurring on or in near-shore waters of MCB Camp Lejeune.


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We would appreciate your sending a written acknowledgement of receipt for our records. We request you submit your comments, if any, by December 12, 2014. If you intend to submit comments, but are unable to meet this date, please feel free to suggest an alternate review timeline for our consideration.

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BRAD VICKERS
Colonel, US Marine Corps
AC/S, G-3/5
By direction


JASON FAUNCE
Captain, US Navy
AC/S, G-F
By direction

Enclosures: 1. Integrated Natural Resources Management Plan
Draft Report November 2014
2. Biological Assessment (Draft) Marine Corps
Base Camp Lejeune 2015-2020 Integrated Natural
Resources Management Plan (INRMP) November 7,
2014



UNITED STATES MARINE CORPS
MARINE CORPS INSTALLATIONS EAST-MARINE CORPS BASE
PSC BOX 20005
CAMP LEJEUNE NC 28542-0005

5090
BEMD
24 MAR 2014

Dr. Louis Daniel
Director, Division of Marine Fisheries
North Carolina Department of Environment and Natural Resources
PO Box 769
Morehead City, NC 28557

Dear Dr. Daniel:

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Sincerely,

A handwritten signature in black ink, appearing to read "R. F. Castellvi".

R. F. CASTELLVI
Brigadier General, U. S. Marine Corps
Commanding General
Marine Corps Installations East-
Marine Corps Base, Camp Lejeune

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UNITED STATES MARINE CORPS
MARINE CORPS INSTALLATIONS EAST-MARINE CORPS BASE
PSC BOX 20005
CAMP LEJEUNE NC 28542-0005

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NOV 13 2014

Dr. Louis Daniel
Director, Division of Marine Fisheries
North Carolina Department of Environment and Natural Resources
PO Box 769
Morehead City, NC 28557

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Upon our receipt of your comments, we will begin the preparation of our Pre-Final INRMP. Additionally, an Environmental Assessment (EA) will be prepared for approval by the Commanding General, Marine Corps Installations East-Marine Corps Base.

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All stakeholder comments on the Draft INRMP will be considered in developing the Pre-Final INRMP, which will be provided to you for additional review. A Draft EA will also be published for public comment at that time.

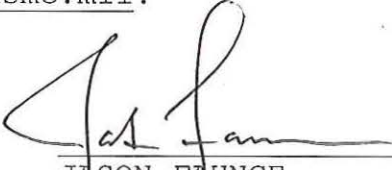
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BRAD VICKERS
Colonel, US Marine Corps
AC/S, G-3/5
By direction


JASON FAUNCE
Captain, US Navy
AC/S, G-F
By direction

Enclosure: 1. Integrated Natural Resources Management Plan
Draft Report November 2014



North Carolina Department of Environment and Natural Resources

Pat McCrory
Governor

Donald R. van der Vaart
Secretary

Jan. 21, 2015

Col. Brad Vickers, Assistant Chief of Staff, Base Operations
Capt. Jason Faunce, Assistant Chief of Staff, Facilities
Marine Corps Installations East – Marine Corps Base
PSC 20005
Camp Lejeune, North Carolina 28542-0005

Dear Sirs:

Please accept the following comments on the November 2014 Draft Integrated Natural Resource Management Plan (INMRP) from the N.C. Division of Marine Fisheries under authority of N.C.G.S. 113-131.

The Integrated Natural Resources Management Plan (INRMP) for Marine Corps Base Camp Lejeune focuses almost exclusively on freshwater and terrestrial resources of the base. While the base does not own public trust bottom, activities on the surrounding land can greatly affect the estuarine and marine habitat and fish resources. The limited information on estuarine and marine resources is included in Section 4.8, Coastal Area Management. More information on the estuarine and marine habitats within the management plan area should be included in this section or in Section 2.3.4, Water Resources and Wetlands. Information on the value of coastal fisheries should be included, as it indicates the economic importance of managing sustainable estuarine and marine resources and their habitats. Finally, information on how military activities potentially affect estuarine and marine resources and fishing activity should be included.

The plan incorrectly states that Wildlife Resources Commission has the authority to manage all fish and game. The Division of Marine Fisheries has authority to protect and conserve marine and estuarine resources and public trust resources (G.S. 143B-10). Marine and estuarine resources are defined as “All fish, except inland game fish, found in the Atlantic Ocean and in coastal fishing waters; all fisheries based upon such fish; all uncultivated or undomesticated plant and animal life, other than wildlife resources, inhabiting or dependent upon coastal fishing waters; and the entire ecology supporting such fish, fisheries, and plant and animal life.” [GS 113-129(11)]. Public trust resources are land and water areas, public and private, which are subject to public trust rights as defined in GS1-45.1: “those rights held in trust by the State for the use and benefit of the people of the State in common. They include, but are not limited to, the right to navigate, swim, hunt, fish, and enjoy all recreational activities in the water-courses of the State and the right to freely use and enjoy the State’s ocean and estuarine beaches and public access to the beaches.”

The Fisheries Reform Act of 1997 (G.S. 143B-279.8) establishes a process for preparation of coastal fisheries and habitat management plans and for North Carolina, and states “the goal of the plans shall be to ensure the long-term viability of the State’s commercially and recreationally significant species or fisheries.” Through these plans, rules are developed that manage fisheries and protect critical fish habitat. Of particular relevance to this plan is the Oyster and Clam Fishery Management Plans (<http://portal.ncdenr.org/web/mf/fmps-under-development>) and the Coastal Habitat Protection Plan (<http://portal.ncdenr.org/web/mf/59>). These plans include information on and maps of other habitats located in New River and its tributaries, including oyster reefs,

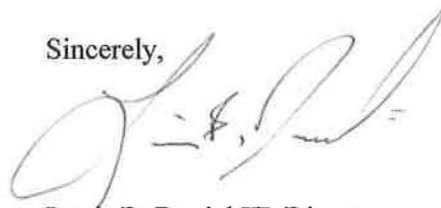
submerged aquatic vegetation, and ocean hard bottom off of Onslow Beach, as well as the location of shellfish management areas and polluted shellfish boundaries.

The DMF has designated important estuarine nursery locations that consistently support and produce populations of juvenile shrimp, crab, and finfishes. Nursery areas are defined in rule 15 NCAC 03I .0101(4)(f)0 as: "areas in which for reasons such as food, cover, bottom type, salinity, temperature and other factors, young finfish and crustaceans spend the major portion of their initial growing season." Much of the New River within Camp Lejeune is currently defined as Primary, Secondary, or Special Secondary Nursery Areas. Continued protection of water quality, and consideration of nursery areas in the New River is vital to locally maintain many economically valuable commercial and recreational fisheries including: southern flounder, red drum, spotted sea trout, blue crab, shrimp, hard clam and oyster. Anadromous fish spawning areas were designated in the upper reaches of the New River. Protection of Marine Fisheries Commission designated areas is a priority for the Division of Marine Fisheries and should be mentioned in this resource management plan. Maps of these specially designated areas are also on Division's website in the bottom right corner (<http://portal.ncdenr.org/web/mf/>). The division has completed a habitat assessment in the White Oak river basin, including the New River tributary, which identifies a subset of strategic habitat areas that collectively represent a diversity of habitats, are in excellent ecological condition, and support critical fish functions. The final report was approved by the Marine Fisheries Commission in November 2014. Recognition of the need to protect and enhance these strategic habitat areas should be included in the plan. An electronic version of the report will be sent to Marty Korenek.

Support of the Division of Marine Fisheries Shellfish Rehabilitation Program through the Marine Corps providing cultch stockpile and loading locations is greatly appreciated and exceptionally valuable to the resource. This cooperation has allowed the division to plant over 63,000 bushels of cultch material from the Mile Hammock Bay site over the last five years, providing significant habitat and economic value to the area. The division recommends that Action 4.8-01 in Section 4.8.3 be modified to: *Support oyster management in the NRE by providing NCDMF access to store oyster shell (at Mile Hammock Bay) used for oyster cultch planting in sites at selected locations in the NRE, and allowing public access to existing DMF Shellfish Management Areas for shellfishing and fishing continue to be allowed by the military base.* Also, DMF recommends modifying Action 4.8-02 to: *Implement habitat-friendly shoreline stabilization projects (living shorelines) along the New River.*

Thank you for consideration of these comments and recommendations.

Sincerely,



Louis B. Daniel III, Director
Division of Marine Fisheries, NCDENR

Cc: M. Korenek
S. Taylor
J. Facendola
A. Deaton



UNITED STATES MARINE CORPS
MARINE CORPS INSTALLATIONS EAST-MARINE CORPS BASE
PSC BOX 20005
CAMP LEJEUNE NC 28542-0005

5090
BEMD
24 MAR 2014

Mr. Gordon S. Myers
Executive Director
North Carolina Wildlife Resources Commission
1751 Varsity Drive
Raleigh, NC 27606

Dear Mr. Myers:

The Marine Corps Installations East-Marine Corps Base, Camp Lejeune (MCIEAST-MCB CAMLEJ) proposes to revise its 2007 through 2011 Integrated Natural Resources Management Plan. A stakeholder kickoff meeting will be held April 30, 2014, with representatives invited from the following cooperating agencies: U.S. Fish and Wildlife Service, National Marine Fisheries Service, and the North Carolina Division of Marine Fisheries.

MCIEAST-MCB CAMLEJ has a long history of successful natural resource stewardship and values its effective relationship with your agency and your support of our efforts to integrate natural resources management activities with military mission requirements and training land use unique to MCB CAMLEJ.

This kickoff meeting is an important milestone in our effort to ensure military training and readiness requirements are being accomplished within the constraints of our limited training lands. With your shared support, we can meet the intent of the Sikes Act Improvement Act as it relates to military training and our obligations under the Endangered Species Act.

We respectfully request that you confirm your attendance, and any other designee you wish to attend, within 15 days of receipt.

The point of contact for this project is Mr. Martin Korenek, Environmental Conservation Branch, Environmental Management Division, G-F, at (910)451-9384 or email martin.korenek@usmc.mil.

Sincerely,

A handwritten signature in black ink, appearing to read "R. F. Castellvi".

R. F. CASTELLVI
Brigadier General, U. S. Marine Corps
Commanding General
Marine Corps Installations East-
Marine Corps Base, Camp Lejeune

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UNITED STATES MARINE CORPS
MARINE CORPS INSTALLATIONS EAST-MARINE CORPS BASE
PSC BOX 20005
CAMP LEJEUNE NC 28542-0005

5090
BEMD

NOV 13 2014

Mr. Gordon S. Myers
Executive Director
North Carolina Wildlife Resources Commission
1751 Varsity Drive
Raleigh, NC 27606

Dear Mr. Myers:

Enclosed, please find a copy of Camp Lejeune's Draft 2015-2020 Integrated Natural Resource Management Plan (INRMP) for your review. We are providing these documents to solicit your comments in accordance with the Sikes Act Improvement Act (16 U.S.C. 670(a), *et seq.*).

Upon our receipt of your comments, we will begin the preparation of our Pre-Final INRMP. Additionally, an Environmental Assessment (EA) will be prepared for approval by the Commanding General, Marine Corps Installations East-Marine Corps Base.

Cooperative development of the Draft INRMP began on April 30, 2014 at a stakeholder kickoff meeting including representatives from the following cooperating agencies, and bureaus: United States Fish and Wildlife Service (USFWS), National Marine Fisheries Service (NMFS), North Carolina Wildlife Resource Commission (NCWRC), North Carolina Division of Marine Fisheries (NCDMF), and North Carolina Department of Environment and Natural Resources (NCDENR).


All stakeholder comments on the Draft INRMP will be considered in developing the Pre-Final INRMP, which will be provided to you for additional review. A Draft EA will also be published for public comment at that time.


As detailed in Chapter 4, this INRMP is intended to satisfy USFWS and NMFS criteria for exempting Camp Lejeune from any possible critical habitat designation, including open water habitat for those federally listed and at risk species occurring on or in near-shore waters of MCB Camp Lejeune.

Camp Lejeune has a long history of successful natural resource stewardship and values its effective relationship with your staff. We developed this draft as a means to aggressively recover Camp Lejeune's RCW population and simultaneously reduce Camp Lejeune's military restrictions. This is an important milestone in our collective on-going effort to integrate natural resources management with the primary military mission of the United States Marine Corps.

We would appreciate your sending a written acknowledgement of receipt for our records. We request you submit your comments, if any, by December 12, 2014. If you intend to submit comments, but are unable to meet this date, please feel free to suggest an alternate review timeline for our consideration.

Our point of contact is Mr. Martin Korenek, Environmental Conservation Branch, Environmental Management Division, G-F at (910) 451-9384 or email martin.korenek@usmc.mil.


BRAD VICKERS
Colonel, US Marine Corps
AC/S, G-3/5
By direction


JASON FAUNCE
Captain, US Navy
AC/S, G-F
By direction

Enclosure: 1. Integrated Natural Resources Management Plan
Draft Report November 2014



⊠ North Carolina Wildlife Resources Commission ⊠

Gordon Myers, Executive Director

23 January 2015

Mr. Martin Korenek
Natural Resources Manager
Environmental Conservation Branch
USMC Camp Lejeune

Dear Mr. Korenek:

Staff with the North Carolina Wildlife Resources Commission (NCWRC) received the Draft 2015-2020 Integrated Natural Resource Management Plan (INRMP) and have reviewed the plan to provide comments with regard to the protection and conservation of terrestrial and aquatic wildlife resources found within the property of Camp Lejeune.

We acknowledge and appreciate the relationship between Camp Lejeune and our agency. This relationship exists not just during the review of INRMPs, but throughout the INRMP cycle. This communication provides distribution of data for several state and federal protected species, allowing the best conservation measures practicable to be obtained. Camp Lejeune provides important habitat opportunities for numerous species such as red-cockaded woodpecker (*Picoides borealis*), Bachman's sparrow (*Peucaea aestivalis*), Henslow's sparrow (*Ammodramus henslowii*), American oystercatcher (*Haematopus palliatus*), Wilson's plover (*Charadrius wilsonia*), piping plover (*Charadrius melodus*), eastern diamond-backed rattlesnake (*Crotalus adamanteus*), Carolina gopher frog (*Lithobates capito*), green sea turtle (*Chelonia mydas*), loggerhead sea turtle (*Caretta caretta*) and numerous more. Therefore, it is without hesitation that we support the continued management of these species for their conservation.

Our agency has compiled specific comments for the INRMP from several staff and will submit them separate from this letter. This letter will be in support of the plan, but will have some specific comments related to certain species. It is our intention that this letter will be sent expeditiously.

Once again, we appreciate the opportunity to review and provide comment on the 2015-2020 INRMP. If there are specific comments or questions, please do not hesitate to call or email at (252) 948-3916 or maria.dunn@ncwildlife.org

Sincerely,

Maria T. Dunn
Coastal Coordinator

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☒ North Carolina Wildlife Resources Commission ☒

Gordon Myers, Executive Director

30 January 2015

Mr. Martin Korenek
Natural Resources Manager
Environmental Conservation Branch
USMC Camp Lejeune

Dear Mr. Korenek:

Staff with the North Carolina Wildlife Resources Commission (NCWRC) reviewed the Draft 2015-2020 Integrated Natural Resource Management Plan (INRMP) and have compiled the following comments and recommendations regarding the document.

Page 1-3, lines 332-336

Recent activity within the buffer and surrounding lands of the G-10 impact area, including establishment of new ranges, do not conform to this statement. The construction of these ranges, and other land clearing activities in the area, pose a significant threat to conservation of several reptiles and amphibians on the base including: Carolina Gopher Frog, Ornate Chorus Frog, Eastern Diamondback Rattlesnake, and Southern Hognose Snake. All of these species require mature, quality longleaf pine uplands and the area in and around the G-10 represents the core habitat for these species. Three of these species (all but the Ornate Chorus Frog) have also been petitioned for federal listing protection. In addition to meeting the requirements of DoDI 4715.03, Camp Lejeune's efforts to deter development/alteration of any kind in these sensitive areas would go a long way towards keeping these species off of any federal list.

Page 1-6, lines 428-430; Page 4-76, lines 2362-2400

Camp Lejeune intends to meet Red-cockaded Woodpecker recovery goals partially through the RASP program. However, this program does not meet the needs of any of the other rare and sensitive species utilizing these same habitats on base, including Carolina Gopher Frog, Ornate Chorus Frog, Eastern Diamondback Rattlesnake, Southern Hognose Snake, Mabee's Salamander, Southern Chorus Frog, Mimic Glass Lizard, and Eastern Chicken Turtle. Reptiles and amphibians are not so easily moved as birds. Managers on base need to realize that losses of habitat for Red-cockaded Woodpeckers on base also have significant impacts to a wide range of rare and sensitive reptiles and amphibians.

Page 1-7, lines 459-466

Restoration efforts for longleaf pine on GSRA are proposed to be halted. Site indices would readily provide information to the Marine Corps about which areas would be most suitable for longleaf planting.

Page 1-7, lines 476-492 Page 1-10, lines 569-570

To ensure conservation of rare amphibians on base, attempts could be made to minimize or eliminate the possibility of any of the corridors/areas planned for the CAAAC to navigate in or near ponds and wetlands across the longleaf pine landscape. These wetlands, especially including those which are temporary or ephemeral in nature, are extremely important to the long-term conservation of rare amphibian species, such as the Carolina Gopher Frog. Vehicle traffic through or directly adjacent to these ponds lowers their value to amphibians, by reducing reproductive capabilities and output; overall recruitment declines.

Pages 1-8 and 1-9, lines 496-516

Aerial spraying of herbicides for vegetation control in the area of the G-10 impact area could be severely debilitating to conservation efforts for rare amphibians on Camp Lejeune, including Carolina Gopher Frog, Ornate Chorus Frog, Southern Chorus Frog, and Mabee's Salamander through aerial drift of the chemicals, deposition into surface waters, and bioaccumulation in food resources. Numerous herbicides are known to have deleterious effects on development of eggs and larvae, as well as on sexual maturation in adults. Consideration should be given to prevailing wind speeds and direction when scheduling spray applications. When possible, avoid aerial spraying in areas that contain amphibian breeding habitats (streams, ponds, wetlands) especially during breeding seasons. During other times of the year minimize impacts from aerial spraying by avoiding or reducing applications when weather conditions are likely to result in chemical drift. The use of chemicals that are less likely to harm aquatic wildlife such as those labeled specifically as an aquatic herbicide or surfactant-free glyphosate products (for example, Agri-Dex with 53.8% glyphosate) is preferred.

Page 1-18, lines 799-801

Hofmann Forest would seem a highly logical area for Camp Lejeune managers to consider as high priority for acquisition or easement, to allow for future training needs and expansion.

Page 2-42, line 1327

A more appropriate term would be "Ephemeral Pool" or "Temporary Pool." Vernal pools are those temporary pools which fill in the spring. However, many of the pools on Camp Lejeune actually fill in the fall or winter, making them autumnal pools. To cover all wetland types, one of the other terms above would be more accurate.

Page 3-57, lines 1799-1802

Piping Plover (Threatened), American Oystercatcher (2014 Watch List species), Wilson's Plover (2014 Watch List species), and Least Tern often nest on Onslow Beach. Potential nesting areas should be delineated with posts and string/rope in late March and remain posted through mid-August or until the last chick fledges. Marked nesting areas should be avoided by amphibious/land operations and recreationists. The Red Knot (proposed Threatened 2014) likely uses Onslow Beach during fall and spring migrations as a stop-over site, and during winter as a foraging and roosting site. All of these species are of conservation concern to NCWRC, and all are protected by the Migratory Bird Treaty Act (MBTA).

Page 4-64, line 2047

The INRMP includes those species which have been "Proposed" to be listed, such as Red Knot. Several reptiles and amphibians may need to be added to this listing with the designation "P," since they have been petitioned for federal listing (this seems to be the same as "proposed"). Those reptile and amphibian species petitioned for federal listing that occur on Camp Lejeune include: Chamberlain's Dwarf Salamander, Carolina Gopher Frog, Spotted Turtle, Southern Hognose Snake, and Eastern Diamondback Rattlesnake.

Page 4-69 Figure 4-2

Great Red-cockaded Woodpecker recovery work.

Page 4-72, lines 2210-2211; Page 4-73, lines 2275-2276; Page 4-77, lines 2409-2410

Goals for Red-cockaded Woodpecker management in this INRMP are to burn as much of the base forested areas as possible on a three-year frequency, and to increase the proportion of fires that occur in the growing season. NCWRC staff supports this activity, but requests bloom periods and the presence of pollinators be considered when applying prescribed burns during growing seasons. This may minimize negative impacts on arthropods and other invertebrates essential as forage.

Page 4-78, lines 2438-2440

Although no Leatherback or Kemp's Ridley's nests have been documented on Lejeune, there is potential. Leatherbacks often start nesting early, so although surveying is not started until March or April, it may be of benefit to have avian surveyors be aware of early turtle nesting.

Page 4-79, lines 2459-2460

Tracks should be counted after hatchlings emerge. In many cases tracks will be gone if they are counted after 80 days.

Pages 4-79, lines 2467-2469

Sea turtle nesting season occurs from May 1 to November 15. Further protection for sea turtles, Piping Plovers, and Red Knots could occur if driving near the inlet was also restricted during this period or throughout the year.

Page 4-83, lines 2575-2577

Survey frequency should be noted.

Page 4-83, lines 2579-2580

It is stated these plants are recorded. If not already, perhaps they can be photo-referenced.

Page 4-86, lines 2603-2609

These statements sound as if Piping Plovers are rarely found on Onslow Beach when they are frequently found during most months of the year. We recommend rather than protecting only high quality habitat all suitable habitat be protected.

Page 4-86, lines 2611-2617

Protocol for shorebird surveys should be provided. A figure to show transects walked or areas surveyed with center point would be beneficial. Clarification of data collection should be noted including the definition of bi-weekly (twice per week or once every two weeks), and details of data format, dissemination, and data request protocol.

People who survey should use binoculars and spotting scopes so species identification is optimal. Spotting scopes and digital cameras with zoom lens allow proper identification and documentation of piping plovers including if they are banded.

Posting of potential nesting areas should be done in March. Shorebirds (including Piping Plovers and American Oystercatchers) arrive on potential nesting areas in mid- to late March and establish nesting territories by early to mid-April. Some oystercatchers complete their first nests by mid-April. Having potential nesting areas posted in March will let shorebirds select undisturbed nesting sites. If a site is disturbed when they arrive, they likely will move elsewhere or use a marginal portion of the site (closer to vegetation and therefore, predators).

Reference Figure 4-7 and point out the areas mentioned. The amphibious training, light operations, and recreation areas of the beach are low-likelihood nesting areas due to their narrow width. However, the New River and Browns Inlet areas are high-likelihood sites for Piping plovers, Red Knots, American Oystercatchers, Wilson's Plovers and Least Terns. Monitoring and protection in those areas could be increased.

Page 4-86, lines 2618-2625

The potential nesting habitat should be posted in March. Therefore, if Piping Plover nesting activity is recorded, the nest site should already be in a protected area. The nest site may need additional protection – more signs, an enclosure around the nest, predator management in the area, etc.

Page 4-86, line 2625

Refer to figure that shows each beach designation. E.g., Figure 4-7 with Amphibious Training Beach section in red, Light Operations in purple, and N1/Bt-3 Impact Area in ~pink. The beach driving area (yellow) should be used only by Camp Lejeune staff, as needed, from 1 April – 1 August. No dogs should be allowed from 1 April – 1 August, whether on leash or not. Pedestrians can walk seaward of posted areas, and boaters can anchor their boats along the shoreline, but also must stay seaward of posted areas. Recreational Activities area (Green) should be surveyed for shorebirds, but that area's use by birds may be sacrificed to recreation unless nesting occurs, at which time the nest(s) should be protected with posts, string, and signs.

Page 4-86, lines 2627-2628

We appreciate the acknowledgment of the need for ephemeral habitats for plovers.

Page 4-86, lines 2627-2629

Since protection of Piping Plovers and Seabeach Amaranth is of primary importance, posting of the area for their protection will, by coincidence, also protect Least Terns, Willets, Wilson's Plovers, and other species.

Page 4-86, lines 2630

The EA Training Area is not shown in Figure 4-7. If a new figure is needed, it should be inserted near line 618 and referenced in this paragraph as appropriate.

Page 4-87, lines 2637-2646.

For each Action, specific methods should be provided. For Action 4.1-29, specifically, how and in what form these reports are provided should be agreed-upon. These data should also be reported to USFWS.

Page 4-87, lines 2676-2679

Although North Carolina does not have as many Red Knots as Delaware, high numbers have been found on Onslow Beach in the winter provided the winter is not too severe. Although we agree Red Knots use the beaches during migration, some birds stay for several months of the year.

Page 4-87, lines 2682-2683

Piping Plover protection do benefit Red Knot, but Red Knot must feed undisturbed in the intertidal zone, especially in fall (Aug-Oct), winter (Dec, Jan, Feb), and spring (Apr-May). The intertidal zone is not protected from vehicle driving, pedestrians, dogs, boats, anglers; therefore, they are flushed or precluded from feeding sites. Spring roost sites are probably protected by posted nesting areas.

Page 4-87, line 2687

Red Knots also use oceanfront habitat regularly.

Page 4-89, lines 2696-2699

Provide specific methods that will be used to implement Actions. Methods should include how, where, when, and by whom actions will be implemented. A map of the areas that are used and likely to be used by Red Knot could be provided.

Page 4-91 Table 4-1

At this time only a few wintering Eastern Henslow's Sparrows are found on Holly Shelter Game Lands. We have found no nesting birds. Please contact NCWRC if staff from the Center for Conservation Biology can assist in surveys for Black Rails on Camp Lejeune in spring-summer 2015.

Pages 4-93 to 4-94

Camp Lejeune has done a great job with fire and longleaf ecosystem management.

Page 4-123, lines 3613-3633

Northern Long-Eared Bat is likely on Camp Lejeune. Since it appears this bat may be federally listed soon, surveys could be conducted.

Page 4-126, lines 3720-3721

Northern Bobwhite Quail would be a better example here since grouse are not found on Camp Lejeune.

Page 4-132, lines 3880-3883

Include a map that shows where these survey points are located.

Page 4-133, lines 3926-3931

It appears that more focal migratory bird species of concern use this habitat than any other. The same thing appears to be true with our Wildlife Action Plan priority species. Perhaps since so many species of concern use this habitat, more detail could be provided about how this habitat is being protected. Camp Lejeune has a unique opportunity to manage this habitat better than adjacent developed beaches.

Page 4-138, lines 4066-4067

Isolated wetlands are generally less protected than other wetlands, and because they are particularly important for several of NCWRC priority amphibians, more discussion of some extra or different measures of protection for these areas could be included. For example, since these wetlands tend to succeed relatively quickly if they get overgrown, a 50' buffer may not be the best measure; instead it's better to daylight the ponds. Timing of this work is also critical to local amphibian populations.

Page 4-158, 4.10.2

Include free-ranging cats and hogs as an invasive species that should not be present on DoD lands.

Appendix 17, Page 16, line 21

Incubation period should be 49-75+ days.

Appendix 17, Page 16, line 26

Age of maturity is around 30+ years.

http://www.sefsc.noaa.gov/turtles/PR_Snover_Rhodin_2008_Biology_of_Turtles.pdf.

Appendix 17, Page 17, line 20

Only seven loggerhead nests were laid in 2004 on Onslow Beach (NCWRC database).

Appendix 17, Page 17, line 30

Incubation period should be 49-75+ days.

In addition to the above, specific comments related to the INRMP document, we would like to add a few additional statements. There are few sea turtle data available from Browns Island, due to difficulty with access. It would be good if more regular aerial surveys could be conducted (twice per month) over Browns Island, to estimate turtle nest abundance. Concurrent aerial surveys of Onslow Beach with groundtruthing would develop an index of nest to non-nesting crawls on Browns Island as well as strengthen estimates on Browns Island. Aerial surveys for Red Knots and wading birds are also very beneficial, though the procedure to obtain access in restricted air space is uncertain. Clarification of this procedure would be appreciated.

Overall the NCWRC is pleased with the Draft INRMP and the efforts of Camp Lejeune to preserve important wildlife resources. Continued coordination with state and federal wildlife resources agencies throughout this INRMP period is encouraged and would be greatly appreciated. Please contact me at (252) 948-3916 or at maria.dunn@ncwildlife.org if there are any comments, questions, or if I or other NCWRC staff could be of further assistance.

Sincerely,

A handwritten signature in cursive script, appearing to read "Maria T. Dunn".

Maria T. Dunn
Coastal Permit Coordinator

2014 Draft INRMP Comment-Response Matrix

#	Agency	INRMP Section	Page or Figure	Line	Comment	Response
1	NOAA NMFS Southeast Regional Office				No comments received.	
2	USFWS Raleigh Field Office				We concur with MCB Camp Lejeune's determination that the requirements for precluding the designation of critical habitat, as provided for under the National Defense Authorization Act of 2004 have been met. This determination must be revisited if: (1) new information reveals impacts of this identified action that may affect listed species in a manner not previously considered; (2) this action is subsequently modified in a manner that was not considered in this review; or, (3) a new species is listed that may be affected by the identified action.	MCB Camp Lejeune will re-evaluate requirements for precluding the designation of critical habitat, as provided for under the National Defense Authorization Act of 2004 as required.
3	USFWS Raleigh Field Office	3.3.2 Threatened and Endangered Species 3.3.2.1 Red-cockaded Woodpecker 4.1.4.1 Red-cockaded Woodpecker/ 2014 RCW Management Plan	p. 3-55, p. 3-56, p. 4-72, p. 4-75	1728, 1750-1757, 2215-2216, 2315	As discussed in the 2007 INRMP, RCW clusters that form in high-use training areas would not be marked and would be subject to incidental take specified for military training activities. It would be helpful to verify that the locations and distribution of the high-use training areas have not changed. A map showing MCB Camp Lejeune's high-priority training areas in the 2015 INRMP would also be helpful.	High-use training areas will no longer be designated or mapped. MCB Camp Lejeune recognizes that many training areas are used more frequently than others, e.g. are "highly used". High-use training areas is no longer a unique designation that determines management actions. Instead, natural resources managers will coordinate with military planners to determine the best plan for RCW cluster marking based upon current training requirements in all training areas.
4	USFWS Raleigh Field Office	App 6	p. 8, p. 10, Fig. 4	199-201, and 259	No regeneration of offsite loblolly pine is planned at longleaf sites. Since most of MCB Camp Lejeune's forest is loblolly pine, the conversion back to longleaf could be a substantial task - although no further data are provided in the management plan on the acres or extent of loblolly pine in RCW partitions. Figure 4 of Appendix 6 depicting longleaf pine stands and longleaf pine sites with offsite pine clearly indicates there is a substantial coverage and restoration challenge.	MCB Camp Lejeune recognizes the substantial size of the task. Percentage of loblolly pine in RCW partitions varies from 0-100%. MCB Camp Lejeune will use the partition management planning process to ensure that conversion is planned in a timely manner based on age of the loblolly, and that sufficient RCW habitat is maintained into the future.

#	Agency	INRMP Section	Page or Figure	Line	Comment	Response
5	USFWS Raleigh Field Office	App 6	p. 9	216-224	Given the INRMP's objective to establish and sustain 120 acres of good quality foraging habitat (GQFH), additional consideration is required to recognize that loblolly pine partitions greater than 200 acres may be needed to establish or sustain 120 acres of GQFH during the conversion process.	MCB Camp Lejeune's long-term objective is to establish and maintain 120 acres of GQFH. However, this may not be achieved until after longleaf pine restoration/conversion is complete. The intention is to accomplish this restoration/conversion within 200-acre partitions with the goal of maintaining 120 acres of suitable habitat.
6	USFWS Raleigh Field Office	App 6	p. 10	216-224	MCB Camp Lejeune should assess and evaluate the age-class structure of loblolly pine in stands and partitions. Loblolly is not as long-lived as longleaf. Uncertainty exists for the age at which a loblolly stand with prevailing even-age attributes will decline due to tree mortality and natural senescence to a state when suitable foraging habitat no longer is available.	MCB Camp Lejeune examines the age-class structure of loblolly pine in forest stands and RCW partitions. A higher priority for partition management is placed on loblolly-dominated partitions to ensure that foraging and nesting habitat is not lost to loblolly senescence. We also recognize that age diversity within stands may allow foraging or permit the replacement of nesting habitat with suitable trees within a stand. We intend to look at each partition and develop a plan for restoration based on these factors.
7	USFWS Raleigh Field Office	App 6	p. 10	251-257	The ability to control the partition area for existing RCW clusters will be extremely limited. MCB Camp Lejeune intends to retain 120 acres of GQFH in occupied partitions during the longleaf pine restoration process. This is a good objective, but it may not be possible or desirable depending on partition area, acres of loblolly pine in a partition, loblolly pine age-classes, and anticipated loblolly pine age at senescence.	Although the long-term goal is to establish and maintain 120 acres of GQFH, MCB Camp Lejeune recognizes that there may be short-term degradation in habitat quality during the restoration process. We believe the 200 acre partition will allow for continuous suitable habitat, but not retention of 120 acres of GQFH until longleaf is restored.
8	USFWS Raleigh Field Office	App 6	p. 10	251-257	Certain partitions with loblolly pine may require conversion to longleaf without sustaining 120 acres of GQFH at the partition-level to avoid a future risk of a greater reduction in partition foraging habitat due to natural stand senescence and decline. In such cases, the applicable objective would be to minimally sustain habitat at the managed stability standard (MSS) while restoring habitat and moving toward GQFH.	There may be cases where certain partitions will fall back to the MSS, during the longleaf restoration process. However, in most cases, 120 acres of suitable habitat is a realistic goal, with the long-term goal of sustaining 120 acres of GQFH.

#	Agency	INRMP Section	Page or Figure	Line	Comment	Response
9	USFWS Raleigh Field Office	App 6	p. 12, pp. 12-13, p. 15, p. 17	294-317, 318-333, 434, 475-478	<p>Management options for regenerating longleaf pine are stated to include patch clearcuts (Appendix 6, lines 294 - 317). MCB Camp Lejeune also states that all silvicultural management methods will be consistent with those in the RCW Recovery Plan (Appendix 6, line 434). However, silvicultural guidelines for managing habitat as outlined in the Recovery Plan do not include patch clearcuts.</p> <p>Recovery Plan guidelines are limited to modified even-aged methods (two-aged) and uneven-aged methods using single-tree selection or group selection. And when groups selection is employed, the size of regenerated patches is described as less than two acres.</p> <p>Patch harvests greater than two acres for longleaf regeneration as proposed in the INRMP would appear to be appropriately considered as a patch clearcut and not a form of group selection. This is not consistent with Recovery Plan guidelines for foraging habitat management.</p> <p>Small patch clearcuts up to five acres also are listed as an option for regenerating loblolly pine in partitions where loblolly will not be converted to longleaf. The same concerns described for patch clearcuts for longleaf apply here for loblolly in RCW partitions.</p>	<p>MCB Camp Lejeune will not use small patch clearcuts for regeneration of longleaf pine. Longleaf pine regeneration will be accomplished by either two-aged or uneven aged management, as described in the 2003 RCW recovery plan. Even-aged management will be used to convert loblolly stands to longleaf stands. MCB Camp Lejeune's 2014 RCW Management Plan and Silvicultural System for timber management will reflect these changes.</p> <p>There are few, if any foreseeable requirements for regenerating loblolly pine in partitions.</p>
10	USFWS Raleigh Field Office	App 6	p. 12	324-326	<p>The seedtree option as described would more accurately be classified as a modified or irregular shelterwood due to the residual stocking of retained loblolly.</p>	<p>Concur. MCB Camp Lejeune's 2014 RCW Management Plan has been modified to reflect that modified even-aged methods (two-aged) and uneven-aged methods using single-tree selection or group selection are the methods for regenerating longleaf pine as per the 2003 RCW recovery plan.</p> <p>*See App 6 - Silvicultural Techniques, p. 12, lines 11 and 12</p>

#	Agency	INRMP Section	Page or Figure	Line	Comment	Response
11	USFWS Raleigh Field Office	App 6	p. 18	487-489	Areas slated for loblolly pine management for RCWs are areas that "do not typically support longleaf, but can support loblolly." Are these loblolly sites identified in the ecological classification system?	Restoration and enhancement of longleaf pine-dominated communities will continue on those sites where they historically occurred, as determined by the Ecological Classification System and Land Type Phases. Stands that may have loblolly as codominant with hardwoods, but are not on longleaf soils do not make up a significant portion of the base and are not counted toward MCB Camp Lejeune's "RCW management Acres." Discussion of these areas will be removed from the RCW management section.
12	USFWS Raleigh Field Office	App 6	p. 12	318-320	Loblolly sites and stands are slated for regeneration on a minimum 100-year rotation. Increasing the rotation interval to 120 or more years will reduce the partition area required to sustain 120 or more acres of GQFH. This could be important, particularly for existing RCW partitions with loblolly pine, to enhance management flexibility and sustain 120 acres of GQFH in affected partitions. The previous comment on small patch clearcuts also is applicable here, relative to regeneration methods.	As stated above, MCB Camp Lejeune does not intend to establish and maintain 120 acres of GQFH in all loblolly dominated partitions until restoration of longleaf is complete. We recognize that increasing loblolly rotation age to 120 years would increase flexibility, and may allow for a loblolly rotation age of 120 years in certain areas. However, there is a high priority to establish longleaf in partitions dominated by older loblolly. In these areas, loblolly may be converted sooner, if necessary. The intent is to maintain flexibility with regard to the age at which a loblolly stand is converted.
13	USFWS Raleigh Field Office	App 6			The Recovery Plan strategy using uneven-aged methods is to sustain stand-level and landscape level habitat for foraging and cavity tress. The maximum size of group selection harvests in the 2003 Recovery Plan continues to reflect prevalent recommendation today. Ecologically, this is considered compatible with RCWs because the patch size up to two acres, although perhaps greater than that with single-tree selection, should be sufficiently small so as not to disrupt RCW foraging habitat use and selection within that stand or partition under such treatments.	MCB Camp Lejeune's RCW management will be modified to be consistent with recovery guidelines.

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14	USFWS Raleigh Field Office	App 6	p. 19	539-543	The RCW management plan includes good provisions to rake fuels from the base of cavity trees to reduce and avoid cavity tree fire damage. However, no data are provided on the extent prescribed or wildfire has destroyed cavity trees in the past, as a predictor of future effects. MCBCL should possess monitoring data to assess unavoidable fire impacts. These data should be evaluated also for the purposes of authorized take incidental to prescribed fire and wildfire control in the BiOp.	Since, 2007, MCB Camp Lejeune has not exceeded, on average, 2 cavity trees lost per year due to damage from prescribed fire. However, due to continued increase in clusters and cavity trees, it would be appropriate to increase the incidental take from 2 to 3 trees per year potentially lost to harm from prescribed burning or wildland fire management. MCB Camp Lejeune collects destroyed cavity tree data and includes this information in annual reports to the USFWS.
15	USFWS Raleigh Field Office	App 6	p. 17	471-472	The partition management focus by MCB Camp Lejeune is very good. The installation map illustrating the location of current and future partitions also demonstrates consideration and allocations of habitat to attain the objective of 173 active clusters.	MCB Camp Lejeune will continue partition management for current and future partitions to attain the recovery goal of 173 active clusters.
16	NCDENR NC Division of Marine Fisheries	4.8 Coastal Area Management 4.8.2 Geographic Areas of Concern			The INRMP for MCB Camp Lejeune focuses almost exclusively on freshwater and terrestrial resources of the base...More information on estuarine and marine habitats within the management plan area should be included in [Section 4.8, Coastal Area Management] or in Section 2.3.4, Water Resources and Wetlands. Information on the value of coastal fisheries should be included, as it indicates the economic importance of managing sustainable estuarine and marine resources and their habitats. Information on how military activities potentially affect estuarine and marine resources and fishing activity should be included.	Concur. Added; The North Carolina Division of Marine Fisheries (DMF) is responsible for the stewardship of the state's marine and estuarine resources. The DMF's jurisdiction encompasses all coastal waters and extends to 3 miles offshore. The estuaries, brackish swamps and mud flats that serve as nursery areas for shrimp, crabs, finfish, and shellfish in the waters that surround MCB Camp Lejeune, support an important commercial fishing industry and are enjoyed by an ever-increasing recreational angler population. The DMF is dedicated to ensuring sustainable marine and estuarine fisheries and habitats for the citizens of North Carolina. *See p. 4-149, lines 26-31

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17	NCDENR NC Division of Marine Fisheries	4.4 Fish and Wildlife Management 4.4.1 Federal, State, and Other Regulations	p. 4-112	3299	The plan incorrectly states that Wildlife Resources Commission has the authority to manage all fish and game. DMF has authority to protect and conserve marine and estuarine resources and public trust resources (G.S. 143B-10).	Concur. Document modified to clarify and correct. Added "The NCWRC is the state government agency created by the General Assembly in 1947 to conserve and sustain the state's fish and wildlife resources through research, scientific management, wise use, and public input. The mission of the NCWRC is to conserve North Carolina's wildlife resources and their habitats and provide programs and opportunities that allow hunters, anglers, boaters; other outdoor enthusiasts to enjoy wildlife-associated recreation." *See p. 4-114, lines 5-9
18	NCDENR NC Division of Marine Fisheries	4.8 Coastal Area Management			The Fisheries Reform Act of 1997 (G.S. 143B-279.8) establishes a process for preparation of coastal fisheries and habitat management plans for North Carolina, and state 'the goal of the plans shall be to ensure the long-term viability of the State's commercially and recreationally significant species or fisheries Through these plans rules are developed that manage fisheries and protect critical fish habitat. Of particular relevance to this plan is the Oyster and Clam Fishery Management Plans (http://portal.ncdenr.org/web/mf/fmps-under-development) and the Coastal Habitat Protection Plan (http://portal.ncdenr.org/web/mf/59).	Included in Section 4.8; "The NC Fisheries Reform Act of 1997 (G.S. 143B-279.8) establishes a process for preparation of coastal fisheries and habitat management plans for North Carolina, and states 'the goal of the plans shall be to ensure the long-term viability of the State's commercially and recreationally significant species or fisheries". Through these plans rules are developed that manage fisheries and protect critical fish habitat. Of particular relevance to this plan are the Oyster and Clam Fishery Management Plans and the Coastal Habitat Protection Plan. *See p. 4-149, lines 18-23
19	NCDENR NC Division of Marine Fisheries	4.8 Coastal Area Management 4.8.2 Geographic Areas of Concern/ Protection of Nursery Areas	p. 4-148	4327-4365	Much of the New River within Camp Lejeune is currently defined as Primary, Secondary, or Special Secondary Nursery Areas. Continued protection of water quality and consideration of nursery areas in the New River is vital to locally maintain many economically valuable commercial and recreation fisheries...Anadromous fish spawning areas were designated in the upper reaches of the New River. Protection of Marine Fisheries Commission designated areas is a priority for the Division of Marine Fisheries and should be mentioned in this resource management plan.	Concur. Added "The DMF is responsible for preserving, protecting and developing PNAs for commercially important finfish and shellfish. The protection of designated PNAs, SNAs, Special SNAs, and anadromous fish spawning areas in the upper reaches of the NRE is a priority for DMF." *See p. 4-151, lines 35-36; p. 152, line 1

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20	NCDENR NC Division of Marine Fisheries	4.8 Coastal Area Management 4.8.2 Geographic Areas of Concern			The division has completed a habitat assessment in the White Oak river basin, including the New River tributary, which identifies a subset of strategic habitat areas that collectively represent a diversity of fish habitats, are in excellent ecological condition, and support critical fish functions. The final report was approved by the Marine Fisheries Commission in November 2014. Recognition of the need to protect and enhance these strategic habitat areas should be included in the plan.	Noted. MCB Camp Lejeune recognizes the need to support DMF plans to and protect and enhance strategic habitat areas, as well as a subset of strategic habitat areas identified in a habitat assessment in the White Oak river basin, including the New River tributary. *See p. 4-155, lines 4-6
21	NCDENR NC Division of Marine Fisheries	4.8 Coastal Area Management 4.8.3 Coastal Area Conservation Goals & Measures	p. 4-152	4478	The Division recommends that Action 4.8-01 in Section 4.8.3 be modified to : Support oyster management in the NRE by providing NCDMF access to store oyster shell (at Mile Hammock Bay) used for oyster cultch planting in sites as selected location in the NRE, <u>and allowing public access to existing DMF Shellfish Management Areas for shellfishing and fishing continue to be allowed by the military base.</u>	Concur. Modified Action item to "• Action 4.8-01: Support oyster management in the NRE by providing NCDMF access to store oyster shell (at Mile Hammock Bay) used for oyster cultch planting in sites at selected locations in the NRE and support public access to existing DMF Shellfish Management Areas for shellfishing and fishing consistent with the military mission." *See p. 4-155, lines 17-20
22	NCDENR NC Division of Marine Fisheries	4.8 Coastal Area Management 4.8.3 Coastal Area Conservation Goals & Measures	p. 4-152	4481	DMF recommends modifying Action 4.8-02 to: Implement <u>habitat-friendly</u> shoreline stabilization projects (<u>living shorelines</u>) along the New River.	Concur. Changed to; "Action 4.8-02: Implement living shoreline stabilization projects along the New River where site conditions support shoreline protection and habitat restoration designs." *See p. 4-155, lines 21-22
23	NCDENR NC Division of Marine Fisheries	4.8 Coastal Area Management 4.8.3 Coastal Area Conservation Goals & Measures	p. 4-152	4465-4467	Support of the DMF Shellfish Rehabilitation Program through the Marine Corps providing cultch stockpile and loading locations is greatly appreciated and exceptionally valuable to the resource. This cooperation has allowed the division to plant over 63,000 bushels of cultch material from the Mile Hammock Bay site over the last five years, providing significant habitat and economic value to the area.	MCB Camp Lejeune will continue to provide cultch stockpile and loading locations at Mile Hammock Bay in support of the DMF Shellfish Rehabilitation Program consistent with the military mission.

#	Agency	INRMP Section	Page or Figure	Line	Comment	Response
24	NCWRC Raleigh, NC	1.1 INRMP Vision	p. 1-3	332-336	Recent activity within the buffer and surrounding lands of the G-10 impact area, including establishment of new ranges, do not conform to this statement. The construction of these ranges, and other land clearing activities in the area, pose a significant threat to conservation of several reptiles and amphibians on the base including: Carolina Gopher Frog, Ornate Chorus Frog, Eastern Diamondback Rattlesnake, and Southern Hognose Snake. All of these species require mature, quality longleaf pine uplands and the area in and around the G-10 represents the core habitat for these species. Three of these species (all but the Ornate Chorus Frog) have also been petitioned for federal listing protection. In addition to meeting the requirements of DoDI 4715.03, Camp Lejeune's efforts to deter development/alteration of any kind in these sensitive areas would go a long way towards keeping these species off of any federal list.	MCB Camp Lejeune recognizes the habitat value of lands, like those within the G-10 Impact area for SAR. However, the INRMP focuses on those lands available for active management. To the maximum extent practicable and where it does not conflict with the installation mission, will survey and take other appropriate measures to identify, monitor and manage reptiles and amphibians, including those identified as species at risk (SAR). We will prioritize proactive management of some of those species that, if listed, could adversely impact military readiness. But, our efforts remain focused on managing natural resources at a landscape scale that will benefit all species and their habitats. We will continue to cooperate with the NCWRC by providing field observation data on SAR discoveries, and allowing NCWRC staff access to participate in annual surveys.
25	NCWRC Raleigh, NC	1.1 INRMP Vision	p. 1-6, p. 4-76	428-430, 2362-2400	Camp Lejeune intends to meet Red-cockaded Woodpecker recovery goals partially through the RASP program. However, this program does not meet the needs of any of the other rare and sensitive species utilizing these same habitats on base, including Carolina Gopher Frog, Ornate Chorus Frog, Eastern Diamondback Rattlesnake, Southern Hognose Snake, Mabee's Salamander, Southern Chorus Frog, Mimic Glass Lizard, and Eastern Chicken Turtle. Reptiles and amphibians are not so easily moved as birds. Managers on base need to realize that losses of habitat for Red-cockaded Woodpeckers on base also have significant impacts to a wide range of rare and sensitive reptiles and amphibians.	MCB Camp Lejeune recognizes that a wide range of rare and sensitive reptiles and amphibians may also occupy habitat shared by RCWs. However, many of these species are simply not afforded the same level of protection as those receiving protection covered by the ESA. The RASP was intended to establish a process by which properties with the potential to increase the RCW population can be identified, evaluated and protected, and managed in perpetuity, thereby enhancing the recovery of the Coastal NC Primary Core (CNCPC) Population. Rest assured, properties that meet requirements in order to be eligible for the RCW RASP, will almost certainly provide habitat for many unlisted species that benefit from recovery and management of longleaf pine, thereby enhancing the long-term sustainability of those species. MCB Camp Lejeune has also teamed with Onslow Bight Conservation Forum partners, who together, have contributed millions of dollars to establish conservation easements on properties valuable to non-listed, but important rare and sensitive reptiles and amphibians.

#	Agency	INRMP Section	Page or Figure	Line	Comment	Response
26	NCWRC Raleigh, NC	1.4.1 Operational Imperatives and Goals for this INRMP/GSRA Longleaf Pine	p. 1-7	459-466	Restoration efforts for longleaf pine on GSRA are proposed to be halted. Site indices would readily provide information to the Marine Corps about which areas would be most suitable for longleaf planting.	Restoration efforts for longleaf pine on GSRA are proposed to be halted during design of off road tactical vehicle driving areas. Restoration and enhancement of longleaf pine-dominated communities will continue on sites elsewhere on Base where they historically occurred, as determined by the Ecological Classification System and Land Type Phases.
27	NCWRC Raleigh, NC	1.4.2 Operational Messages and Themes/CAAAC Phase 1/BTCMC	p. 1-7, p. 1-10	476-492, 569-570	To ensure conservation of rare amphibians on base, attempts could be made to minimize or eliminate the possibility of any of the corridors/areas planned for the CAAAC to navigate in or near ponds and wetlands across the longleaf pine landscape. These wetlands, especially including those which are temporary or ephemeral in nature, are extremely important to the long-term conservation of rare amphibian species, such as the Carolina Gopher Frog. Vehicle traffic through or directly adjacent to these ponds lowers their value to amphibians, by reducing reproductive capabilities and output; overall recruitment declines.	MCB Camp Lejeune recognizes that ephemeral ponds and wetlands across the longleaf pine landscape are extremely important to the long-term conservation of rare amphibian species, such as the Carolina Gopher Frog. Base staff have recently performed surveys and updated habitat inventories of many of those ponds important to not only Carolina Gopher Frogs, but other species. This information will be used to assist in the design of off road maneuver corridors in order to avoid and minimize impacts from vehicle traffic through or directly adjacent to these ponds.
28	NCWRC Raleigh, NC	1.4 Commanding General Messages and Themes 1.4.1 Operational Imperatives and Goals for this INRMP	pp. 1-8, 1-9	496-516	Aerial spraying of herbicides for vegetation control in the area of the G-10 impact area could be severely debilitating to conservation efforts for rare amphibians on Camp Lejeune, including Carolina Gopher Frog, Ornate Chorus Frog, Southern Chorus Frog, and Mabee's Salamander through aerial drift of the chemicals, deposition into surface waters, and bioaccumulation in food resources. Numerous herbicides are known to have deleterious effects on development of eggs and larvae, as well as on sexual maturation in adults. Consideration should be given to prevailing wind speeds and direction when scheduling spray applications. When possible, avoid aerial spraying in areas that contain amphibian breeding habitats (streams, ponds, wetlands) especially during breeding seasons. During other times of the year minimize impacts from aerial spraying by avoiding or reducing applications when weather conditions are likely to result in chemical drift. The use of chemicals that are less likely to harm aquatic wildlife such as those labeled specifically as an aquatic herbicide or surfactant-free glyphosate products (for example, Agri-Dex with 53.8% glyphosate) is preferred.	Aerial spraying of herbicides for vegetation control in the G-10 impact area will be performed using Best Management Practices in accordance with all federal requirements established for the safe and effective use of herbicides in aquatic environments. The use of chemicals that are least likely to harm aquatic wildlife such as those labeled specifically as an aquatic herbicide or surfactant-free glyphosate products (for example, Agri-Dex with 53.8% glyphosate) will be considered.

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29	NCWRC Raleigh, NC	1.6.3 Future Land Use Needs	p.1-18	799-801	Hofmann Forest would seem a highly logical area for Camp Lejeune managers to consider as high priority for acquisition or easement, to allow for future training needs and expansion.	As weapon systems, aircraft platforms, tactics, techniques, and procedures evolve, the Marine Corps constantly explores opportunities to train in or from new areas that may provide unique training that is otherwise unavailable within the confines of existing Marine Corps installations. To this end, MCB Camp Lejeune is constantly evaluating off-base areas that may support these training requirements. Access to Hofmann Forest is not currently critical to our training requirements. However, we will reassess training programs in the event current or any future owners change their use of the Hofmann Forest area. Hofmann Forest, like any other viable training site within the region, will remain an area of interest for MCB Camp Lejeune.
30	NCWRC Raleigh, NC	2.3.6 Plant Communities	p. 2-42	1327	A more appropriate term would be "Ephemeral Pool" or "Temporary Pool." Vernal pools are those temporary pools which fill in the spring. However, many of the pools on Camp Lejeune actually fill in the fall or winter, making them autumnal pools. To cover all wetland types, one of the other terms above would be more accurate.	MCB Camp Lejeune will use "ephemeral pool" as the appropriate term to describe those often isolated depression ponds that are subject to seasonal changes in hydrology. *See p. 2-42, lines 15-25

#	Agency	INRMP Section	Page or Figure	Line	Comment	Response
31	NCWRC Raleigh, NC	3.3.2 Threatened and Endangered Species	p. 3-57	1799-1802	Piping Plover (Threatened), American Oystercatcher (2014 Watch List species), Wilson’s Plover (2014 Watch List species), and Least Tern often nest on Onslow Beach. Potential nesting areas should be delineated with posts and string/rope in late March and remain posted through mid-August or until the last chick fledges. Marked nesting areas should be avoided by amphibious/land operations and recreationists. The Red Knot (proposed Threatened 2014) likely uses Onslow Beach during fall and spring migrations as a stop-over site, and during winter as a foraging and roosting site. All of these species are of conservation concern to NCWRC, and all are protected by the Migratory Bird Treaty Act (MBTA).	<p>Potential nesting areas will be delineated with posts, signs, and string/rope (we use fabric tape) no later than March 15. Areas will remain posted until August 15, or until the last chick fledges.</p> <p>Potential nesting areas are posted with signs that say the following:</p> <p>COLONIAL WATERBIRD AND SHOREBIRD NESTING AREA</p> <p>Entry into this area by people or pets may cause parents to abandon eggs and chicks. To help minimize impacts to beach-nesting birds, please do the following:</p> <ul style="list-style-type: none"> - keep out of marked area - keep pets out of marked area, and on a leash at all times - stay close to the water line - do not linger in this area - take your trash with you <p>For more information call Environmental Conservation</p> <p>Areas are also posted with "no vehicles allowed" signs.</p> <p>*See p. 4-87, lines 11-12</p>
32	NCWRC Raleigh, NC	4.1.1 Threatened and Endangered Species at MCB Camp Lejeune	p. 4-64	2047	The INRMP includes those species which have been “Proposed” to be listed, such as Red Knot. Several reptiles and amphibians may need to be added to this listing with the designation “P,” since they have been petitioned for federal listing (this seems to be the same as “proposed”). Those reptile and amphibian species petitioned for federal listing that occur on Camp Lejeune include: Chamberlain’s Dwarf Salamander, Carolina Gopher Frog, Spotted Turtle, Southern Hognose Snake, and Eastern Diamondback Rattlesnake	The Endangered Species section of the INRMP addresses only those species subject to Section 7 of the ESA; i.e. those species that are federally listed as endangered (E) or threatened (T), candidates for federal listing (C), or species proposed for federal listing by the USFWS (P). MCB Camp Lejeune recognizes that a wide range of rare and sensitive reptiles and amphibians may also occupy habitat shared by RCWs. However, many of these species are not afforded the same level of protection as those covered by the ESA.
33	NCWRC Raleigh, NC	4.1.1 Threatened and Endangered Species at MCB Camp Lejeune			Great RCW recovery work.	MCB Camp Lejeune will continue partition management for current and future partitions to attain the recovery goal of 173 active clusters.

#	Agency	INRMP Section	Page or Figure	Line	Comment	Response
34	NCWRC Raleigh, NC	4.1.4 Threatened and Endangered Species Management Previous Red-Cockaded Woodpecker Plans	p. 4-72, p. 4-73, p. 4-77	2210-2211, 2275-2276, 2409-2410	Goals for Red-cockaded Woodpecker management in this INRMP are to burn as much of the base forested areas as possible on a three-year frequency, and to increase the proportion of fires that occur in the growing season. NCWRC staff supports this activity, but requests bloom periods and the presence of pollinators be considered when applying prescribed burns during growing seasons. This may minimize negative impacts on arthropods and other invertebrates essential as forage.	MCB Camp Lejeune must take into account many factors when considering time of burn, including military training, weather, availability of personnel, time of year, fuel load, etc. Time of bloom, and the presence of pollinators are not variables we can add to the list of factors affecting where and when we burn. Overall, we believe that the beneficial effects of emphasizing greater fire frequency and growing season burns will outweigh any temporary negative impacts to pollinators.
35	NCWRC Raleigh, NC	4.1.4 Threatened and Endangered Species Management 2014 RCW Management Plan Action 4.1-03	p. 4-78	2438-2440	Although no Leatherback or Kemp's Ridleys nests have been documented on Lejeune, there is potential. Leatherbacks often start nesting early, so although surveying is not started until March or April, it may be of benefit to have avian surveyors be aware of early turtle nesting.	Although daily morning surveys do not start until May, Threatened and Endangered Species personnel are frequently on the beach in the early spring conducting shorebird surveys, marking of shorebird areas, and other activities. MCB Camp Lejeune is aware of the potential for an early leatherback nest, will document and report any signs of early leatherback nesting, and follow sea turtle nest protection protocols.
36	NCWRC Raleigh, NC	4.1.4.3 Sea Turtles	p. 4-79	2459-2460	Tracks should be counted after hatchlings emerge. In many cases tracks will be gone if they are counted after 80 days.	Agreed. Text has been modified to clearly to state tracks will be counted the morning after sea turtles emerge. *See p. 4-78, lines 31-33
37	NCWRC Raleigh, NC	4.1.4.3 Sea Turtles	p. 4-79	2467-2469	Sea turtle nesting season occurs from May 1 to November 15. Further protection for sea turtles, Piping Plovers, and Red Knots could occur if driving near the inlet was also restricted during this period or throughout the year.	Beach driving on the south end of Onslow Beach (to New River Inlet) is prohibited (except for essential staff) between April 1 and August 31. Daytime driving is allowed Between September 1 and October 31. These dates allow for recreational fall fishing. It should be noted that MCB Camp Lejeune has potential habitat at the north end of Onslow Beach (Browns Inlet), and at both ends of Browns Island (Browns and Bear Inlets), which are complete off limits to all beach driving or any other human entry.
38	NCWRC Raleigh, NC	4.1.4.7 Seabeach Amaranth	p. 4-83	2575-2577	Survey frequency should be noted.	Concur. Surveys are conducted periodically throughout the growing season, beginning in late spring, and ending in late summer. *See p. 4-86, lines 5-8
39	NCWRC Raleigh, NC	4.1.4.7 Seabeach Amaranth	p. 4-83	2579-2580	It is stated these plants are recorded. If not already, perhaps they can be photo-referenced.	All locations are identified, the location recorded with GPS, and documented with photographs as required.

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40	NCWRC Raleigh, NC	4.1.4.9 Piping Plover	p. 4-86	2603-2609	These statements sound as if Piping Plovers are rarely found on Onslow Beach when they are frequently found during most months of the year. We recommend rather than protecting only high quality habitat all suitable habitat be protected.	MCB Camp Lejeune manages all habitat, including high-quality habitat Onslow Beach. The USFWS has not designated critical habitat for piping plovers on MCB Camp Lejeune. MCB Camp Lejeune's management of Onslow Beach satisfies USFWS habitat recovery requirements for this species.
41	NCWRC Raleigh, NC	4.1.4.9 Piping Plover	p. 4-86	2611-2617	<p>Protocol for shorebird surveys should be provided. A figure to show transects walked or areas surveyed with center point would be beneficial. Clarification of data collection should be noted including the definition of bi-weekly (twice per week or once every two weeks), and details of data format, dissemination, and data request protocol.</p> <p>People who survey should use binoculars and spotting scopes so species identification is optimal. Spotting scopes and digital cameras with zoom lens allow proper identification and documentation of piping plovers including if they are banded.</p>	MCB Camp Lejeune's survey protocol satisfies USFWS monitoring requirements for this species. MCB Camp Lejeune welcomes input from NCWRC regarding revising shorebird monitoring protocol, if necessary, to meet the needs of the State and USFWS.
42	NCWRC Raleigh, NC	4.1.4.9 Piping Plover	p. 4-86	2611-2617	Posting of potential nesting areas should be done in March. Shorebirds (including Piping Plovers and American Oystercatchers) arrive on potential nesting areas in mid- to late March and establish nesting territories by early to mid-April. Some oystercatchers complete their first nests by mid-April. Having potential nesting areas posted in March will let shorebirds select undisturbed nesting sites. If a site is disturbed when they arrive, they likely will move elsewhere or use a marginal portion of the site (closer to vegetation and therefore, predators).	<p>Potential nesting areas will be posted no later than March 15. Document has been modified to reflect this change.</p> <p>*See p. 4-87, lines 11-12</p>
43	NCWRC Raleigh, NC	4.1.4.9 Piping Plover	p. 4-86, Fig. 4-7	2611-2617	Reference figure 4-7 and point out the areas mentioned. The amphibious training, light operations, and recreation areas of the beach are low-likelihood nesting areas due to their narrow width. However, the New River and Browns Inlet areas are high-likelihood sites for Piping plovers, Red Knots, American Oystercatchers, Wilson's Plovers and Least Terns. Monitoring and protection in those areas could be increased.	Shorebird habitat at New River inlet and Browns inlet areas are protected. Beach driving is regulated at New River inlet. It should be noted that MCB Camp Lejeune has potential habitat at the north end of Onslow Beach (Browns Inlet), and at both ends of Browns Island (Browns and Bear Inlets), which are complete off limits to all beach driving or any other human entry.

#	Agency	INRMP Section	Page or Figure	Line	Comment	Response
44	NCWRC Raleigh, NC	4.1.4.9 Piping Plover	p. 4-86	2618-2625	The potential nesting habitat should be posted in March. Therefore, if Piping Plover nesting activity is recorded, the nest site should already be in a protected area. The nest site may need additional protection – more signs, an enclosure around the nest, predator management in the area, etc.	Potential nesting areas will be posted no later than March 15. Document has been modified to reflect this change. *See p. 4-87, lines 11-12
45	NCWRC Raleigh, NC	4.1.4.9 Piping Plover	p. 4-86, Fig. 4-7	2625	Refer to figure that shows each beach designation. E.g., Figure 4-7 with Amphibious Training Beach section in red, Light Operations in purple, and N1/Bt-3 Impact Area in pink. The beach driving area (yellow) should be used only by Camp Lejeune staff, as needed, from 1 April – 1 August. No dogs should be allowed from 1 April – 1 August, whether on leash or not. Pedestrians can walk seaward of posted areas, and boaters can anchor their boats along the shoreline, but also must stay seaward of posted areas. Recreational Activities area (Green) should be surveyed for shorebirds, but that area's use by birds may be sacrificed to recreation unless nesting occurs, at which time the nest(s) should be protected with posts, string, and signs.	Currently the "beach driving area" is off limits to driving between April 1 and August 31. During that time, only essential staff have permission for beach driving. We do not plan on prohibiting dogs between April 1 and August 1. However, dogs are required to be on a leash at all times. This rule is enforced by Base Conservation Law Enforcement Officers. Potential nesting areas are posted with signs that say the following: COLONIAL WATERBIRD AND SHOREBIRD NESTING AREA Entry into this area by people or pets may cause parents to abandon eggs and chicks. To help minimize impacts to beach-nesting birds, please do the following: - keep out of marked area - keep pets out of marked area, and on a leash at all times -stay close to the water line - do not linger in this area - take your trash with you For more information call Environmental Conservation Areas are also posted with "no vehicles allowed" signs. We believe the current protective measures are adequate.
46	NCWRC Raleigh, NC	4.1.4.9 Piping Plover	p. 4-86	2627-2628	We appreciate the acknowledgment of the need for ephemeral habitats for plovers	MCB Camp Lejeune will continue to manage shorebird habitat in accordance with the principles of ecosystem management.
47	NCWRC Raleigh, NC	4.1.4.9 Piping Plover	p. 4-86	2627-2629	Since protection of Piping Plovers and Seabeach Amaranth is of primary importance, posting of the area for their protection will, by coincidence, also protect Least Terns, Willets, Wilson's Plovers, and other species.	We recognize that posting of areas has benefits for multiple species. Incidental observations of other shorebird species can be provided to NCWRC.

#	Agency	INRMP Section	Page or Figure	Line	Comment	Response
48	NCWRC Raleigh, NC	4.1.4.9 Piping Plover	p. 4-86, Fig. 4-7	2621	The EA Training Area is not shown in Figure 4-7. If a new figure is needed, it should be inserted near line 2618 and referenced in this paragraph as appropriate.	Reference to EA training area has been removed from the text.
49	NCWRC Raleigh, NC	4.1.4.10 Piping Plover Conservation Goals and Measures	p. 4-87	2631-2635	For each Action, specific methods should be provided. For Action 4.1-29, specifically, how and in what form these reports are provided should be agreed-upon. These data should also be reported to USFWS.	MCB Camp Lejeune will coordinate with NCWRC and USFWS to develop standardized survey methodology and report formats to meet agency data collection preferences.
50	NCWRC Raleigh, NC	4.1.4.15 Red Knot	p. 4-87	2676-2679	Although North Carolina does not have as many Red Knots as Delaware, high numbers have been found on Onslow Beach in the winter provided the winter is not too severe. Although we agree Red Knots use the beaches during migration, some birds stay for several months of the year.	Concur. Document has been modified to state that "Red knot primarily uses the North Carolina coast, including MCB Camp Lejeune, during its migration, and in the winter." See p. 4-89, lines 15-16
51	NCWRC Raleigh, NC	4.1.4.15 Red Knot	p. 4-87	2682-2683	Piping Plover protection do benefit Red Knot, but Red Knot must feed undisturbed in the intertidal zone, especially in fall (Aug-Oct), winter (Dec, Jan, Feb), and spring (Apr-May). The intertidal zone is not protected from vehicle driving, pedestrians, dogs, boats, anglers; therefore, they are flushed or precluded from feeding sites. Spring roost sites are probably protected by posted nesting areas.	The four miles of beach on Browns Island are completely off limits to human entry except for occasional EOD beach sweeps. Another mile of the north end of Onslow beach is only accessed by base personnel very briefly during morning turtle surveys. These areas offer undisturbed access to the intertidal zone year round. On the south end, beach driving is prohibited 5 months of the year. Although the training beach experiences disturbance, when training is not occurring, birds have undisturbed access to the intertidal zone. Use of the recreational beach is highly seasonal, with low levels of human disturbance during the winter. Overall, MCB Camp Lejeune's 11 miles of beach provide many opportunities for undisturbed shorebird foraging.
52	NCWRC Raleigh, NC	4.1.4.15 Red Knot	p. 4-87	2687	Red Knots also use oceanfront habitat regularly.	We recognize the importance of oceanfront habitat for red knot. Much of MCB Camp Lejeune's 11 miles of oceanfront are either completely undisturbed or seasonally undisturbed by human presence. These areas provide benefit to the species, although they are not directly targeted for specific management.

#	Agency	INRMP Section	Page or Figure	Line	Comment	Response
53	NCWRC Raleigh, NC	4.1.4.16 Red Knot Conservation Goals and Measures	p. 4-89	2686-2688	Provide specific methods that will be used to implement Actions. Methods should include how, where, when, and by whom actions will be implemented. A map of the areas that are used and likely to be used by Red Knot could be provided.	We look forward to working with the NCWRC and the USFWS to determine adequate measures to implement actions. A map is not required, since the entire barrier island system of both Onslow Beach and Browns Island may be habitat for red knot. These areas provide benefit to the species, although they are not directly targeted for specific management.
54	NCWRC Raleigh, NC	4.1.5.2 Species at Risk at MCB Camp Lejeune	p. 4-91	Table 4-1	At this time only a few wintering Eastern Henslow's Sparrows are found on Holly Shelter Game Lands. We have found no nesting birds. Please contact NCWRC if staff from the Center for Conservation Biology can assist in surveys for Black Rails on Camp Lejeune in spring-summer 2015.	We will continue to cooperate with the NCWRC by providing field observation data collected by MCB Camp Lejeune Staff, and will contact NCWRC staff to coordinate assistance for surveys for Black Rails on MCB Camp Lejeune in spring-summer 2015.
55	NCWRC Raleigh, NC	4.4.5.1 Nuisance Wildlife Species of Interest/ Bats	p. 4-123	3613-3633	Northern Long-Eared Bat is likely on Camp Lejeune. Since it appears this bat may be federally listed soon, surveys could be conducted.	There are no known instances of Northern Long-Eared Bat on MCB Camp Lejeune. Habitat inventories and surveys for this species will be performed to meet the requirements of the ESA.
56	NCWRC Raleigh, NC	4.5 Migratory Bird Management	p. 4-126	3720-3721	Northern Bobwhite Quail would be a better example here since grouse are not found on Camp Lejeune.	Concur. Northern Bobwhite Quail is a common game bird on MCB Camp Lejeune. *See p. 4-128, line 20
57	NCWRC Raleigh, NC	4.5.3 Habitat Conservation for Migratory Birds	p. 4-132	3880-3883	Include a map that shows where these survey points are located.	MCB Camp Lejeune will continue to develop annual, short, and long range management plans for migratory birds needed to achieve migratory bird conservation goals. Maps will be prepared and included in those specific plans.

#	Agency	INRMP Section	Page or Figure	Line	Comment	Response
58	NCWRC Raleigh, NC	4.5.3 Habitat Conservation for Migratory Birds/ Beach and Barrier Island Habitats	p. 4-133	3926-3931	It appears that more focal migratory bird species of concern use this habitat than any other. The same thing appears to be true with our Wildlife Action Plan priority species. Perhaps since so many species of concern use this habitat, more detail could be provided about how this habitat is being protected. Camp Lejeune has a unique opportunity to manage this habitat better than adjacent developed beaches.	The very nature of many military training operations requires undeveloped areas, which in turn benefit migratory bird species of concern. This is especially true of MCB Camp Lejeune's barrier island system, vital for amphibious training. The barrier island system must remain largely undeveloped due to requirements for live-fire range buffers, undeveloped areas free of night-time lighting, and natural landing beaches free from recreational activities, all of which are essential to MCB Camp Lejeune's military mission. Development detrimental to focal migratory bird species of concern is also discouraged by the Coastal Barrier Resources Act (CBRA) of 1982. Portions of Onslow Beach are subject to the requirements of the CBRA, a law that encourages the conservation of hurricane prone, biologically rich coastal barriers by restricting Federal expenditures that encourage development.
59	NCWRC Raleigh, NC	4.7 Wetland Protection and Management 4.7.1 Federal, State & Other Regulations	p. 4-138	4066-4067	Isolated wetlands are generally less protected than other wetlands, and because they are particularly important for several of NCWRC priority amphibians, more discussion of some extra or different measures of protection for these areas could be included. For example, since these wetlands tend to succeed relatively quickly if they get overgrown, a 50' buffer may not be the best measure; instead it's better to daylight the ponds. Timing of this work is also critical to local amphibian populations.	MCB Camp Lejeune incorporated a base-wide requirement in 2010 requiring a 50 ft construction/clearing limit set back from jurisdictional wetland boundaries as a standard practice for all proposed projects. This buffer is intended to serve as a boundary to place limits for development and mechanized land clearing in advance of such activities. Isolated wetlands and the adjacent forested areas around them are managed incidentally and benefit through actions implemented in support of other programs including, Threatened and Endangered Species, Forest Protection and Timber Management. Particular ponds have and will continue to receive treatment on a case-by-case basis.

#	Agency	INRMP Section	Page or Figure	Line	Comment	Response
60	NCWRC Raleigh, NC	4.10.2 Invasive Species of Concern	p. 4-158	4615-4631	Include free-ranging cats and hogs as an invasive species that should not be present on DoD lands.	Feral cats and feral hogs will be managed/removed consistent with DoD policy. The Prefinal INMRP reads as follows: "DoDI 4715.03 – Natural Resources Conservation Program, directs that DoD shall identify, prioritize, monitor, and control invasive and noxious species and feral animals on its installations whenever feasible. The DoD Pest Management Program (DoDI, 4150.7) further states that it is DoD policy to prevent or control pests that may adversely impact readiness or military operations by affecting the health of personnel, or by damaging structures, materiel, or property. EO 13112 specifically addresses the control of invasive, non-native species on federal land..." This statement implies that all feral animals including cats and pigs are not permitted on DoD lands. *See p. 4-160, lines 2-9
61	NCWRC Raleigh, NC	App 17	p. 16	21	Incubation period should be 49-75+ days.	Concur. The document has been modified to include this information. *See p. 18, line 1
62	NCWRC Raleigh, NC	App 17	p. 16	26	Age of maturity is around 30+ years. http://www.sefsc.noaa.gov/turtles/PR_Snover_Rhodin_2008_Biology_of_Turtles.pdf .	Concur. The document has been modified to include this information. *See p. 18, line 6
63	NCWRC Raleigh, NC	App 17	p. 17	20	Only seven loggerhead nests were laid in 2004 on Onslow Beach (NCWRC database).	The document now refers to the period covered by the last INRMP, 2007-2014. *See p. 18, lines 33-34; p. 19 lines, 1-2
64	NCWRC Raleigh, NC	App 17	p. 17	30	Incubation period should be 49-75+ days.	Concur. The document has been modified to include this information. *See p. 19, line 12

#	Agency	INRMP Section	Page or Figure	Line	Comment	Response
65	NCWRC Raleigh, NC	4.1.4.3 Sea Turtles			There are few sea turtle data available from Browns Island, due to difficulty with access. It would be good if more regular aerial surveys could be conducted (twice per month) over Browns Island, to estimate turtle nest abundance. Concurrent aerial surveys of Onslow Beach with groundtruthing would develop an index of nest to non-nesting crawls on Browns Island as well as strengthen estimates on Browns Island.	The document has been modified to reflect that aerial surveys are typically conducted at least twice per week during the nesting season. There may be sufficient data to develop an index using data from aerial surveys conducted on the north end of Onslow Beach. *See 4-78, lines 27-28
66	NCWRC Raleigh, NC				Aerial surveys for Red Knots and wading birds are also very beneficial, though the procedure to obtain access in restricted air space is uncertain. Clarification of this procedure would be appreciated.	MCB Camp Lejeune has a Letter of Agreement in place that provides procedures applicable to MCB Camp Lejeune Range Control Duty Officer and the State of North Carolina aircraft for the control and access to Restricted Areas, <u>R5306D, R5306E, R5303A, B, C and R5304A, B, C. USE OF R5306D, R5306E, R5303A, B, C AND R5304A, B, C BY THE STATE OF NORTH CAROLINA AIRCRAFT.</u> The agreement provides for airspace use by North Carolina Forest Service Aircraft, North Carolina Highway Patrol, North Carolina Dept. of Transportation, North Carolina Wildlife Resources Commission, North Carolina Division of Marine Fisheries, North Carolina Division of Coastal Management, and the North Carolina State Bureau of Investigation.

NOTE: * denotes INRMP changes

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Appendix 18:

Biological Assessment

MCB Camp Lejeune

2015-2020 INRMP

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Biological Assessment

Marine Corps Base Camp Lejeune

2015-2020 Integrated Natural Resources Management Plan (INRMP)

February, 2015

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LIST OF ACRONYMS AND ABBREVIATIONS

ASPP	Annual Silvicultural Prescription Plan
BA	Biological Assessment
BCTMC	Beach to Combat Town Maneuver Course
CAAAC	Combined Arms Amphibious Assault Course
CPC	Center for Plant Conservation
DoD	Department of Defense
DoDI	Department of Defense Instruction
DPS	Distinct Populations Segments
ESA	Endangered Species Act
FR	Federal Register
GSRA	Greater Sandy Run Area
INRMP	Integrated Natural Resources Management Plan
MCB	Marine Corps Base
MCG	Mission Compatible Goal
MCO	Marine Corps Order
NCNHP	North Carolina Natural Heritage Program
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
RASP	Recovery and Sustainment Plan
RCW	Red-cockaded Woodpecker
T&E	Threatened and Endangered Species
T (S/A)	Threatened due to Similarity of Appearance
TVMA	Tactical Vehicle Maneuver Area
USC	U.S. Code
USFWS	U.S. Fish and Wildlife Service

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1.0 INTRODUCTION

1.1 Background

Marine Corps Base (MCB) Camp Lejeune proposes to implement a revised Integrated Natural Resources Management Plan (INRMP) for the period 2015-2020. The revised INRMP outlines the management goals and objectives for natural resources conservation and support of mission sustainability on MCB Camp Lejeune in accordance with the Sikes Act (16 United States Code [USC] 670a *et seq.*) and the INRMP implementing policies established in Department of Defense Instruction (DoDI) 4715.3 (*Environmental Conservation the Program*) and Marine Corps Order (MCO) P5090.2A (*Environmental Protection and Compliance Manual*). The INRMP has been revised to address new management strategies and actions that will deconflict and more fully integrate training and conservation objectives on MCB Camp Lejeune. Pursuant to Section 7 of the Endangered Species Act (ESA) (16 USC 1531 *et seq.*), MCB Camp Lejeune is required to consult with the U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) to ensure that actions it proposes to undertake will not jeopardize the continued existence of a listed species or result in the destruction or adverse modification of critical habitat. This Biological Assessment (BA) has been prepared in compliance with Section 7 of the ESA to evaluate the potential effects of implementing the revised INRMP on federally listed threatened and endangered (T&E) species and critical habitats in the vicinity of MCB Camp Lejeune.

1.1.1 Consultation History

There have been several major consultations addressing impacts to T&E species on MCB Camp Lejeune that include MCB Camp Lejeune's 1999 Mission Compatible Plan for the Comprehensive Long-term Management of the Red-cockaded Woodpecker (RCW), and Biological Assessment on Operations at MCB Camp Lejeune, NC; the 2002 Biological Assessment on the Effects of Current Use and Modification of Training Areas, Dune Stabilization, and Continued Recreational Use of Onslow Beach; the 2008 Biological Assessment of the G-10 Range Transformation Plan; the 2009 Biological Assessments (USFWS and NMFS) for Potential Effects to Listed Species from Current and Proposed Range Operations at Marine Corps Base Camp Lejeune and the 2012 Programmatic Biological Assessment of the Red-cockaded Woodpecker Recovery and Sustainment Program ().

The following is a list of relevant consultations and meetings between MCB Camp Lejeune and the USFWS, Raleigh Field Office specifically for the INRMP revision:

1. INRMP kickoff meeting that included USFWS, and State agencies. MCB Camp Lejeune laid out the proposed course of action for the INRMP and takes comments/questions from stakeholders. April 30, 2014.

2. Meeting with USFWS to discuss in more detail MCB Camp Lejeune proposed course of action for INRMP. July 29, 2014.
3. MCB Camp Lejeune letter to USFWS documenting the results of July 29 meeting. The letter specifically addressed incidental take for future listed species sites in the Greater Sandy Run Area (GSRA), value of pocosin habitat for RCW, temporary cessation of longleaf planting in GSRA, support for Combined Arms Amphibious Assault Course (CAAAC) Phase 1 maneuver corridor, and vegetation management in the G-10 impact area. August 6, 2014.
4. USFWS responded to August 6, 2014 letter (Attachment 1). September 18, 2014.
5. MCB Camp Lejeune teleconference with USFWS to clarify some of the points in the September 18, 2014 letter, and to request an email and follow-up letter with clarifications. September 19, 2014.
6. USFWS sent an email clarifying the incidental take for future listed species sites in GSRA. September 19, 2014.
7. Draft INRMP sent to USFWS November 14, 2014
8. USFWS Comments on draft INRMP received December 23, 2014

2.0 ACTION AREA

2.1 Action Area Description

MCB Camp Lejeune consists of over 143,000 acres of land in Onslow County, North Carolina. The installation is located 45 miles southwest of New Bern, 125 miles southeast of Raleigh, and 47 miles northeast of Wilmington (Figure 2-1). The Main Base consists of 101,620 acres and GSRA encompasses 41,230 acres. MCB Camp Lejeune includes administrative cantonment areas, air station, impact areas, training and maneuver areas, drop zones, landing zones, gun positions and outlying landing fields, etc. (Table 2-1).

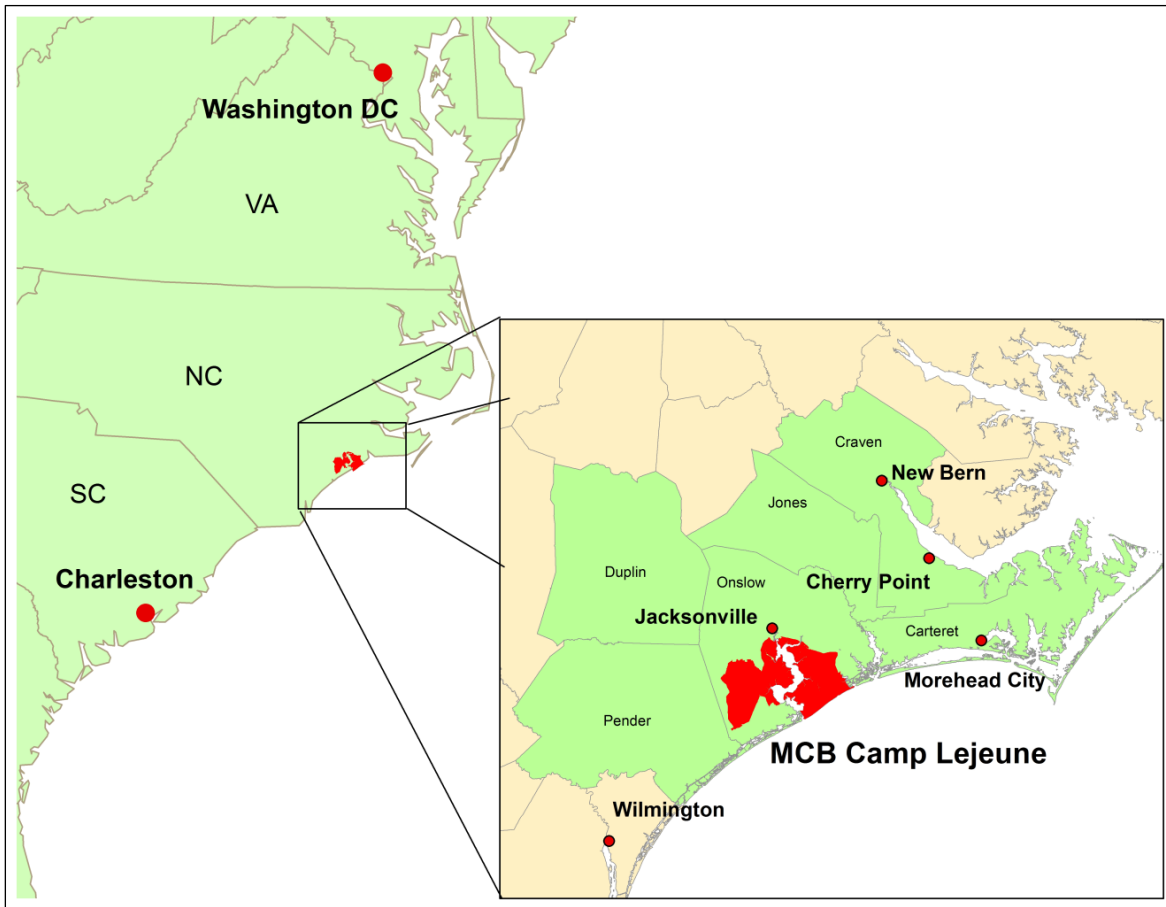


Figure 2-1. General location of MCB Camp Lejeune

Table 2-1 Major land use areas of MCB Camp Lejeune

Use	Acres
Training Areas	95,940
Cantonment	17,158
Impact Areas	12,394
Wetlands	10,502
Undeveloped Land	6,324

Based on the U.S. Forest Service National Hierarchical Framework of Ecological Units, MCB Camp Lejeune is in the Atlantic Coastal Flatlands Section (Section 232C) of the Outer Coastal Plain Mixed Forest Province (Province 232). This province comprises the flat and irregular Atlantic and Gulf Coastal Plains to the sea punctuated by a series of fluvial and coastal terraces. The region is characterized by numerous slow-moving streams, marshes, and swamps. Along the Atlantic coast, the extensive coastal marshes and interior swamps are dominated by gum (*Nyssa* spp.) and cypress (*Taxodium* spp.). Most upland areas are covered by subclimax pine forest that has an understory of grasses and sedge savannas. Undrained shallow depressions in savannas form upland bogs or pocosins that are dominated by evergreen shrubs (Bailey 1995).

MCB Camp Lejeune is located in a region that historically experienced cyclical fires throughout much of the landscape. The upland sand ridges, upland flats, and much of the pocosin areas experienced fires on a 1 to 3-year interval and developed fire-dependent communities, including extensive pine savannas and pine flatwoods that dominate MCB Camp Lejeune's forest landscape. Presettlement vegetation at MCB Camp Lejeune is thought to have consisted of pure longleaf on sandy soils in fire exposed locations, loblolly pine (*Pinus taeda*) in bottomlands and swamps, pond pine (*P. serotina*) in peatlands and mineral soils, and mixtures of longleaf and pond pine on moist savanna sites (Frost, 2001). Due to the area's complex landscape, relatively fire-intolerant hardwood communities also developed on naturally protected sites such as steep slopes, ravines, and excessively wet areas (Frost, 2001), these include Cypress-Gum Swamps, Mixed Mesic Hardwoods, and Coastal Plain Small Stream Swamps. There are several maritime ecological communities present on MCB Camp Lejeune as well, some of which have a moderate 3 to 5-year or greater disturbance regime (e.g., fire or inundation), and include Coastal Fringe Evergreen Forests, Dune Grass, and Salt Marsh.

Approximately 90,000 acres of MCB Camp Lejeune are managed forestland. Impact areas such as the G-10, K-2 and BT-3 are used exclusively for military training and are not managed (Figure 2-2). Pure pine, pure hardwood, and mixed/pine hardwood stands are the dominant forested vegetation types found on MCB Camp Lejeune. Approximately 75 percent of pine acres are loblolly pine, with the remaining pine consisting of longleaf pine, pond pine and planted slash pine (*Pinus elliottii*). Several species of hardwoods are present at MCB Camp Lejeune including black gum (*Nyssa sylvatica*), sweet gum (*Liquidambar styraciflua*), southern red oak (*Quercus falcata*), white oak (*Q. alba*), red maple (*Acer rubrum*), and yellow poplar (*Liriodendron tulipifera*). Shrub species composition varies with wetness, but generally consists of wax myrtle (*Myrica cerifera*), blue huckleberry (*Gaylussacia frondosa*), and sparkleberry (*Vaccinium arboreum*). Groundcover species vary with the degree of land disturbance and fire regimes, but can include wiregrass (*Aristida stricta*) in longleaf pine savannas, bracken fern (*Pteridium aquilinum*), and bluestems (*Schizachyrium* spp.), as well as more disturbance tolerant

species such as greenbriar (*Smilax* spp.) and broomsedge (*Andropogon virginicus*) (USMC 2006).

Jurisdictional and planning level wetland delineations have identified over 55,000 acres, of wetland at MCB Camp Lejeune, encompassing approximately 44 percent of the Base’s land area. Approximately 28 percent of the land area of the Main Base and 62 percent of the land area at GSRA are comprised of wetlands. Wetlands at GSRA are part of the Great Sandy Run Pocosin, Shelter Swamp, Sandy Run Swamp, Juniper Swamp, and Big Shakey Swamp. Wetlands on the Main Base are more closely associated with broad creek basins and the coastal marshes. Wetlands at MCB Camp Lejeune are primarily classified as forested palustrine and coastal estuarine systems.

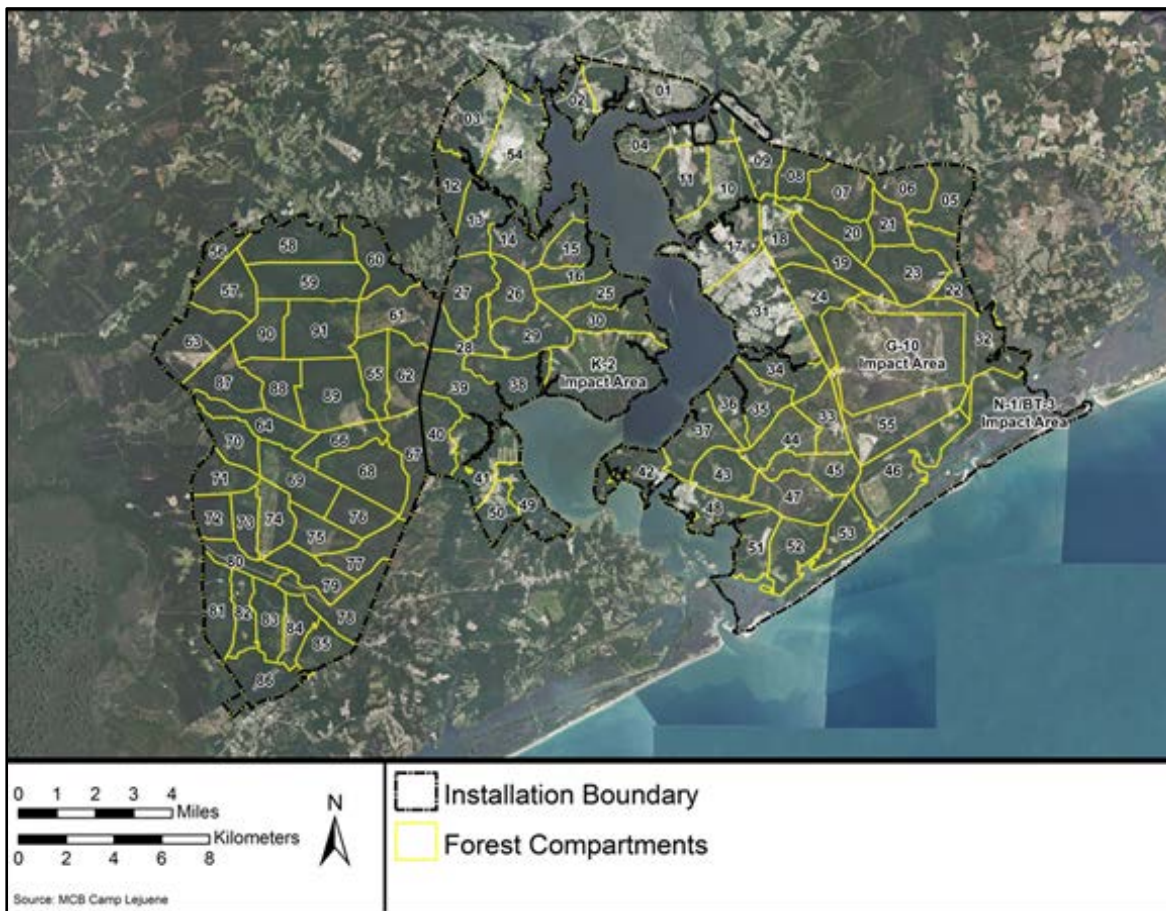


Figure 2-2. MCB Camp Lejeune includes approximately 90,000 acres of managed forest compartments

3.0 DESCRIPTION OF THE PROPOSED ACTION

The proposed action is to implement a revised INRMP to direct natural resources management activities on MCB Camp Lejeune for the period 2015-2020. The revised INRMP would carry

over the majority of the existing goals, objectives, and management actions from the current INRMP; but would also initiate a number of new management strategies to deconflict and more fully integrate training and conservation objectives. The majority of the actions that would be implemented under the revised INRMP are consistent with the terms and conditions and conservation measures of the prior consultations described above. The majority of the proposed management changes under the revised INRMP would be changes in the protocols for planning and prioritizing the implementation of management actions. The proposed action would not include any significant changes to existing management systems or current methods of implementing management treatments.

3.1 General Management Approach

Under the proposed action, MCB Camp Lejeune would continue to implement an ecosystem-based management approach emphasizing the restoration of longleaf pine to its native distribution on Mainside and Verona Loop, frequent growing season prescribed burning across the base, ecological thinning to restore historical pine densities, and efforts to control encroaching midstory hardwoods. Changes under the revised INRMP would include a goal to increase both the frequency of prescribed burning across the base and the proportion of prescribed burns that are conducted during the growing season. These changes in prescribed burning would be designed to more closely replicate the historical natural fire regime on MCB Camp Lejeune by burning as much of the base as possible during the growing season on a 3-year rotation. As a strategy to meet this goal, MCB Camp Lejeune would also pursue aerial ignition prescribed burning capabilities.

An additional change would include the suspension of longleaf pine restoration efforts on GSRA during the ongoing planning process for the Tactical Vehicle Maneuver Areas (TVMA) range development initiative. The ongoing process of planning and designing maneuver ranges on GSRA precludes the identification of suitable longleaf pine restoration sites at this time. In order to avoid inefficient and ineffective resource allocation, longleaf pine restoration on GSRA would be put on hold pending completion of the range planning and design process. Potential longleaf restoration sites on GSRA would be reevaluated upon completion of the planning/design process or at the end of the 5-year INRMP period, whichever comes first. Finally, MCB Camp Lejeune will no longer consider 5-acre patch cuts as a method of regenerating longleaf or loblolly pine stands. Instead regeneration will be accomplished with modified two-aged management, or uneven-aged management.

3.2 Threatened and Endangered Species Management

3.2.1 Red-cockaded Woodpecker (RCW)

Population Management and Monitoring

The majority of the population management strategies and actions under the revised INRMP would be consistent with the terms and conditions and conservation measures of prior consultations. MCB Camp Lejeune would continue to manage for recovery in accordance with the current RCW Mission Compatible Goal (MCG) of 173 active clusters. Consistent with the current INRMP and the RCW Recovery and Sustainment Plan (RASP), MCB Camp Lejeune would continue to implement an aggressive RCW population growth strategy on Mainside and Verona Loop while exploring opportunities to address constraints on mission capabilities through the establishment of some recovery clusters on off-base properties. Under the revised INRMP, the goal for population growth would be to maintain the current 5 percent average annual growth rate. MCB Camp Lejeune would continue to manage all designated RCW areas for potential future occupation through the application of an ecosystem management approach, including the restoration of longleaf pine to its historical native distribution on Mainside and Verona Loop and the application of frequent growing season prescribed burns.

As part of the overarching strategy to deconflict and integrate training and conservation objectives, the revised INRMP would establish new protocols for planning and prioritizing the establishment of new recruitment clusters through artificial cavity provisioning. Under this approach, there will no longer be designated “high-use training areas.” Instead, the Threatened and Endangered Species Section would coordinate with the G3 to ensure that no new recruitment clusters are intentionally established in highly used training areas until all other areas are occupied, unless approved by G3. Whether a new cluster is to be marked will be determined through coordination between Environmental Management Division and G3 at the time of installation based upon the expected impact on tactical maneuver by operating forces. Decisions regarding cluster placement would be made on a case-by-case basis; however, it is expected that this approach would primarily affect cluster placement in the vicinity of highly used training areas surrounding Combat Town and the G-10 impact area. Most of the suitable habitat in the Combat Town/G-10 area is currently occupied; and consequently, changes in patterns of cluster placement are expected to be minimal.

In an effort to assess impacts of tactical vehicle maneuver training in RCW habitat, a monitoring plan to assess effects on habitat would accompany future training corridor projects such as the Beach to Combat Town Maneuver Corridor (BCTMC). Camp Lejeune will proceed with the development of the BCTMC under the assumption that off-road tactical vehicle maneuver is not compatible with RCW management practices. The implementation period for the revised INRMP

would be used to monitor and evaluate RCW responses to off-road maneuver to validate or invalidate this assumption. The BCTMC and associated impacts will be addressed in a future biological assessment.

Cluster Management and Protection

The majority of the cluster management and protection activities under the revised INRMP would be consistent with the terms and conditions and conservation measures of prior consultations. The proposed action would retain MCB Camp Lejeune's currently adopted training restrictions. The revised INRMP would establish a policy that any new clusters that become established in highly used training areas through pioneering would remain unmarked for training purposes. However, these clusters would become part of the installation's approved percentage of unmarked clusters. Otherwise, current policies for marking and unmarking clusters and removing training restrictions from clusters as population milestones are met would continue to apply under the revised INRMP. As an additional new measure to reduce current constraints on training, specific clusters that are currently located in highly used training areas may receive targeted management treatments to adjust the distribution of cavity trees. All methods and techniques employed in cluster reconfiguration efforts would be consistent with the terms and conditions and conservation measures of prior consultations.

Habitat Management

All RCW habitat management actions under the proposed action would be consistent with the terms and conditions and conservation measures of prior consultations. The proposed action would continue the current practice of partition-level habitat management in all habitats designated for the RCW (Figure 3-1). MCB Camp Lejeune would continue to manage partitions toward a minimum of 120 acres of good quality foraging habitat in accordance with the 2003 RCW recovery plan. It is recognized that restoration of longleaf pine may result in temporary degradation of habitat, in the short term. During the restoration process, the goal will be to maintain 120 acres of suitable foraging habitat, not necessarily good quality foraging habitat. The existing silvicultural system and associated methods of treating RCW habitat through timber stand improvements would continue under the revised INRMP. Consistent with the current INRMP, partitions would be treated on a 10-year cycle with more frequent treatments as necessary to address cluster-specific habitat requirements. MCB Camp Lejeune would continue to manage all designated RCW areas for general habitat improvement through the application of an ecosystem management approach, including the restoration of longleaf pine to its historical native distribution on Mainside and Verona Loop and the application of frequent growing season prescribed burns.

Military Training in RCW Clusters

Although not a management action, training in RCW clusters is tied to management through Camp Lejeune’s RCW cluster buffer marking and system of population milestones that allow for cluster buffers, and training restrictions to be removed. Training in clusters has the potential to result in take of RCW. In the 2007 INRMP, impacts due to training activities were minimized by adhering to a set of guidelines adapted from the U.S. Army (MCB Camp Lejeune, 2007). These guidelines, found in Table 6-1, restrict certain training activities within RCW clusters.

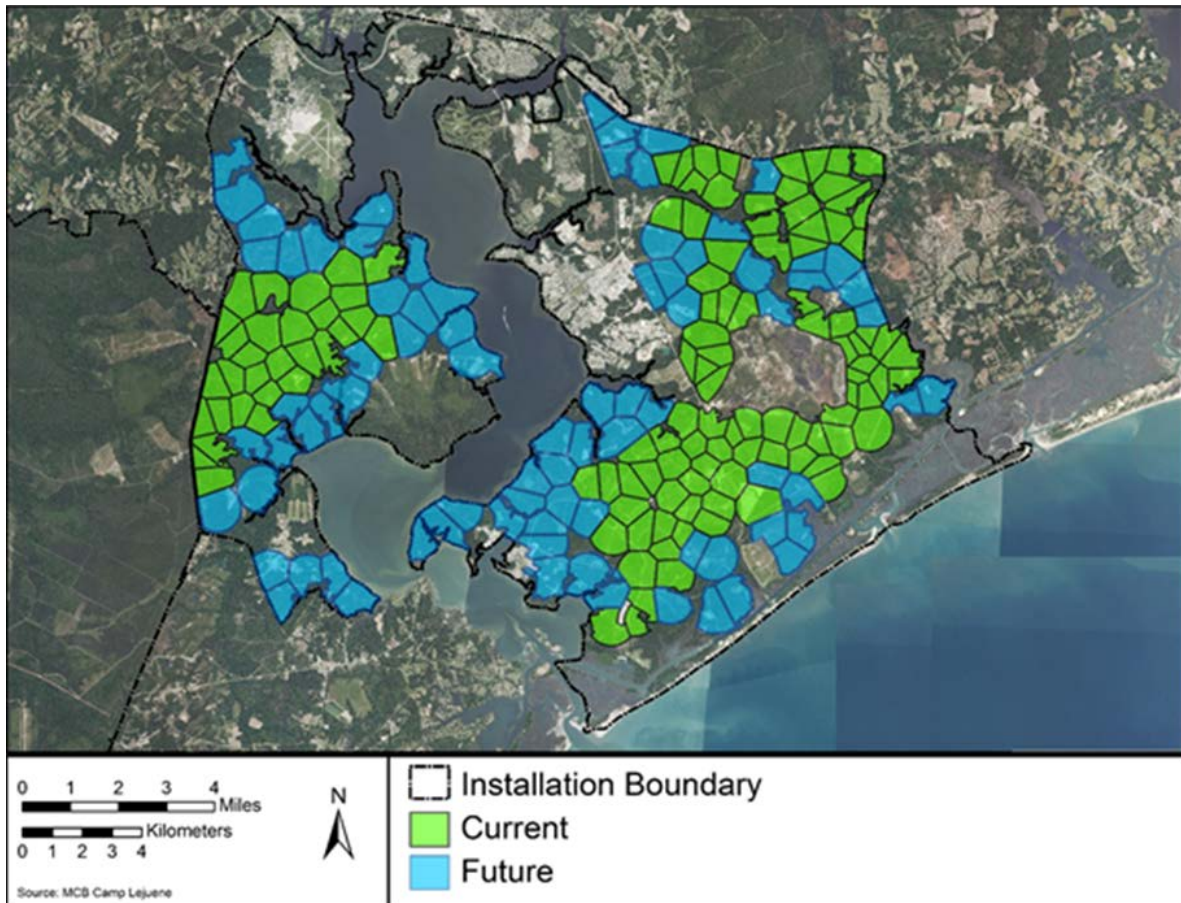


Figure 3-1. Red-cockaded woodpecker management partitions on MCB Camp Lejeune

3.2.2 GSRA Incidental Take Agreement

In support of the overarching goal to deconflict and integrate training and natural resource management objectives, the revised INRMP would establish an agreement with the USFWS that any new occurrences of threatened and endangered species appearing on GSRA as a result of beneficial fire management and/or other natural resource management practices would not result in additional constraints on training or range development capabilities.

Due in large part to rapid RCW population growth and associated reductions in training capabilities on Mainside and Verona Loop, the development and maintenance of minimally constrained tactical vehicle maneuver capabilities on GSRA is now critical to the current and future success of the training mission. Although listed species are not currently a significant training constraint on GSRA, MCB Camp Lejeune is concerned that prescribed burning and other beneficial natural resource management practices may lead to the establishment of new listed species occurrences, thereby further impacting mission capabilities and increasing training pressures on existing listed species populations on Mainside and Verona Loop.

The current emphasis on maintaining the capabilities of GSRA to support as yet undetermined future mission requirements has in turn impeded the implementation of beneficial natural resource management actions on GSRA as well as the development of conservation partnerships for the management of adjacent properties. The incidental take agreement would ensure continued access to GSRA for minimally constrained tactical vehicle maneuver training, thereby allowing MCB Camp Lejeune to implement beneficial ecosystem management practices and pursue regional conservation partnerships without concern of compromising future training missions.

The agreement established with the USFWS under the revised INRMP would pre-authorize incidental take for any new occurrences of listed species on GSRA above an established baseline. The agreement would reaffirm and clarify an agreement already in place for the RCW on GSRA, but would also cover all species currently listed under the ESA, as well as any species that might become federally listed in the future. In the case of the RCW, the established baseline for the entire GSRA would be zero clusters. The baseline for rough-leaved loosestrife would include all currently known occurrences on GSRA. The baseline for all other currently listed species within the recently surveyed TVMA study area would also be zero (Figure 3-2).

Baselines for currently listed species on remaining portions of GSRA would be established as surveys are completed. In the case of species that may become listed in the future, baselines would not apply and the agreement would pre-authorize incidental take for all existing occurrences and all occurrences that may become established in the future either prior to or after listing. This agreement would apply to any incidental take resulting from all training activities and range development projects, as well as any supporting infrastructure and facility development projects. All consultation requirements associated with this agreement would be completed during this current consultation for the revised INRMP. Subsequent to the revised INRMP consultation, any listed species that appear as a result of prescribed fire or other habitat management activities could be taken without further USFWS approval or consultation. Camp Lejeune would notify USFWS of any incidental take in annual INRMP updates.

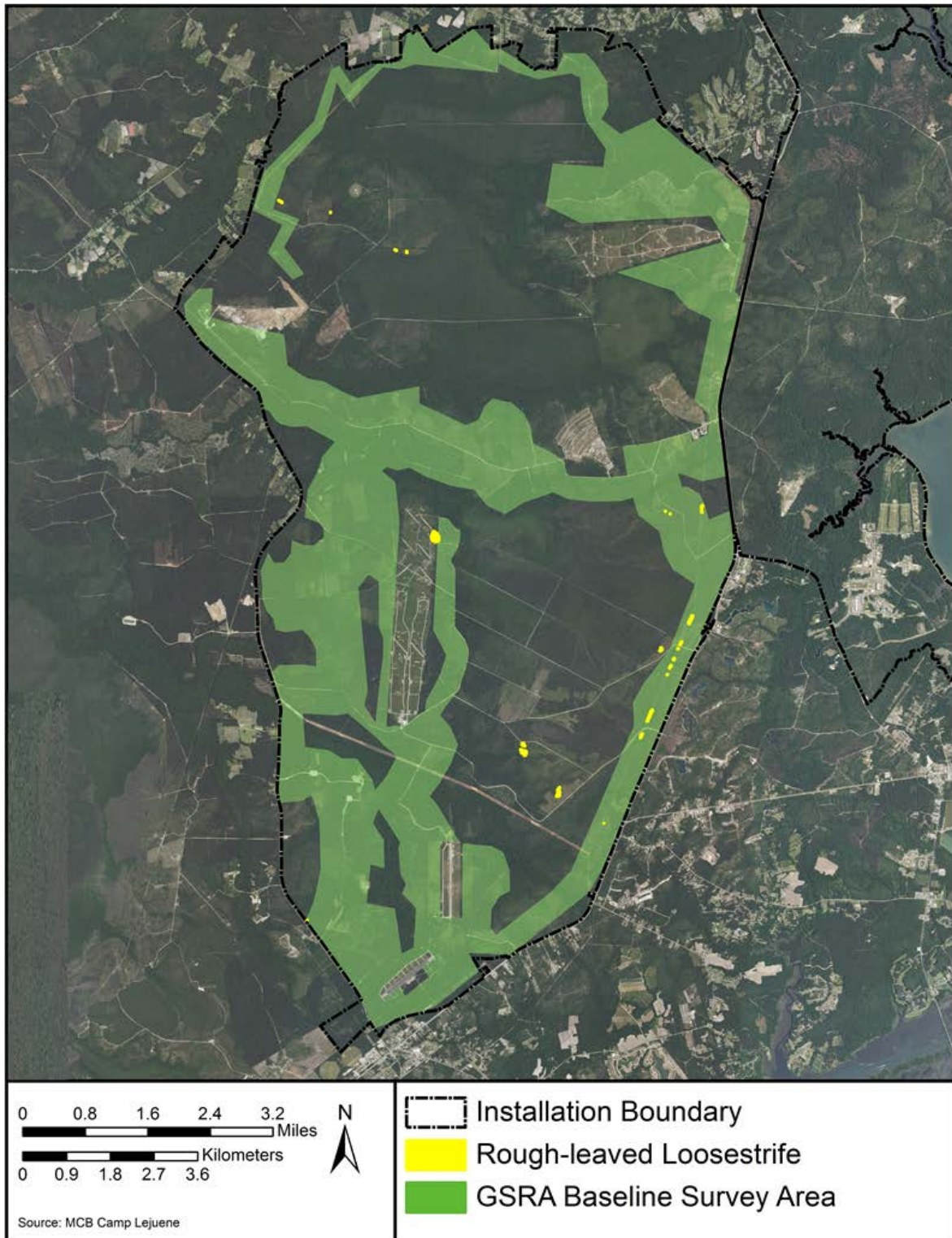


Figure 3-2. Map of known GSRA baseline populations of listed species and survey area

3.3 Forest Management

Most of the forest management actions implemented under the revised INRMP would be consistent with the terms and conditions and conservation measures of prior consultations. Consistent with the current INRMP, forest compartments would be treated on a 10-year cycle with more frequent treatments as necessary to address specific RCW habitat requirements. MCB Camp Lejeune would continue to restore longleaf pine to its native distribution on Mainside and Verona Loop. Methods of longleaf pine regeneration would continue in accordance with those described in the current INRMP. The only changes in forest management that would not be consistent with prior consultations would involve the suspension of longleaf pine restoration efforts on GSRA during the ongoing planning process for the Tactical Vehicle Maneuver Areas (TVMA) range development initiative, and elimination of 5-acre patch cuts as a method of timber stand regeneration. The ongoing process of planning and designing maneuver ranges on GSRA precludes the identification of suitable longleaf pine restoration sites at this time. In order to avoid inefficient and ineffective resource allocation, longleaf pine restoration on GSRA would be put on hold pending completion of the range planning and design process. Potential longleaf restoration sites on GSRA would be reevaluated upon completion of the planning/design process or at the end of the five-year INRMP period, whichever comes first. The elimination of 5-acre patch cuts for regeneration will leave two options; modified two-aged management, and uneven-aged management, which are consistent with 2003 RCW recovery plan.

3.4 Wildland Fire Management

Wildland fire management under the revised INRMP would continue in a manner consistent with the terms and conditions and conservation measures of prior consultations. The revised INRMP would pursue a strategy of increasing both the frequency of prescribed burning and the proportion of prescribed burns that are conducted during the growing season. These changes in prescribed burning would be designed to more closely replicate the historical natural fire regime on MCB Camp Lejeune by burning as much of the base as possible during the growing season on a 3-year rotation, especially in designated RCW habitat. As a strategy to meet this goal, MCB Camp Lejeune would also pursue aerial ignition prescribed burning capabilities.

3.5 Coastal Area Management

The training areas on Onslow Beach support specialized amphibious training operations, in addition to recreational use. Amphibious training and beach driving, have the potential to accelerate natural erosion of beach and barrier dunes, and impacting maritime communities. In addition, Brown's Island is the N1/BT-3 impact area and is critical for live fire operations. MCB Camp Lejeune may stabilize and protect coastal dunes through seasonal driving restrictions, replanting dune grasses, and periodic installation of sand fences to facilitate dune formation.

4.0 PROTECTED SPECIES AND CRITICAL HABITAT CONSIDERED AND EVALUATED

4.1 Federally Listed Species Occurring in the Action Area

The following assessment includes species that are currently listed or proposed for listing as threatened or endangered under the ESA; as well as candidate species for listing that have the potential to occur within the proposed action area. Table 4-1 lists those species documented in or with the potential to occur on MCB Camp Lejeune.

The 2015-2020 INRMP only addresses resource management activities that will occur on land. These management activities will not affect federally listed marine species including northern right whale (*Eubaleana glacialis*), fin whale, (*Balaenoptera physalus*), humpback whale (*Megaptera novaeangliae*), sei whale (*B. borealis*), sperm whale (*Physeter catadon*), West Indian manatee (*Trichechus manatus*), smalltooth sawfish (*Pristis pectinata*), and shortnose sturgeon (*Acipenser brevirostrum*). However, because INRMPs are the means by which justification is made for exemption from critical habitat, protective measures for marine mammals and sea turtles in the water are included in this INRMP.

The USFWS Endangered Species Database lists the leatherback (*Dermochelys coriacea*), Kemp’s Ridley, (*Lepidochelys kempii*), and hawksbill (*Eretmochelys imbricata*) sea turtles as occurring in Onslow County; therefore, these species have the potential to occur on MCB Camp Lejeune. However, these species have not nested on MCB Camp Lejeune since monitoring began in 1979; therefore, they are not assessed in this BA. However, as with federally listed marine mammals, in-water protective measures protect listed species in the marine environment, and can be used to justify exemption from in-water critical habitat. If these species were to nest on MCB Camp Lejeune in the future, the conservation benefits and potential impacts would be very similar to those for the loggerhead and green sea turtles assessed in this BA.

Table 4-1 Federally listed species occurring or with the potential to occur in the action area

Common Name	Scientific Name	Status	Closest Likely Occurrence
BIRDS			
Red Knot	<i>Calidris canutus rufa</i>	Threatened	On Base –Onslow Beach, and Brown’s Island
Piping Plover	<i>Charadrius melodus</i>	Threatened	On base – Onslow Beach, and Browns Island

Table 4-1 Federally listed species occurring or with the potential to occur in the action area (Cont'd)

Common Name	Scientific Name	Status	Closest Likely Occurrence
Red-cockaded Woodpecker	<i>Picoides borealis</i>	Endangered	On base – Mainside, and Verona
REPTILES			
American Alligator	<i>Alligator mississippiensis</i>	Threatened/ Similarity of Appearance	On base – any freshwater pond or stream of adequate size
Loggerhead Sea Turtle	<i>Caretta caretta</i>	Threatened	On base – Onslow Beach, and Browns Island
Green Sea Turtle	<i>Chelonia mydas</i>	Threatened	On base – Onslow Beach, and Browns Island
PLANTS			
Seabeach Amaranth	<i>Amaranthus pumilus</i>	Threatened	On base – Onslow Beach
Golden Sedge	<i>Carex lutea</i>	Endangered	Off base – along Onslow/Pender County line.
Hirst’s Panic Grass	<i>Dichanthelium (=Panicum) hirstii</i>	Candidate	On base
Pondberry	<i>Lindera melissifolia</i>	Endangered	Off base - Cumberland and Sampson Counties. Reported on GSRA in 2004, but has not been relocated since.
Rough-leaved Loosestrife	<i>Lysimachia asperulaefolia</i>	Endangered	On base Mainside and GSRA
Cooley's Meadowrue	<i>Thalictrum cooleyi</i>	Endangered	Off base – approximately ½ mile north of Camp Lejeune

Source: USFWS 2014a; NCDENR 2014

4.2 Previously Accomplished Surveys

Surveys conducted in the last 5 years have documented known and new occurrences of federally listed T&E on MCB Camp Lejeune (Table 4-2).

Table 4-2 Recent federally listed threatened and endangered species surveys on MCB Camp Lejeune

Survey	Survey date
Inventory – Species of Interest	March 2010
Rare Species Survey – Proposed G-10 Impact Area Clearing	January 2012
Threatened and Endangered Plant Survey in Support of an Environmental Assessment on the Development of a Tactical Vehicle Maneuver Course in the Greater Sandy Run Area (DRAFT)	October 2014

5.0 BIOLOGY, STATUS, AND PAST MANAGEMENT ACTIONS OF FEDERALLY LISTED SPECIES

5.1 Piping Plover (*Charadrius melodus*)

5.1.1 Biology

Piping plovers are divided into three distinct breeding populations: the Atlantic Coast population (NC to Canada), the Great Lakes population, and the Northern Great Plains population. The wintering ranges of the three breeding populations overlap and include the South Atlantic and Gulf coasts from NC to northern Mexico as well as the Caribbean (USFWS 1996a). The breeding, migratory, and wintering ranges overlap in NC; and consequently, piping plovers can be found in the state during every month of the year (Cameron et al. 2006). Breeding sites in NC are confined to the undeveloped and unstabilized portions of barrier islands, most notably within the Cape Lookout National Seashore, Cape Hatteras National Seashore, Pea Island National Wildlife Refuge, and on Lea and Hutaff Islands (USFWS 2009b). Since 1986, the estimated number of breeding pairs in NC has ranged from 20 to 64 pairs (USFWS 2011a). North Carolina's barrier islands serve as important migratory stop over and wintering sites for all three breeding populations (Cameron et al. 2006). Generally, wintering plovers on the Atlantic coast are found at accreting ends of barrier islands near coastal inlets. Preferred foraging habitats include sandflats adjacent to inlets or passes, sandy mudflats along prograding spits, and overwash areas (USFWS 1996a). A total of 18 critical habitat units for the Atlantic Coast wintering population have been designated in NC from Dare County south to Brunswick County.

No critical habitat has been designated on MCB Camp Lejeune; however critical habitat units are located north of the base at Bogue Inlet and south of the base at New Topsail Inlet in Pender County. The primary constituent elements are associated with intertidal beaches and flats (mud flats, sand flats, algal flats, and washover passes) and associated dune systems and flats above high tide.

5.1.2 Status

The Great Lakes breeding population is currently listed as endangered; whereas, the Northern Great Plains and Atlantic Coast breeding populations are currently listed as threatened. All piping plovers on the Atlantic Coast wintering grounds are considered threatened under the ESA, regardless of breeding origin. The piping plover population in North Carolina belongs to the Southern Recovery Unit subpopulation of the Atlantic Coast population. Censuses indicate there were 333 breeding pairs in 2007 and 331 breeding pairs in 2008 in the Southern Recovery Unit. The number of breeding pairs of the Southern Recovery Unit increased between 2003 and 2007. Census data indicate that the Atlantic Coast population is the largest of the three populations, numbering approximately 1,427 breeding pairs (USFWS 2008). Recovery criteria for the Atlantic Coast population is 2,000 breeding pairs maintained over a five-year period, with the Southern Recovery Unit having a minimum subpopulation of 400 breeding pairs (USFWS 2009).

In 2009, a piping plover nest was found on Onslow Beach, and in 2011, two adult piping plovers and one chick were observed, but a nest was never located. The greatest numbers of breeding pairs documented in North Carolina occur north of Onslow Beach on Cape Hatteras and Cape Lookout National Seashores with 43 and 9 breeding pairs, respectively, documented in 2013 (Schweitzer 2013).

5.1.3 Management Actions

The May 2002 Biological Opinion on the Current Use and Modification of Training Areas, Dune Stabilization and Continued Recreational Use of Onslow Beach authorized incidental take for piping plovers in the form of harassing, disturbing or interfering with piping plovers attempting to nest, forage, or roost within the project area or on adjacent beaches as a result of military training activities or increased use of off-road recreational vehicles, recreational, pedestrian or animal traffic. This incidental take applied to 6.4 linear miles of foraging and roosting habitat on the frontal beach, and approximately 50 acres of sand and mud flats, sand spits, sparsely vegetated sand dunes and overwash habitat located on Onslow Beach adjacent to New River Inlet.

MCB Camp Lejeune maintains the portion of Onslow Beach outside the recreational and training beaches in a natural state. The inlets and large overwash flat on the south east end of Onslow Beach and the inlets and smaller overwash areas on Brown's Island provide relatively

undisturbed habitat for piping plovers and other shorebirds. MCB Camp Lejeune restricts entry into potential nesting habitat and limits beach driving during the nesting season. Additionally, MCB Camp Lejeune would continue its monitoring program for piping plovers and fully protect any nests found outside the training area.

5.2 Sea Turtles

5.2.1 Loggerhead Sea Turtle (*Caretta caretta*)

5.2.1.1 Biology

Loggerhead sea turtles are widely distributed throughout their range, occurring in areas hundreds of miles out to sea to inshore areas such as bays, lagoons, salt marshes, creeks, ship channels, and the mouths of large rivers (USFWS 2014b). Loggerheads typically nest on open beaches or along narrow bays that have suitable sand. In the U.S., nesting typically occurs from April through September, peaking in June and July. Loggerheads may nest one to seven times in a season, with an approximate 14-day interval. The typical incubation period is 49-75+ days, depending on incubation temperatures. Hatchlings usually emerge at night. Most hatchlings originating from the U.S. are thought to remain pelagic in the North Atlantic for as long as 7 to 12 years. Once juveniles reach a certain size they begin recruiting to coastal areas of the Western Atlantic to forage in estuaries, lagoons, bays, river mouths, and shallow coastal waters. Loggerheads typically reach sexual maturity at around 30 years, females will return to their natal beach for nesting.

5.2.1.2 Status

The loggerhead sea turtle was listed as threatened throughout its range in 1978 (43 Federal Register [FR] 32800) and in 2011 the listing was revised to include nine distinct populations segments (DPS). Four DPSs were listed as threatened and five listed as endangered (76 FR 58868). The Northwest Atlantic population, which includes North Carolina, is listed as threatened. There are many threats to the survival and recovery of loggerheads, these include loss and degradation of nesting habitat as a result of coastal development and beach armoring, hatchling disorientation from beachfront lighting, nest predation by native and non-native predators, degradation of foraging habitat; marine pollution and debris; watercraft strikes; disease; and incidental take from channel dredging and commercial trawling, longline, and gill net fisheries (USFWS 2014b).

Currently, nest protection efforts and beach habitat protection are underway in major nesting areas in the southeastern U.S. (USFWS 2014b). In addition, important nesting beaches are continually being acquired for long-term protection. Significant progress has been made reducing mortality from commercial fisheries in U.S. waters with the enforcement of turtle excluded

device requirements. However, due to the loggerhead's long range migratory life style, conservation efforts are severely compromised from fishery activities of other countries lacking adequate protection requirements and from illegal activities. Long-term international cooperation is needed for the recovery and stability of nesting populations.

The National Marine Fisheries Service and USFWS Five Year Review of the Loggerhead Turtle (2007a) summarizes current status of loggerheads from peer reviewed scientific publications; unpublished field observations by the USFWS, State, and other experienced biologists; unpublished survey reports; and notes and communications from other qualified biologists. Data show that from 1989 to 2005, the Northern Nesting Subpopulation (North Carolina south to northwestern Florida) had an average of 5,151 nests per year. From 1983 to 2005, standardized ground surveys of 11 North Carolina, South Carolina, and Georgia beaches showed a significant downward trend in loggerhead nesting of 1.9 percent annually. For the period of the previous INRMP, 2007 -2014, the number of nests documented on Onslow Beach averaged 48.5, with the greatest number, 72 nests, occurring in 2013, and the lowest, 30 nests occurring in 2005. The long term average, since 1979, is 43.6 nests, with a high of 85 in 1981, and a low of 7 in 2005.

5.2.2 Green Sea Turtle (*Chelonia mydas*)

5.2.2.1 Biology

The green sea turtle is distributed worldwide in tropical and subtropical waters. They generally inhabit shallow waters near reefs and in bays and inlets, and are attracted to areas with abundant sea grass and algae (USFWS 2012). Green sea turtles are found in deep sea locations during migration. Nesting typically occurs June through September in the southeastern U.S. Green sea turtles nest at 2, 3, or 4-year intervals; occasionally, successive year clutches may be produced. Nesting occurs at night. Locations are usually on beaches with a sloping platform with minimal distance to nesting locations. Females may produce up to nine clutches in a season, at about 13-day interval. Incubation lasts between 49-75+ days, depending on the incubation temperature. Green sea turtles reach sexual maturity at between 20 and 50 years. Females have strong nesting site fidelity, making long distance migrations between nesting and feeding locations.

5.2.2.2 Status

The majority of green sea turtles were listed as threatened in 1978 with the exception of breeding colony populations in Florida and on the Pacific Coast of Mexico that were listed as endangered (43 FR 32800). The major threat contributing to the decline of the green sea turtle is the commercial harvest for eggs and meat (USWS 2012). In addition, the Fibropapillomatosis disease that results in the development of multiple tumors on the skin and internal organs has been identified as a major cause of mortality. As with the loggerhead, green sea turtle

populations are also impacted by loss and degradation of nesting habitat and hatchling disorientation from beachfront lighting.

The National Marine Fisheries Service and USFWS Five Year Review of the green sea turtle (2007b) summarizes current status of green sea turtles taken from 46 worldwide evaluation sites. North Carolina falls within the Western Atlantic region, but no North Carolina nesting sites are included in reproductive analyses. The major nesting sites in the Atlantic Ocean occur on Ascension Island, Aves Island, Costa Rica, and Surinam. In the U.S., the major nesting location of the Western Atlantic region occurs in Florida, with smaller numbers nesting in Georgia, South Carolina, and North Carolina. Within the Western Atlantic region, population trends at assessed nesting locations appear to be increasing or stable (NMFS and USFWS 2007b). Green sea turtles rarely nest on Onslow Beach, with only two nests documented in the last five years, both in 2013 (MCB Camp Lejeune Survey Data).

5.2.3 Management Actions

MCB Camp Lejeune monitors approximately 7 miles of Onslow Beach each year from mid-May through August. Daily surveys are conducted for sea turtle crawls and the number and location of crawls are documented. If individual turtles are located, personnel document tag information and record size data. Night surveys are undertaken if night training is scheduled to occur during the nesting season to provide immediate protection of nests. If nests are found within the amphibious training beach they are relocated. As the nests near the end of incubation, they are checked each morning for signs of hatching, hatchling emergence, or predation. In addition, nests that are below the mean high tide line are eligible for relocation. After hatching, hatchling tracks are counted to estimate a measure of success before the completion of nest inventory.

Driving on Onslow Beach is restricted to training areas only from April 1 to August 31 to coincide with the shorebird and sea turtle nesting season. Recreational driving is permitted on the beach to the inlet outside of the nesting season.

5.3 Red-cockaded Woodpecker (*Picoides borealis*)

5.3.1 Biology

The historic range of RCW extended from east Texas and Oklahoma, north to Missouri, and east to Virginia, Maryland and Delaware, and was found in all states to the south (DoD and USFWS 2006). Due to the loss of open pine woodlands and savannas that once dominated the southeast, RCW range has decreased to regions of east Texas and Oklahoma, east through Arkansas and Louisiana to North Carolina, and the states south; being extirpated from Missouri, Tennessee, Kentucky, Virginia, Maryland, and Delaware. As discussed above, RCW requires open pine woodlands and savannas with large old pines for cavity trees; foraging habitat is typically mature

pine habitat, with little or no hardwood midstory, and typically has a groundcover dominated by native bunch grasses and forbs.

RCWs live in cooperative social family groups consisting of up to 10 birds, usually consisting of a single breeding pair and helpers, which are usually male offspring from previous years (USFWS 2003; DoD and USFWS 2006). Each bird generally roosts in its own cavity; the collection of these cavity trees forms the cluster. One brood is usually produced from one or two nesting attempts. Clutch sizes generally range from two to four eggs, with an average of two young fledged from successful nests.

5.3.2 Status

Red-cockaded woodpecker was listed as endangered in 1970 (35 FR 16047), but was not given federal protection until passage of the ESA in 1973. There are several threats to the existence and recovery of RCW. Foremost among these is the loss of open pine woodlands and savannahs with old pines used as cavity trees. Cavity trees must be in open stands with very little to no hardwood midstory and few to no hardwood overstory trees. Fire suppression allows for hardwood encroachment which leads to cavity abandonment. Also needed is abundant foraging habitat comprised of mature pines with an open canopy low densities of small pines, little or no hardwood or pine midstory, few or no overstory hardwoods, and abundant native bunchgrass and forb groundcovers. The lack of cavity trees, and potential cavity trees, increases the fragmentation and isolation of breeding groups, which decreases genetic diversity. In addition, habitat fragmentation limits the number of potential breeding groups by increasing isolation that disrupts dispersal of helpers and breeder replacements.

In 2003, there were an estimated 14,068 individual RCWs living in 5,627 known active clusters in eleven states, less than 3 percent of the estimated population at the time of European settlement (USFWS 2003). In 2006, the population was estimated to be 15,150 (DoD and USFWS 2006). In accordance with the *2003 Recovery Plan for the Red-cockaded Woodpecker*, the recovery goal of the Coastal North Carolina Primary Core for delisting is 350 active clusters, of which 173 would be on MCB Camp Lejeune. Since 2007, the number of active clusters on MCB Camp Lejeune has increased each year to the current number of 117, with a total of 320 birds (MCB Camp Lejeune Survey Data).

5.3.3 Management Actions

In 1999, MCB Camp Lejeune coordinated with the USFWS to develop the Mission-Compatible, Long-Range RCW Management Plan (1999 RCW Plan). The plan was endorsed in December 1999 with implementation initiation in 2000. A Biological Opinion supporting plan implementation was signed November 30, 1999. The 1999 RCW Plan established a mission-

compatible RCW goal of 173 active clusters, outlined management strategies, and accounted for incidental take.

In the 2007 INRMP, MCB Camp Lejeune introduced the concept of partition-level management, unmarked clusters only in high-use training areas, and population milestones which, when met, would allow MCB Camp Lejeune to remove buffers from an increasing percentage of RCW clusters.

In the 2015 INRMP, partition level management will remain essentially unchanged from 2007. With the exception of GSRA, MCB Camp Lejeune will continue to manage for a minimum of 120 acres of good quality habitat as defined in the 2003 RCW Recovery Plan. For planning purposes, the objective of partitions is an average of 200 acres of suitable or potentially suitable habitat, as recommended in the 2003 RCW Recovery Plan. A goal in this INRMP will be to increase the frequency of burning across the Base, and move closer to an average of a 3-year return interval, with an increasing percentage of burning occurring in the growing season.

5.4 Red Knot (*Calidris canutus rufa*)

5.4.1 Biology

Red knots migrate annually from their breeding grounds in the Canadian Arctic and wintering grounds in the Southeast U.S., the Northeast Gulf of Mexico, northern Brazil, and Tierra del Fuego at the southern tip of South America (USFWS 2013a). Red knots nest in dry, slightly elevated tundra, usually on windswept slopes with sparse vegetation. Only one clutch is laid per season. Females will not lay a second clutch if the first fails. Typical clutch size is four eggs, which hatch after about 22 days. Chicks are fully fledged after about 25 days. Adults begin their migration to wintering grounds around August 10 and the juveniles follow several days later.

Wintering habitat generally has large areas of exposed intertidal sediments (USFWS 2013a). Knots use the tidal mudflats in Maryland and along North Carolina's barrier islands during migration. High quality roosting habitat for wintering and migratory stopover is close to foraging areas, provides protection from predators, has sufficient space during high tides, and is free from excessive human disturbance.

5.4.2 Status

The red knot was listed as threatened by the USFWS in December 2014. The primary threats facing the red knot include loss of both breeding and nonbreeding habitat; reduced prey availability throughout the nonbreeding range; and increasing frequency and severity of asynchronies ("mismatches") in the timing of the birds' annual migratory cycle relative to favorable food and weather conditions. The greatest threat is the reduction of availability of horseshoe crab eggs as a result of increased commercial and medical harvesting of horseshoe

crabs (USFWS 2005). Additionally, rising temperatures as a result of climate change will cause a loss of habitat across its range from sea-level rise, shoreline stabilization, and Arctic warming.

Current population estimates for the mid-Atlantic red knot migratory population are 44,680 stopping in Delaware Bay in 2012, and 12,611 to 14,688 stopping annually in Virginia from 2007 to 2010 (USFWS 2013a). The wintering population in the southeast (Virginia, North Carolina, South Carolina, Georgia, Florida, Louisiana, Alabama, and Mississippi) from 1999 to 2002 was estimated to be approximately 11,700, with the greatest numbers occurring in Florida and Georgia. Overall, it is estimated that red knot numbers declined in the 2000's and have stabilized at a relatively low level. However, data indicate that the southeast wintering population did not decline over the same time period, likely as a result of geographic shifting of red knots from year to year within the region.

5.4.3 Management Actions

Management actions previously discussed for the south end of Onslow Beach for piping plover and sea turtles would also benefit red knots migrating through, or wintering on MCB Camp Lejeune.

5.5 American Alligator (*Alligator mississippiensis*)

5.5.1 Biology

American alligators range from coastal North Carolina south to south Florida and the Keys and west throughout the south to central Texas and extreme southeastern Oklahoma (USGS 2009). They typically inhabit freshwater, in slow-moving streams, lakes, swamps, and marshes. They can tolerate salt water for a short period of time, but lack salt glands (Smithsonian National Zoological Park, No date.).

Alligators nest in May, with nests constructed from vegetation in mounds 7 to 10 feet in diameter and 2 to 3 feet in height. On average, the female lays 35 to 50 eggs, which are then covered by vegetation and will incubate for approximately 65 days. Eggs begin hatching near the end of August. Female alligator aggressively defend juvenile alligators for the first few years. Maturity is reached at six years of age.

5.5.2 Status

The American alligator was listed as endangered in 1967 (32 FR 4001). Due to the protection provided it from the ESA, populations quickly rebounded and it was considered recovered by the USFWS. Due to its similarity of appearance to the federally endangered American crocodile (*Crocodylus acutus*), the American alligator is listed as threatened due to similarity of appearance T(S/A). In the U.S., populations of the American crocodile are limited to Florida.

Because the American alligator is considered recovered, federal actions that may affect alligators are not subject to Section 7 consultation under the ESA.

MCB Camp Lejeune supports a healthy population of American alligator. MCB Camp Lejeune has been monitoring alligator populations since 1980, and the population appears to be stable or increasing slightly (MCB Camp Lejeune Survey Data).

5.6 Seabeach Amaranth (*Amaranthus pumilus*)

5.6.1 Biology

Seabeach amaranth is an annual plant with low, relatively prostrate growth. It is a fleshy plant with rounded, dark green leaves (1-2 cm long) clustered near the tips of fleshy, reddish stems (USFWS 2014c). Germination occurs from April to July, with a small sprig initially forming, but quickly branching into a clump that binds sand that accumulates at its base. Flowers are yellow and inconspicuous, start to bloom in June, with seed produced in July through senescence in early winter. Seed dispersal may occur by wind, water and possibly birds.

Seabeach amaranth is endemic to Atlantic Coast beaches and barrier islands (USFWS 2014c). Its historical range extended from Massachusetts to South Carolina, although it is currently believed to only occur in North Carolina, South Carolina, and New York. Its primary habitat is on sandy ocean beaches in the sparsely vegetated zone of lower foredunes, upper strands of non-eroding beaches (landward of the wrackline), and outwash flats at accreting ends of islands.

5.6.2 Status

Seabeach amaranth was listed by the USFWS as threatened in April 1993 (58 FR 18035). The primary threats to the continued existence of seabeach amaranth are beach stabilization (particularly the use of beach armoring, such as sea walls and riprap), beach erosion and tidal inundation, beach grooming, pedestrian traffic, mechanical beach raking, herbivory by insects and feral animals, and in some circumstances off-road recreational vehicle use (USFWS 2011b).

As reported in the 2007 5-Year Review, in North Carolina, seabeach amaranth numbers fluctuated from a high in 1995 of 20,716 plants to a low in 2000 of 57 plants. However, it should be noted that since 2000, numbers steadily increased to 13,740 in 2005. Surveys on MCB Camp Lejeune over the past six years also had fluctuating numbers with 1 identified in 2009, 31 in 2010, 6 in 2011, 3 in 2012, 1 in 2013, and 27 in 2014 (MCB Camp Lejeune Survey Data). Areas in which seabeach amaranth has been found on MCB Camp Lejeune are shown in Figure 5-1.

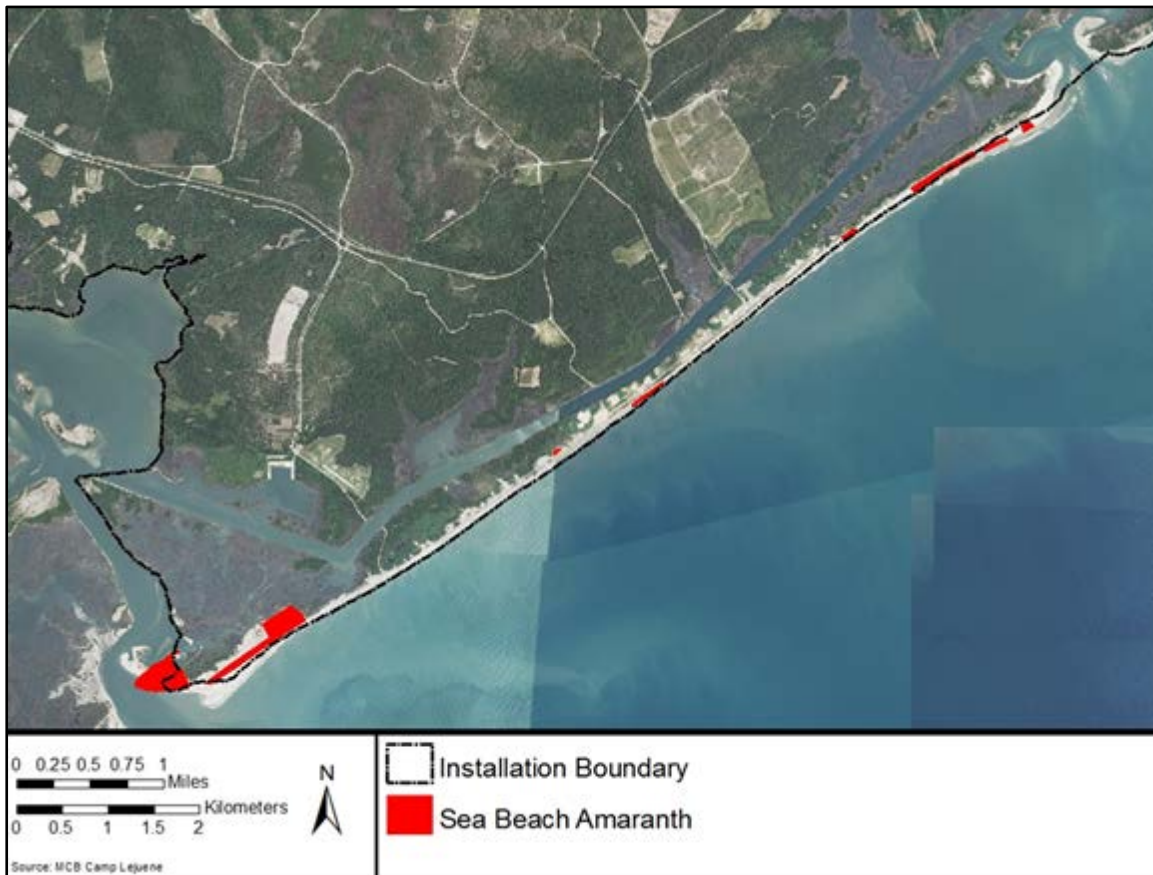


Figure 5-1. Locations of seabeach amaranth on Onslow Beach over the past 5 years

5.6.3 Management Actions

Surveys for seabeach amaranth are conducted in late June when plants are small, but large enough to locate and distinguish. Searches are conducted on foot on upper beach shelves between the wrack line and primary dune line, and all overwash areas. Observations are recorded either as individuals (fewer than three plants/square meter) or as segments (greater than three plants/square meter), individual plants are counted and recorded. Surveys are conducted again in mid to late August when plants are fully-grown and flowering. Locations in which seabeach amaranth has been identified are marked with signs to prevent impacts from military training, beach driving, and pedestrian traffic from harming the plants. The plants are also monitored for webworm herbivory or other causes of mortality. Potential habitat in overwash areas is protected from vehicle traffic year-round with a system of poles and signs designed to keep drivers to the seaward side of certain areas.

5.7 Rough-leaved Loosestrife (*Lysimachia asperulaefolia*)

5.7.1 Biology

Rough-leaved loosestrife is a perennial herb. Its growth form is erect, with mostly unbranched stems, growing to a height of 12 to 24 inches (North Carolina Natural Heritage Program [NCNHP] 2001; USFWS 2011a). Leaves are bluish-green, strongly triangular, and conspicuously whorled in threes or fours; the name ‘rough-leaved’ is a misnomer as leaves are mostly smooth in texture (Weakley 2008; USFWS 2011a). Small, stalked glands are present on most of the plant, especially leaf bases (NCNHP 2001; USFWS 2011a). Flowers are produced at the top of the stem and are five-parted, yellow, and showy (Weakley 2008; USFWS 2011a). Flowers bloom from May to June and produce fruits enclosed by rounded capsules (NCNHP 2001).

The range of rough-leaved loosestrife is on the coastal plain and sandhills of North Carolina and South Carolina (USFWS 2011a). The majority of populations are small, both in extent and the number of stems in an area. This species typically grows in ecotones between longleaf pine uplands and pond pine pocosins. Preferred soils range from moist to seasonally saturated sands and sands under a shallow organic soil layer to deep peat soils. It may also be found on deep peat found in low shrub communities of large Carolina bays. It is also found in disturbed areas such as fire plow lines, roadside depressions, and power line rights-of-way (NCNHP 2001).

5.7.2 Status

Rough-leaved loosestrife was listed as federally endangered in 1987 (73 FR 43947). The most significant threats to rough-leaved loosestrife are fire suppression, wetland drainage, and residential and commercial development that alter or eliminate habitat (USFWS 2011).

The 1995 Rough-leaved Loosestrife Recovery Plan lists 64 extant populations, all but one of which are in North Carolina. MCB Camp Lejeune has documented approximately 46 acres of habitat occupied by rough-leaved loosestrife (Figure 5-2).

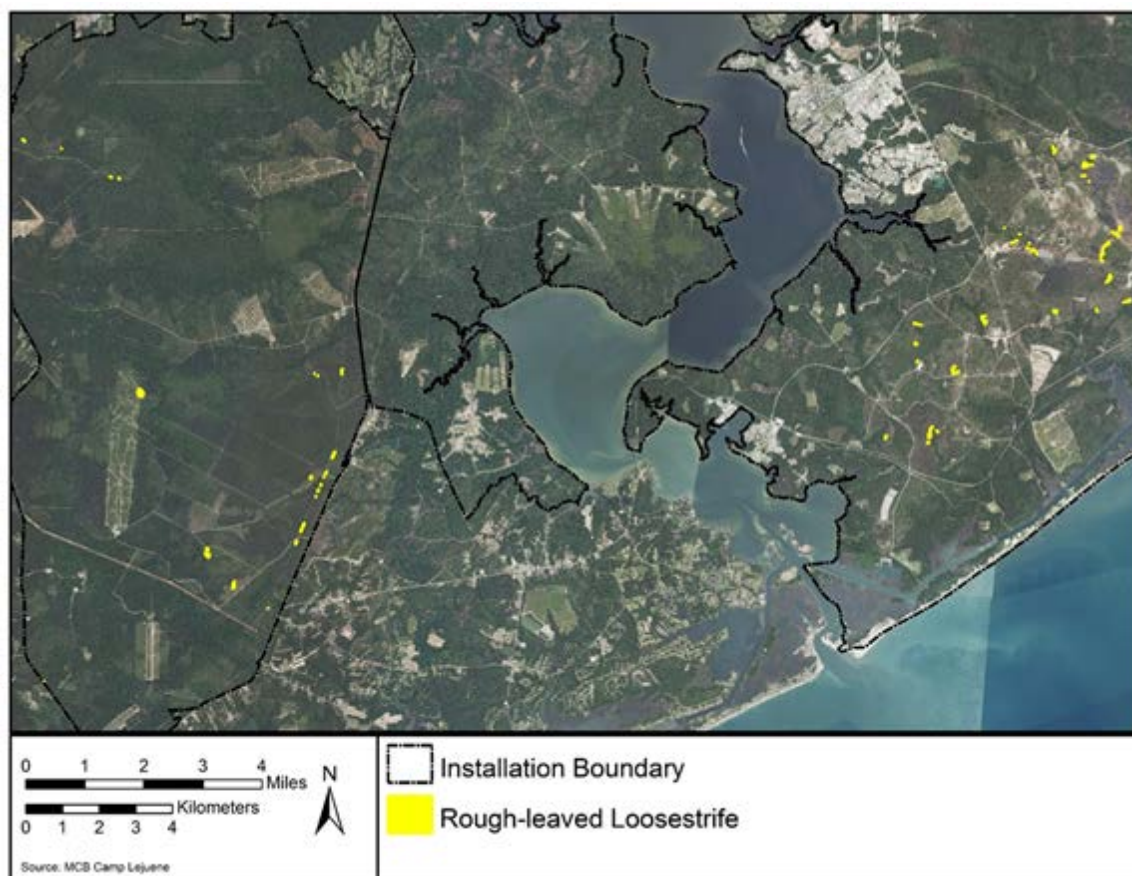


Figure 5-2 **Rough-leaved loosestrife locations on Marine Corps Base Camp Lejeune**

5.7.3 Management Actions

Rough-leaved loosestrife is managed on MCB Camp Lejeune through prescribed fire at a 2 to 3-year interval. This may be supplemented by mowing of shrubby vegetation in the winter when rough-leaved loosestrife is dormant. Areas with rough-leaved loosestrife in the Duke Energy utilities right-of-way are maintained through periodic mowing. Additionally, beneficial silvicultural measures, such as commercial thinning and harvest treatments that remove up to 25 percent of the canopy cover on rough-leaved loosestrife-occupied sites, may be employed to improve habitat conditions.

Areas with rough-leaved loosestrife on MCB Camp Lejeune are protected through the application of land restrictions for specific training, management, and construction activities. Sites are buffered and marked with signs identifying the area as a rough-leaved loosestrife site, and stating prohibited activities (no digging, no vehicles, and no bivouacs). The protective buffer extends 100 feet from the most peripheral individual plants. In total, the marked buffers protect approximately 188 acres of habitat. Most activity in the buffer zone is restricted with the

exception of walking, emergency response, authorized silvicultural activity, and actions necessary for the conservation of the species. Any activities that may impact rough-leaved loosestrife sites proposed in or near high probability habitat require a site survey by the Threatened and Endangered Species section prior to implementation of the activity.

In 2011, MCB Camp Lejeune completed a 10-year monitoring study developed by the North Carolina Plant Conservation Program. Since completion, MCB Camp Lejeune has monitored all known rough-leaved loosestrife sites on a 3-year cycle, with one third of the sites being monitored each year.

5.8 Cooley's Meadowrue (*Thalictrum cooley*)

5.8.1 Biology

Cooley's meadowrue is a perennial herb which grows erect in full sunlight, but becomes lax and trailing in partial shade (USFWS 1994). Height is generally 39 inches, although it may grow over 6 feet in height in recently burned areas (NCNHP 2001). Leaves grow both basally and from the stem and are divided into three to more leaflets. A high degree of variability exists in leaflet shape and length (USFWS 1994). Flowers are unisexual and without petals; however, male flowers present conspicuous lavender filaments. Sepals are present and range in color from green to pale yellow. Flowers bloom from June to July and fruits are tiny, narrow, and ribbed (USFWS 1994).

Cooley's meadowrue is endemic to the Southeastern Coastal Plain, yet its current range includes populations in North Carolina, Georgia, and Florida. Preferred habitat consists of wet pine savannas, grass-sedge bogs, savanna-like areas, and woodland clearings in relatively alkaline soils (Center for Plant Conservation [CPC] 2010a; USFWS 1994). The open to partially open habitat it requires can be achieved by fire or mowing regimes. Cooley's meadowrue is also found in disturbed areas such as fire plow lines, roadside ditches, and power line rights-of-way.

5.8.2 Status

Cooley's meadowrue was listed as federally endangered in 1989 (54 FR 5935). The primary threats to the continued existence of Cooley's meadowrue are the rarity of its habitat due to loss from fire suppression and subsequent ecological succession, forestry practices, and development due to the inadequate regulatory mechanisms to protect listed plants on private lands (USFWS 2009). In utilities rights-of-way, Cooley's meadowrue is threatened by the use of herbicides or mowing during critical growth periods.

Cooley's meadowrue was known to occupy 12 sites in North Carolina and 1 in Florida in 1994 when the 1994 Cooley's Meadowrue Recovery Plan was written. Since then, 12 additional sites have been documented in North Carolina and 7 in Georgia (USFWS 2009). Cooley's meadowrue

is extant in 9 populations, comprising a total of 32 sites or subpopulations. There have been no reported occurrences of Cooley's meadowrue on MCB Camp Lejeune, although it has been documented within a half mile of the installation and habitat does exist.

5.8.3 Management Actions

Since Cooley's meadowrue has not been documented on MCB Camp Lejeune, no management actions have been developed. Cooley's meadowrue is searched for during all flora surveys in locations that have adequate habitat. If it is documented on MCB Camp Lejeune, the Base will consult with the USFWS to determine the best course of action to minimize disturbance while not compromising mission and training requirements.

5.9 Pondberry (*Lindera melissifolia*)

5.9.1 Biology

It is an aromatic, deciduous woody shrub which grows up to 6 feet and reproduces vegetatively by above ground shoots, creating clonal thickets (NCNHP 2001; USFWS 1993). Leaves are alternate, drooping, oblong in shape, and sassafras scented. Flowers are small and pale yellow, appearing before the leaves (NCNHP 2001; USFWS 1993). Flowers bloom from February to April and fruits are glossy, bright red, fleshy, and oval in shape (NCNHP 2001).

The historic range of pondberry included nine southern states, ranging from North Carolina south to Florida, and west to Louisiana up to Missouri (USFWS 2014). Current surveys indicate that it may have been extirpated from Florida and Louisiana. Pondberry typically occurs in seasonally flooded wetlands, sandy sinks, pond margins, and swampy depressions (CPC 2010b). Preferred habitat consists of open bottomland hardwood forests in inland areas, poorly drained swampy depressions, edges of swamps and ponds, and longleaf pine and pond pine forests (NCNHP 2001; USFWS 1993). Pondberry primarily occurs in somewhat shaded areas but is also found in full sunlight (NCNHP 2001). It grows in acidic and generally loamy soils and silty loams (USFWS 1993). In North Carolina, pondberry is found in soil consisting of sandy sediments with a high peat content (CPC 2010b).

5.9.2 Status

Pondberry was listed as federally endangered in 1986 (51 FR 27495). Habitat destruction, fragmentation, altered hydrology, and encroaching vegetation are the primary threats to the continued existence of pondberry. The geographically isolated wetlands that once supported pondberry populations have been cleared for agriculture or timber production. Similarly, hydrological regimes from these operations adjacent to some pondberry sites have negatively impacted these sites. Sites have also been extirpated from feral hog and domestic cattle activity.

Currently, there are 61 known populations of pondberry. Two of these populations occur in North Carolina, one in Cumberland and one in Sampson Counties (USFWS 2014d). This species is thought to be extirpated from Onslow County. A specimen collected in GSRA in 2004 was later identified as pondberry. Repeated searches since 2005 have not located any pondberry plants.

5.9.3 Management Actions

While reportedly collected on GSRA, the presence of pondberry has never been confirmed, despite frequent surveys; as such, no management actions have been developed. Pondberry is searched for during all flora surveys in locations that have adequate habitat. If it is documented on MCB Camp Lejeune, the Base will consult with the USFWS to determine the best course of action to minimize disturbance while not compromising mission and training requirements.

5.10 Golden Sedge (*Carex lutea*)

5.10.1 Biology

Golden sedge is a tall, slender, perennial sedge growing in tufted clumps to a height of 39 inches or more. Leaves are grass-like, narrow, yellowish-green in color, and up to 26 inches in length. The female floral and fruiting structures are conspicuously bright yellow and textured without curved projections. Fruits are produced mid-April to June (USFWS 2014e).

Golden sedge is endemic to two counties on the coastal plain of North Carolina, Onslow and Pender Counties, in the Northeast Cape Fear River watershed (CPC 2010c; USFWS 2014e). It commonly occurs in ecotones between pine savannas and wet hardwood-conifer forests, such as partially shaded savanna swamp areas that experienced fires every three to five years. It has also been found in disturbed areas including roadside and power line rights-of-way. Sandy soils overlying relatively alkaline marine-originated limestone deposits are preferred. Soils are very wet to periodically shallowly inundated (USFWS 2014e).

5.10.2 Status

Golden Sedge was listed as federally endangered in 2002 (67 FR 3120). Fire suppression and the subsequent ecological succession is a principal threat to pondberry (USFWS 2014e). Threats also include drainage of the high-water table from silviculture and agriculture, inappropriate herbicide use in utilities rights-of way, and development (CPC 2010c; USFWS 2014e).

Golden sedge was not discovered until 1991 and named a distinct species until 1994. No formal monitoring program exists for this species. While North Carolina Natural Heritage Program personnel surveyed most populations between 2005 and 2007, and population estimates have been made, they have not been monitored enough to predict long-term population trends. To

date, only eight populations of golden sedge populations, in 21 known sites, have been documented; all are found within a four-mile-wide area in the Northeast Cape Fear River watershed in Pender and Onslow Counties, North Carolina (USFWS 2014e).

5.10.3 Management Actions

No populations of golden sedge have been documented on MCB Camp Lejeune, therefore, no management actions have been developed. During flora surveys in locations that have adequate habitat, golden sedge is included in the list of species to be located. If it is documented on MCB Camp Lejeune, the Base will consult with the USFWS to determine the best course of action to minimize disturbance while not compromising mission and training requirements.

5.11 Hirst's Panic Grass (*Dichanthelium* [= *Panicum*] *hirstii*)

5.11.1 Biology

Hirst's panic grass is a perennial grass, having erect, leafy, flowering stems growing 20 - 60 cm (8 - 23 in) tall (CPC 2010d; USFWS 2013b). Long flowers (spikelets) are produced terminally on a narrowly branched inflorescence along the stem. It overwinters as low, leafy rosettes, with spring culms are produced in May and June and autumnal culms are produced from August through the first frost (Chafin 2007; USFWS 2013b). Seeds also persist in a seed bank until favorable hydrological conditions are present.

Hirst's panic requires habitats that are at least seasonally or intermittently wet, with full sun to light shade, on organic or shallow muck overlaying sand (USFWS 2013b). This species exists in a fire dependent landscape with a sparse tree canopy.

5.11.2 Status

Hirst's panic grass was added to the list of candidates for possible addition to the List of Endangered and Threatened Wildlife and Plants in February 1996 (61 FR 7596). The major threats to the continued existence of this species include encroachment of woody and herbaceous vegetation, competition from rhizomatous perennials, fluctuations in hydrology, and threats associated with its small population number and size (USFWS 2013b). The threat from climate change factors is highly uncertain.

The historic range of this species included eight sites in Delaware, Georgia, New Jersey, and North Carolina (USFWS 2013b). A new population was discovered in Georgia in 2014 (Bill McAvoy, personal communication, 2014) It is currently believed that two sites in Georgia have been extirpated. Of the six remaining sites, two are located in Onslow County, North Carolina. Both of these are located on MCB Camp Lejeune.

5.11.3 Management Actions

A monitoring protocol for Hirst's panic grass was developed in 2014. MCB Camp Lejeune will monitor annually, following this protocol, and send monitoring reports to the NC Natural Heritage Program.

6.0 ANALYSIS OF EFFECTS

The analysis of effects on listed species in the action area is limited to those components of the proposed action that are not consistent with the terms and conditions and conservation measures of prior consultations. As described in Section 3.0; these actions include elements of RCW population and cluster management, the GSRA incidental take agreement, forest management, wildland fire management, and military training and range development. Conservation measures for actions in this document will be consistent with measures from previous biological opinions.

6.1 RCW Management

Population and cluster management actions potentially affecting the RCW would include revised protocols for planning and prioritizing the establishment of new recruitment clusters through artificial cavity provisioning and the potential targeting of specific clusters in highly used training areas for cavity tree reconfiguration. Under the revised INRMP, the Threatened and Endangered Species Section would coordinate with the G3 to ensure that no new recruitment clusters are intentionally established in highly used training areas until all lower use areas reach their full capacity. Decisions regarding cluster placement would be made on a case-by-case basis; however, it is expected that this approach would primarily affect cluster placement in the vicinity of highly used training areas surrounding Combat Town.

6.1.1 Potential Effects

This action may affect the RCW by shifting recruitment to habitats of poorer quality and/or habitats that are less far along in terms of being able support RCW breeding pairs, thereby reducing the rate of population growth. However, the majority of the suitable habitats in the highly used training areas surrounding Combat Town and the G-10 impact area are currently occupied by active clusters; and consequently, changes in patterns of cluster placement are expected to be minimal. MCB Camp Lejeune estimates that the number of recruitment clusters installed in reduced quality habitat as a result of this policy would be 5 or fewer. Although some of these recruitment clusters may be delayed, no significant effects on MCB Camp Lejeune's ability to meet the goal of maintaining the current 5% average annual growth rate would be expected. Similarly, cavity tree reconfiguration efforts in highly used training areas may affect the RCW by shifting cavities to lower quality trees. However, MCB Camp Lejeune has previously been successful in shifting cavity trees to accommodate military projects, and any

new efforts under the revised INRMP would be conducted through methods that are consistent with the terms and conditions and conservation measures of prior consultations. Therefore, it is expected that any effects on the RCW would be minimal.

6.2 Training in RCW Clusters

As in the 2007 INRMP, take may occur as a result of training in RCW clusters. Although military training is not a management activity, the system of managing RCW cluster buffer markings and training activities that are allowed in clusters falls under management, and has the effect of allowing certain training activities to occur in RCW clusters.

6.2.1 Potential Effects

Training activities may result in take of RCW. This take may be in the form of harassment, change in cluster status (i.e. active to inactive), change in group status (i.e. potential breeding group to solitary male), or reproductive output, as a result of military training activities or harm, e.g., destruction of a cavity tree due to damage from military training activities. Although the greatest potential for take is in unmarked clusters, there is also potential for take to occur as a result of the training activities allowed within RCW clusters.

6.2.2 Conservation Measures

To ensure that disturbance due to training does not result in unsustainable impacts to RCW, Camp Lejeune adopted a set of training guidelines, which restrict certain training activities within RCW clusters. These guidelines, adapted from the U.S. Army, are summarized in Table 6-1. Potential damage to habitat in unmarked RCW clusters is avoided by prohibiting intentional damage to pine trees throughout the base.

Table 6-1. Permitted and prohibited activities within marked RCW buffer zones

TRAINING ACTIVITY WITHIN MARKED BUFFER ZONES	PERMITTED
MANEUVER BIVOUAC:	
HASTY DEFENSE, LIGHT INFANTRY, HAND DIGGING ONLY, 2 HOURS MAX	YES
HASTY DEFENSE, MECHANIZED INFANTRY/ARMOR 24 HOURS	NO
DELIBERATE DEFENSE, LIGHT INFANTRY 48 HOURS	NO
DELIBERATE DEFENSE, MECHANIZED INFANTRY/ARMOR	NO
ESTABLISH COMMAND POST, LIGHT INFANTRY 36 HOURS	NO
ESTABLISH COMMAND POST, MECHANIZED INFANTRY/ARMOR 36 HOURS	NO
ASSEMBLY AREA OPERATIONS, LIGHT INFANTRY/MECH INFANTRY/ARMOR	NO
ESTABLISH CS/CSS SITES	NO
ESTABLISH SIGNAL SITES	NO
FOOT TRANSIT THROUGH THE COLONY	YES
WHEELED VEHICLE TRANSIT THROUGH THE COLONY *	YES
ARMORED VEHICLE TRANSIT THROUGH THE COLONY *	YES
CUTTING NATURAL CAMOUFLAGE, HARDWOOD ONLY	YES
ESTABLISH CAMOUFLAGE NETTING	NO
VEHICLE MAINTENANCE FOR NO MORE THAN 2 HOURS	YES
WEAPONS FIRING:	
7.62 AND BELOW BLANK FIRING	YES
.50 CAL BLANK FIRING	NO
ARTILLERY FIRING POINT/POSITION	NO
MLRS FIRING POSITION	NO
ALL OTHERS	NO
NOISE:	
GENERATORS	NO
ARTILLERY/HAND GRENADE SIMULATORS	YES
HOFFMAN TYPE DEVICES	YES
PYROTECHNICS/SMOKE:	
CS/RIOT AGENTS	NO
SMOKE, HAZE OPERATOINS ONLY, GENERATORS OR POTS**	YES
SMOKE GRENADES	YES
INCENDIARY DEVICES TO INCLUDE TRIP FLARES	NO

Table 6-1. Permitted and prohibited activities within marked RCW buffer zones (Cont'd)

TRAINING ACTIVITY WITHIN MARKED BUFFER ZONES	PERMITTED
PYROTECHNICS/SMOKE (Cont'd):	
STAR CLUSTERS/PARACHUTE FLARES	YES
HC SMOKE OF ANY TYPE	NO
DIGGING:	
TANK DITCHES	NO
HASTY INDIVIDUAL FIGHTING POSITIONS, HAND DIGGING ONLY, FILLED AFTER USE	YES
DELIBERATE INDIVIDUAL FIGHTING POSITIONS	NO
CREW-SERVED WEAPONS FIGHTING POSITIONS	NO
VEHICLE FIGHTING POSITIONS	NO
OTHER SURVIVABILITY/FORCE PROTECTION POSITIONS	NO

* Vehicles will not get any closer than 50 ft of a marked cavity tree unless on existing roads, trails, or firebreaks.

** Smoke generators and smoke pots will not be set up within 200 ft of a marked cavity tree, but the smoke may drift through the 200ft cluster buffer.

6.3 GSRA Incidental Take Agreement

The agreement established with the USFWS under the revised INRMP would pre-authorize incidental take for any new occurrences of listed species on GSRA above an established baseline. The agreement would reaffirm and clarify an agreement already in place for the RCW on GSRA, but would also cover all species currently listed under the ESA, as well as any species that might become federally listed in the future. In the case of the RCW, the established baseline for the entire GSRA would be zero clusters. The baseline for rough-leaved loosestrife would include all currently known occurrences on GSRA. The baseline for all other currently listed species within the recently surveyed TVMA study area would also be zero. Baselines for currently listed species on remaining portions of GSRA would be established as surveys are completed. In the case of species that may become listed in the future, baselines would not apply and the agreement would pre-authorize incidental take for all existing occurrences and all occurrences that may become established in the future either prior to or after listing. This agreement would apply to any incidental take resulting from all training activities and range development projects, as well as any supporting infrastructure and facility development projects. All consultation requirements associated with this agreement would be completed during this current consultation for the revised INRMP. Subsequent to the revised INRMP consultation, any listed species that appear as a result of prescribed fire or other habitat management activities could be taken without further USFWS approval or consultation. Camp Lejeune would notify USFWS of any incidental take in annual INRMP updates. This agreement would not have any direct effects on listed species; however, it may affect listed species indirectly by exposing future occurrences to a higher incidence of impacts from military training. Conversely, the agreement may affect listed species indirectly and beneficially by allowing MCB Camp Lejeune to

implement beneficial ecosystem management practices and pursue regional conservation partnerships without concern of compromising future training missions.

6.3.1 Potential Effects

MCB Camp Lejeune's strategy for achieving the base RCW recovery goal does not include any clusters on GSRA and no clusters or designated RCW management areas currently exist on GSRA. Therefore, the GSRA incidental take agreement would not be expected to have any adverse effects on recovery of the MCB Camp Lejeune RCW population. The agreement would allow MCB Camp Lejeune to implement beneficial ecosystem management practices on GSRA without concern of compromising future training missions, thereby increasing the likelihood of future cluster establishment on GSRA through pioneering. Furthermore, the agreement would facilitate the development of conservation partnerships for the establishment and management of RCW clusters on properties adjacent to GSRA, thus further increasing the likelihood of pioneering on GSRA. The establishment of clusters on adjacent properties would also enhance connectivity between the Mainside/Verona Loop and Holly Shelter populations, thereby potentially resulting in beneficial effects on the MCB Camp Lejeune recovery population. Although clusters that become established on GSRA may eventually be lost to training impacts or range development projects, some of the potential beneficial effects related to connectivity between the Mainside/Verona Loop and Holly Shelter populations would be retained. Therefore, the agreement would be expected to have a net beneficial effect on the RCW.

Known rough-leaved loosestrife populations on GSRA and any additional existing populations of rough-leaved loosestrife, pondberry, and/or Hirst's panic grass discovered during baseline surveys would be protected in accordance with the policies of the current INRMP; and these populations would benefit from the implementation of prescribed burning and other ecosystem management practices on GSRA. Although new populations that become established on GSRA may eventually be lost to training impacts or range development projects, some would likely be retained. Therefore, the agreement would be expected to have a net beneficial effect on rough-leaved loosestrife, pondberry, and Hirst's panic grass.

6.4 Forest Management

6.4.1 Suspension of Longleaf Restoration in GSRA

MCB Camp Lejeune's strategy for achieving the base RCW recovery goal does not include any clusters on GSRA and no clusters or designated RCW management areas currently exist on GSRA. Therefore, the suspension of longleaf restoration in GSRA during the TVMA planning and design process would not be expected to have any adverse effects on recovery of the MCB Camp Lejeune RCW population. The suspension of longleaf restoration for five years or less would equate to a short delay in the initiation of habitat improvements on a small portion of

GSRA, whereas the continuation of ecological prescribed burning would have substantial beneficial ecological effects on listed plants and potential future RCW habitat. Therefore, it is expected that any effects on listed species would be discountable.

6.4.2 Annual Silvicultural Prescription Plan

Implementation of the Annual Silvicultural Prescription Plan (ASPP) has the potential to impact RCW, rough-leaved loosestrife, pondberry, Cooley's meadowrue, golden sedge and Hirst's panic grass.

6.4.2.1 Potential Effects

Forest management actions from the implementation of the ASPP (e.g., timber harvest; access road construction, repair, and maintenance; and forest regeneration) may result in the loss or damage to suitable habitat for all the species listed above. Direct impacts to listed plants may also include mortality or injury from the use of harvest and construction equipment. In addition, habitat damage such as from tire/track ruts altering hydrology and from soil compaction of may occur from heavy equipment use. Similarly, damage to RCW foraging and nesting habitat vegetation may also occur from the use of this equipment.

6.4.2.2 Conservation Measures

MCB Camp Lejeune will survey high probability habitat for listed plants prior to commencement of any ground disturbing activities to minimize the potential to impact listed species, including rough-leaved loosestrife and Hirst's panic grass. The buffers surrounding rough-leaved loosestrife populations would reduce the potential for impacts from forest regeneration activities. Skid trails and mechanical site preparation are prohibited within rough-leaved loosestrife sites and buffer zones. In addition, silviculture measures such as commercial thinning and harvest treatments that remove up to 25 percent of the canopy cover on loosestrife-occupied sites would improve habitat conditions.

If populations of pondberry, Cooley's meadowrue, or golden sedge are identified on MCB Camp Lejeune, the Threatened and Endangered Species section, in cooperation with the Forestry section, will develop conservation measures to protect these species during forest management actions.

Silviculture activities will be accomplished within the guidelines of the USFWS 2003 RCW Recovery Plan and would benefit RCW. These activities include thinning of mature pine timber to no less than 40 square feet of basal area, removal of mature canopy hardwoods (canopy hardwoods are not to exceed 10 percent in good quality RCW habitat), retention of potential cavity trees, and two-aged and uneven-aged management for pine. Care will be taken to reduce damage to high-quality native ground cover. Harvest will not occur within 200 feet of active

clusters during the primary nesting season. In addition, low impact methods for replanting activities will be used.

6.4.3 Forest Regeneration

Forest regeneration actions have the potential to impact RCW, rough-leaved loosestrife, pondberry, Cooley's meadowrue, golden sedge, and Hirst's panic grass.

6.4.3.1 Potential Effects

The removal of mature loblolly pine trees for the establishment of longleaf pine may reduce suitable RCW foraging habitat in the near-term. The use of heavy equipment for timber harvesting also has the potential to damage high-quality groundcover. Management actions in regenerated pine stands, such as mechanical pre-commercial thinning, may also disturb birds or damage groundcover. Excessive disturbance has the potential to cause cavity tree or cluster abandonment. However, in the long term, these actions would provide and maintain good quality foraging and nesting habitat. Thinning reduce competition for seedlings, improve wildlife habitat, and eliminates excess fuel that may lead to damaging wildland fires.

Direct impacts to listed plants may also occur, such as mortality or injury from the use of equipment for regeneration activities. These activities also have the potential for indirect impacts such as soil compaction and altered hydrology from tire/track ruts. Listed plants would benefit from forest regeneration and management actions. Thinning that opens the canopy would be beneficial to pondberry and Hirst's panic grass. All listed plants would benefit from a reduced fuel load that would minimize the potential for intense wildland fires.

6.4.3.2 Conservation Measures

When high-quality groundcover is present, regeneration activities (i.e., harvest, planting, and thinning) will use those methods with the lowest impact on groundcover, such as burning and flat planting.

The buffers surrounding rough-leaved loosestrife populations would reduce the potential for impacts from forest regeneration activities. In addition, MCB Camp Lejeune will survey high probability habitat prior to commencement of any ground disturbing activities to minimize the potential to impact listed species.

If populations of pondberry, Cooley's meadowrue, or golden sedge are identified on MCB Camp Lejeune, the Threatened and Endangered Species section, in cooperation with the Forestry section, will develop conservation measures to protect these species during forest regeneration actions.

6.5 Wildland Fire Management

Camp Lejeune's fire management program includes activities that could impact listed species, either from prescribed fire, or fire suppression activities.

6.5.1 Potential Effects

Since MCB Camp Lejeune is located in a region that historically experienced cyclical fires throughout much of the landscape, the use of prescribed fire for ecosystem management would benefit the listed species that evolved in fire-dependent ecosystems such as RCW, rough-leaved loosestrife, golden sedge, Cooley's meadowrue, and pondberry. The relationship of Hirst's panic grass with fire is not well understood (USFWS 2013b). Prescribed fire improves RCW nesting and foraging habitat by controlling hardwood encroachment and maintaining an open, grassy understory. Prescribed fires are also beneficial by improving forest health, reducing fuel levels and controlling competing and non-native plant species. Prescribed fire does, however, have the potential to negatively impact listed species such as damaging or killing RCW cavity trees if fuel levels are not controlled. Additionally, if fuel levels are too high, fire intensity has the potential to kill or damage listed plants. The use of plowed fire lines also has the potential to alter hydrology of an area.

A planned increase in fire frequency, combined with a greater number of RCW cavity trees on the landscape may result in a greater number of RCW cavities taken as a result of fire management activities. The BO for the previous INRMP allowed for take of two cavity trees per year as a result of prescribed fire and wildland fire management. Although, on average, this level of take was not exceeded, Camp Lejeune believes there is a potential for increased impact to RCW cavity trees from fire.

6.5.2 Conservation Measures

Procedures in place to clear vegetation 12 feet around cavity trees minimize the potential for damage or loss during prescribed burns. Fires must be properly timed to ensure fuel loads are not so great that fire intensity kills or damages listed species. Supplementing fire management with mowing of shrubby vegetation in the winter reduces the potential for fires that are too intense. If plowed fire lines are necessary for prescribed burns, they will not be within rough-leaved loosestrife buffers or in a manner that may change area hydrology. Surveys will be conducted prior to the installation of a fire line in habitat with the potential to support listed species.

6.6 Coastal Area Management

Coastal area management activities include dune stabilization, in the form of dune grass planting and sand fence installation.

6.6.1 Potential Effects

Dune stabilization actions have the potential to impact piping plover and seabeach amaranth. In order to encourage new dune formation on the portions of the dune-beach system that are designated training areas, actions such as seasonal driving restrictions, replanting dune grasses and installing sand fences are completed annually. While they're not commonly located within the designated training area, both piping plovers and seabeach amaranth have the potential to occur anywhere along Onslow Beach, and have the potential to be affected from management actions. Potential impacts from dune grass planting and sand fence installation include damage to plover nests or disturbance of nesting or wintering birds and damage to seabeach amaranth that may be present.

6.6.2 Conservation Measures

Specifically to conserve piping plovers, seabeach amaranth and other species, dune stabilization actions do not occur in areas other than designated training areas. Piping plovers identified on Onslow Beach during the nesting season would be observed for breeding behavior. If breeding behavior is observed, or a nest is located outside of the military training portion of the beach, appropriate protective measures would be implemented, including posting the areas to prohibit disturbance, including pedestrians and pets. In the unlikely event that a nest is located within the designated training area, MCB Camp Lejeune will pursue an incidental take statement. Surveys for seabeach amaranth are conducted annually throughout all potential habitat locations. Any locations in which seabeach amaranth is identified are marked with signs restricting military or recreational beach driving and pedestrian traffic.

6.7 Cumulative Effects

Cumulative effects are defined under the ESA as the effects of future non-federal (state, tribal, local, or private) actions that are reasonably certain to occur within the action area. Future federal actions that are unrelated to the proposed action were not considered in this analysis because they will be subject to separate Section 7 consultations. The action area considered in this consultation does not include any non-federal lands. Consequently, MCB Camp Lejeune has not identified any reasonably foreseeable non-federal actions within the action area that would contribute to cumulative effects.

7.0 DETERMINATION OF EFFECTS AND CONCLUSION

In accordance with section 7(c) of the ESA, MCB Camp Lejeune has analyzed the effects of implementing the revised INRMP on federally listed species within the action area. Management actions implemented under the revised INRMP would largely have beneficial effects on federally listed species on MCB Camp Lejeune.

For ongoing management activities, a finding of “no effect” has been made for red knot, Cooley’s meadowrue, pondberry, and golden sedge for the 2015-2020 INRMP. Proposed actions will either be outside of the habitat typically occupied by these species or these species would not be located in the areas of the proposed actions, even though they utilize the habitat type found in these areas.

Proposed management actions have been determined to have a “may affect, but not likely to adversely affect” finding for piping plovers, loggerhead and green sea turtles, seabeach amaranth, rough-leaved loosestrife, and Hirst’s panic grass. Sufficient conservation measures are in place to provide protection from the proposed actions if they were to occur in or near areas in which these species are located. In addition, several of the proposed actions would have beneficial impacts to these species.

Overall, implementation this INRMP will have a beneficial effect on RCW recovery. However certain management actions, and training activities could adversely affect RCW and require incidental take. For this reason MCB Camp Lejeune has determined that a finding of “may effect, and is likely to adversely affect” RCW is appropriate for implementation of the 2015 INRMP, and actions associated with RCW habitat management, forest management, and wildland fire management. Some adverse effects are possible from the implementation of these actions. The removal of training restrictions would allow training to occur within active clusters and near cavity trees, thus increasing the potential for damage and destruction of cavity trees and RCW habitat, as well as increasing the level of disturbance. Habitat and forest management has the potential to damage cavity trees and habitat, and disturb birds due to the nature in which it’s accomplished (e.g., with the use of heavy equipment). Similarly, prescribed fire used for wildland fire management also has the potential to damage or kill cavity trees.

In addition to the effects of continuing management actions that are consistent with prior consultations, MCB Camp Lejeune has determined that implementation of the GSRA incidental take agreement under the revised INRMP may affect, and is likely to adversely affect the RCW, rough-leaved loosestrife, Cooley’s meadowrue, golden sedge, and Hirst’s panic grass.. The GSRA incidental take agreement and associated training and range development activities could result in the incidental take of all new occurrences of these species above established baselines.

MCB Camp Lejeune has also determined that new policies for RCW management in highly used training areas, including new protocols for the placement of recruitment clusters and cavity tree reconfiguration efforts, may affect, but are not likely to adversely affect the RCW. Furthermore, it is determined that changes in forest management and wildland fire management are not likely to adversely affect the RCW, rough-leaved loosestrife, pondberry, Cooley’s meadowrue, golden sedge, and Hirst’s panic grass.

In previous plans, incidental take was granted for a number of activities. With this biological assessment, MCB Camp Lejeune seeks to extend, and in some cases expand upon and add to the take granted in the 2007 INRMP. For the period of this INRMP, Camp Lejeune seeks the following incidental take:

- All future RCW clusters in the Cantonment (up to 6)
- All future occurrences (i.e. above the current baseline population) of federally listed species in GSRA. The current baseline for RCW is zero clusters.
- Up to three active RCW cavity trees per year harmed or lost as a result of damage from prescribed burning or wildland fire management
- Up to 10% of the total number of unmarked RCW clusters. This take may be in the form of harassment, change in cluster status (i.e. active to inactive), change in group status (i.e. potential breeding group to solitary male), or reproductive output, as a result of military training activities or harm, e.g., destruction of a cavity tree due to damage from military training activities.

As discussed in Section 4.1, provisions in the 2004 National Defense Authorization Act allow military installations to be excluded from critical habitat designation. It is the intent of MCB Camp Lejeune, and MCB Camp Lejeune seeks USFWS, and NMFS concurrence that this INRMP is sufficient to justify exemption from critical habitat for all federally listed species known to occur at MCB Camp Lejeune.

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Appendix 19:

USFWS Biological Opinion

MCB Camp Lejeune

2015-2020 INRMP

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United States Department of the Interior

FISH AND WILDLIFE SERVICE

Raleigh ES Field Office

Post Office Box 33726

Raleigh, North Carolina 27636-3726

July 17, 2015

Mr. John R. Townson
Director, Environmental Management Division
Marine Corps Base
PSC 20005
Camp Lejeune, North Carolina 28542-0005

FWS Log No: 2015-I-0251

Dear Mr. Townson:

This document transmits the U.S. Fish and Wildlife Service's (Service) biological opinion based on our review of the Biological Assessment (BA) contained in Appendix .17 of the proposed 2015-2020 Integrated Natural Resources Management Plan (revised INRMP) for Marine Corps Base (MCB), Camp Lejeune located in Onslow County North Carolina (Camp Lejeune 2015) and its effects on the red-cockaded woodpecker (RCW, *Picoides borealis*) in accordance with section 7 of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et seq.). Your February 27, 2015 request for formal consultation was received on March 3, 2015. This biological opinion is based on information provided in the February 2015 Biological Assessment (BA), electronic mail, and other published and unpublished sources of information. A complete administrative record of this consultation is on file at our Raleigh Field Office.

The natural resource management activities discussed in the revised INRMP and BA are restricted to the land and do not address marine species (e.g. West Indian manatee (*Trichechus manatus*)). Other federally listed species which occur in the project area include the piping plover (*Charadrius melodus*; threatened), loggerhead turtle (*Caretta caretta*; threatened), green turtle (*Chelonia mydas*; threatened), rufa subspecies of the red knot (*Calidris canutus rufa*; threatened), seabeach amaranth (*Amaranthus pumilus*; threatened) and rough-leaved loosestrife (*Lysimachia asperulaefolia*; endangered). Additionally Cooley's meadowrue (*Thalictrum cooleyi*; endangered), Pondberry (*Lindera melissifolia*; endangered), and golden sedge (*Carex lutea*; endangered) have the potential to occur in the project area but have not been detected there. Conservation measures contained in the revised INRMP for these species are summarized in the table below. MCB Camp Lejeune has concluded that the conservation measures described in the revised INRMP would have an overall beneficial effect on these species. Based on a review of the BA and the revised INRMP, the Service concurs with MCB Camp Lejeune's determination that the proposed action may affect but is not likely to adversely affect (NLAA) the piping plover, nesting sea turtles, red knot, seabeach amaranth and rough-leaved loosestrife; and will have no effect (NE) on Cooley's meadowrue, Pondberry or golden sedge.

Table 1: Proposed Conservation Measures and Management Actions for NLAA and NE Species

Species/ Habitat	Proposed Conservation Measures and Management Actions
Piping plover	<p>MCB Camp Lejeune maintains the portion of Onslow Beach outside the recreational and training beaches in a natural state. Specifically to conserve piping plovers, seabeach amaranth and other species, dune stabilization actions do not occur in areas other than designated training areas. The inlets and large overwash flat on the south east end of Onslow Beach and the inlets and smaller overwash areas on Brown’s Island provide relatively undisturbed habitat for piping plovers and other shorebirds. MCB Camp Lejeune restricts entry into potential nesting habitat and limits beach driving during the nesting season.</p> <p>Piping plovers identified on Onslow Beach during the nesting season would be observed for breeding behavior. If breeding behavior is observed, or a nest is located outside of the military training portion of the beach, appropriate protective measures would be implemented, including posting the areas to prohibit disturbance, including pedestrians and pets. In the unlikely event that a nest is located within the designated training area, MCB Camp Lejeune and the Service will re-consult to prepare an incidental take statement. Driving on Onslow Beach is restricted to training areas only from April 1 to August 31 to coincide with shorebird nesting season. Recreational driving is permitted on the beach to the inlet outside of the nesting season.</p>
Loggerhead and green sea turtles	<p>MCB Camp Lejeune monitors approximately 7 miles of Onslow Beach each year from mid-May through August. Daily surveys are conducted for sea turtle crawls and the number and location of crawls are documented. If individual turtles are located, personnel document tag information and record size data. Night surveys are undertaken if night training is scheduled to occur during the nesting season to provide immediate protection of nests. If nests are found within the amphibious training beach they are relocated. As the nests near the end of incubation, they are checked each morning for signs of hatching, hatchling emergence, or predation. In addition, nests that are below the mean high tide line are eligible for relocation. After hatching, hatchling tracks are counted to estimate a measure of success before the completion of nest inventory. Driving on Onslow Beach is restricted to training areas only from April 1 to August 31 to coincide with sea turtle nesting season. Recreational driving is permitted on the beach to the inlet outside of the nesting season.</p>
Red knot	<p>Management actions previously discussed for the south end of Onslow Beach for piping plover and sea turtles would also benefit red knots migrating through, or wintering on MCB Camp Lejeune.</p>
Seabeach amaranth	<p>Surveys for seabeach amaranth are conducted annually throughout all potential habitat locations. Any locations in which seabeach amaranth is identified are marked with signs restricting military or recreational beach driving and pedestrian traffic.</p>
Rough-leaved loosestrife, Hirst’s panic grass, golden sedge, Pondberry, Cooley’s meadowrue	<p>MCB Camp Lejeune will survey high probability habitat for listed plants prior to commencement of any ground disturbing activities to minimize the potential to impact listed species, including rough-leaved loosestrife and Hirst’s panic grass. If populations of pondberry, Cooley’s meadowrue, or golden sedge are identified on MCB Camp Lejeune, the Threatened and Endangered Species section, in cooperation with the Forestry section, will develop conservation measures to protect these species during forest management actions.</p> <p>The buffers surrounding rough-leaved loosestrife populations would reduce the potential for impacts from forest regeneration activities. Skid trails and mechanical site preparation are prohibited within rough-leaved loosestrife sites and buffer zones. In addition, silvicultural measures such as commercial thinning and harvest treatments that remove up to 25 percent of the canopy cover on loosestrife-occupied sites would improve habitat conditions.</p>

Provisions of the 2004 National Defense Authorization Act enable military installations to be excluded from critical habitat designation provided that an INRMP, acceptable to the Secretary of the Interior is in place. Critical habitat has been designated in North Carolina for piping plovers and loggerhead sea turtles and is addressed through section 7 consultation on the revised INRMP.


A total of 18 critical habitat units for the Atlantic Coast wintering population of piping plovers have been identified from Dare County south to Brunswick County. Critical habitat units are located north (Bogue Inlet, Carteret County) and south (New Topsail Inlet, Pender County) of Camp Lejeune. However, no critical habitat for the piping plover was designated on the installation. The primary constituent elements are associated with intertidal beaches and flats (mud flats, sand flats, algal flats, and washover passes) and associated dune systems and flats above high tide. The Service has determined that the conservation benefits provided through the revised INRMP are sufficient to preclude critical habitat designation for the piping plover on MCB Camp Lejeune.

North Carolina contains eight terrestrial critical habitat units for the Northwest Atlantic Ocean Loggerhead Sea Turtle Distinct Population Segment (DPS). Loggerhead critical habitat occurs north of Camp Lejeune on Bear Island (Onslow County) and south on Topsail Island (Onslow and Pender counties). Primary constituent elements of critical habitat for loggerhead turtles include: suitable nesting beach habitat that has (a) relatively unimpeded nearshore access from the ocean to the beach for nesting females and from the beach to the ocean for both post-nesting females and hatchlings and (b) is located above mean high water to avoid being inundated frequently by high tides; Sand that (a) allows for suitable nest construction, (b) is suitable for facilitating gas diffusion conducive to embryo development, and (c) is able to develop and maintain temperatures and a moisture content conducive to embryo development; Suitable nesting beach habitat with sufficient darkness to ensure nesting turtles are not deterred from emerging onto the beach and hatchlings and post-nesting females orient to the sea; and natural coastal processes or artificially created or maintained habitat mimicking natural conditions. In the final rule designating terrestrial critical habitat for the Northwest Atlantic Ocean Loggerhead DPS, (79 Federal Register 39756; Service 2014), the Service determined that "...the identified lands are subject to the MCB Camp Lejeune INRMP and that conservation efforts identified in the INRMP will provide a benefit to the loggerhead sea turtle. Therefore, lands within this installation are exempt from critical habitat designation. We are not including 12.4 km (7.7 mi) of habitat in this critical habitat designation because of this exemption."

The Service greatly appreciates the cooperation of MCB, Camp Lejeune during this consultation. We have assigned our log number (Service FWS Log) # 2015-I-0251 to this consultation; please refer to it in any future correspondence concerning this project. If you or your staff have any questions concerning this BO, please contact Mr. John Hammond of the Raleigh Field Office at

(919) 856.4520 extension 28, or via email at john_hammond@fws.gov.

Sincerely,


FOL Pete Benjamin
Field Supervisor

cc: Will McDearman, FWS, Jackson, MS
Ann Marie Lauritsen, St. Petersburg, FL

Literature cited:

U.S. Fish and Wildlife Service. 2014. Designation of Critical Habitat for the Northwest Atlantic Ocean Distinct Population Segment of the Loggerhead Sea Turtle; Final Rule; 79 Federal Register 132 (10 July 2014), pp. 39756 - 39854.

BIOLOGICAL OPINION

Marine Corps Base Camp Lejeune

Integrated Natural Resources Management Plan 2015 - 2020

July 17, 2015

USFWS Log No. 04EN2000-2015-I-0251

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Acronyms

AAV	Amphibious Assault Vehicle
Act	Endangered Species Act
ASPP	Annual Silvicultural Prescription Plan
BA	Biological Assessment
BCTMC	Beach to Combat Town Maneuver Course
BO	Biological Opinion
CAAAC	Combined Arms Amphibious Assault Course
CFR	Code of Federal Regulations
CH	Critical Habitat
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CPC	Center for Plant Conservation
DoD	Department of Defense
DoDI	Department of Defense Instruction
DOI	U.S. Department of the Interior
DPS	Distinct Population Segment
F	Fahrenheit
FR	Federal Register
GSRA	Greater Sandy Run Area
INRMP	Integrated Natural Resources Management Plan
MCB	Marine Corps Base
MCG	Mission Compatible Goal
MCO	Marine Corps Order
NCNHP	North Carolina Natural Heritage Program
NCWRC	North Carolina Wildlife Resources Commission
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NWR	National Wildlife Refuge
PCE	Primary Constituent Element
RASP	Recovery and Sustainment Plan
RCW	Red-cockaded Woodpecker
Service	U.S. Fish and Wildlife Service
T (S/A)	Threatened due to Similarity of Appearance
T&E	Threatened and Endangered Species
TVMA	Tactical Vehicle Maneuver Area

Acronyms

U.S.	United States
U.S.C.	United States Code

CONSULTATION HISTORY

April 30, 2014 – The Service attended an INRMP kickoff meeting that included State and federal agencies. MCB Camp Lejeune laid out the proposed course of action for the INRMP and takes comments/questions from stakeholders.

July 29, 2014 – The Service and MCB Camp Lejeune met to discuss in greater detail the installation's proposed course of action for INRMP.

August 6, 2014 - MCB Camp Lejeune sent a letter to the Service documenting the results of July 29 meeting. The letter specifically addressed incidental take for future listed species sites in the Greater Sandy Run Area (GSRA), value of pocosin habitat for RCW, temporary cessation of longleaf planting in GSRA, support for Combined Arms Amphibious Assault Course (CAAAC) Phase 1 maneuver corridor, and vegetation management in the G-10 impact area.

September 18, 2014 – The Service responded to MCB Camp Lejeune's August 6, 2014 letter.

September 19, 2014 - MCB Camp Lejeune and the Service held a teleconference to clarify some of the points expressed in the Services September 18, 2014 letter. MCB Camp Lejeune requested an email and follow-up letter with clarifications.

September 19, 2014 – The Service sent an email clarifying incidental take provisions for future listed species sites in GSRA.

November 14, 2014 – MCB Camp Lejeune transmitted a Draft INRMP to the Service.

December 23, 2014 – The Service provided comments to MCB Camp Lejeune on the Draft INRMP.

February 27, 2015 – MCB Camp Lejeune transmitted the Pre-final INRMP to the Service and requested formal consultation with the Service.

BIOLOGICAL OPINION

A biological opinion is the document that states the opinion of the Service as to whether a federal action is likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification of designated critical habitat. This biological opinion addresses the *rufa* subspecies of the red knot (*Calidris canutus rufa*; red knot), piping plover (*Charadrius melodus melodus*), red-cockaded woodpecker (*Picooides borealis*; RCW), loggerhead sea turtle (*Caretta caretta*), green sea turtle (*Chelonia mydas*), seabeach amaranth (*Amaranthus pumilus*) and rough-leaved loosestrife (*Lysimachia asperulaefolia*) and requirements to conserve designated critical habitat for these species, and evaluates the effects of the proposed action, interrelated and interdependent actions, and cumulative effects relative to the status of the species and the status of the critical habitat to arrive at a Service opinion that the proposed action is or isn't likely to jeopardize species or adversely modify critical habitat. *Jeopardize the continued existence of* means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species.

Provisions of the 2004 National Defense Authorization Act enable military installations to be excluded from critical habitat designation provided that an INRMP, acceptable to the Secretary of the Interior is in place. We have relied upon the statutory provisions of the ESA to complete our analysis with respect to critical habitat. No critical habitat has been designated for the red-cockaded woodpecker.

I. DESCRIPTION OF THE PROPOSED ACTION

A. Location and Project Description

Marine Corps Base (MCB) Camp Lejeune consists of over 143,000 acres of land in Onslow County, North Carolina. The installation is located 45 miles southwest of New Bern, 125 miles southeast of Raleigh, and 47 miles northeast of Wilmington (Figure 1). The Main Base consists of 101,620 acres and the Greater Sandy Run Area (GSRA) encompasses 41,230 acres. MCB Camp Lejeune includes administrative cantonment areas, air station, impact areas, training and maneuver areas, drop zones, landing zones, gun positions and outlying landing fields, etc. The Main Base area (Mainside) includes all MCB Camp Lejeune property from the eastern shore of the New River to NC Highway 172, and south of NC Highway 24. The Verona Loop Area is the portion of the base that lies west of the New River to US Highway 17, and north of NC Highway 210. The Verona Loop Area includes Marine Corps Air Station (MCAS) New River, Camp Geiger, Camp Devil Dog, and Stone Bay.

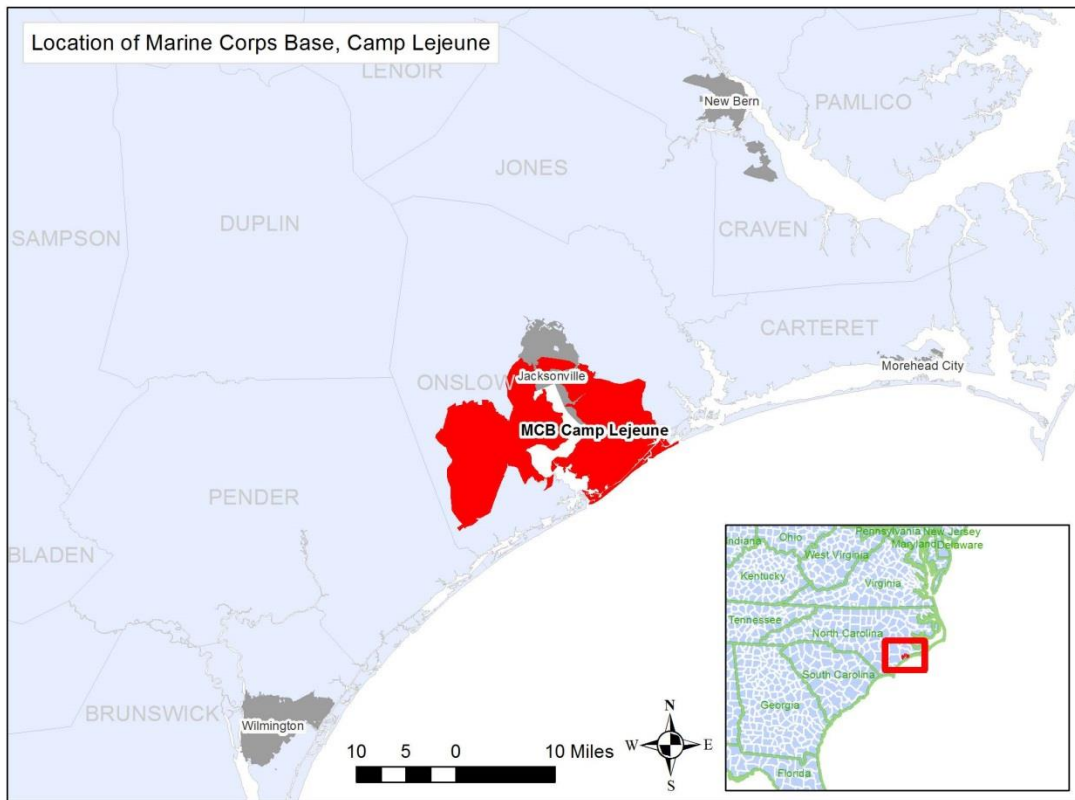


Figure 1: Location of MCB Camp Lejeune

The action being considered in this biological opinion is implementation of MCB Camp Lejeune’s Integrated Natural Resources Management Plan (INRMP) for 2015 through 2020. The INRMP is a long-term planning document to guide implementation of Camp Lejeune’s natural resources management program to ensure consistency with the installation’s military mission and to support “no net loss” in military mission capability for the base lands, while providing for the conservation and rehabilitation and the sustainable multipurpose use of natural resources on MCB Camp Lejeune.

The revised INRMP would adopt the majority of the existing goals, objectives, and management actions from the current INRMP, but would also initiate new management strategies to de-conflict and more fully integrate training and conservation objectives. Most of the proposed changes in the revised INRMP involve changes in the protocols for planning and prioritizing the implementation of management actions. The proposed action would not include any significant changes to existing management systems or current methods of implementing management treatments.

MCB Camp Lejeune would continue to implement ecosystem-based management emphasizing longleaf pine restoration within its native distribution on Mainside and Verona Loop; conduct frequent growing season prescribed burning across the base; implement ecological thinning to restore historical pine densities; and control encroaching midstory hardwoods. Changes under the revised INRMP would include a goal to increase both the frequency of prescribed burning across the base as well as the proportion of prescribed burns that are conducted during the growing season. These changes in prescribed burning would be designed to more closely replicate the historical natural fire frequency and intensity on MCB Camp Lejeune by burning as much of the base as possible during the growing season on a three-year rotation. As an additional tool to meet this goal, MCB Camp Lejeune would also increase use of aerial ignition for prescribed burning.

A component of the revised INRMP is the suspension of longleaf pine restoration efforts on GSRA during the ongoing planning process for the Tactical Vehicle Maneuver Areas (TVMA) range development initiative. To meet long-term training objectives, longleaf pine restoration and identification of suitable longleaf sites on the GSRA will be set aside, pending completion of the range planning and design process. Potential longleaf restoration sites on GSRA would be reevaluated upon completion of the planning/design process or at the end of the five-year INRMP period, whichever comes first. Camp Lejeune will no longer use five-acre patch cuts as a method of regenerating longleaf or loblolly pine stands. Instead regeneration will be accomplished with modified two-aged management, or uneven-aged management.

B. Red-cockaded Woodpecker (RCW) Management

Population Management and Monitoring

Most of the population management strategies and actions under the revised INRMP would be consistent with the terms and conditions and conservation measures of prior consultations. MCB Camp Lejeune would continue to manage for recovery in accordance with the current RCW Mission Compatible Goal (MCG) of 173 active clusters. Consistent with the current INRMP and the RCW Recovery and Sustainment Plan (RASP), MCB Camp Lejeune would continue to implement an aggressive RCW population growth strategy on Mainside and Verona Loop while exploring opportunities to address constraints on mission capabilities through the establishment of recruitment recovery clusters on off-base properties. Under the revised INRMP, the goal for population growth would be to maintain the current five percent average annual growth rate. Camp Lejeune would continue to manage all designated RCW areas for potential future occupation through ecosystem management, including longleaf pine restoration to its historical native distribution on Mainside and Verona Loop and the application of frequent growing season prescribed burns.

As part of the INRMP's expressed strategy to de-conflict and integrate training and conservation objectives, the revised INRMP would establish new protocols for planning and prioritizing the

establishment of new recruitment clusters through artificial cavity provisioning. Under this approach, there will no longer be designated “high-use training areas.” Instead, the Threatened and Endangered Species Section would coordinate with the G3 to ensure that no new recruitment clusters are intentionally established in highly used training areas until all other areas are occupied, unless approved by G3. Whether a new cluster is to be marked will be determined through coordination between Environmental Management Division and G3 at the time of installation based upon the expected impact on tactical maneuver by operating forces. Decisions regarding cluster placement would be made on a case-by-case basis; however, it is expected that this approach would primarily affect cluster placement in the vicinity of highly used training areas surrounding Combat Town and the G-10 impact area. Most of the suitable habitat in the Combat Town/G-10 area is currently occupied; and consequently, changes in patterns of cluster placement are expected to be minimal.

The revised INRMP would include development of a monitoring plan to assess impacts of tactical vehicle maneuver training in RCW habitat. The monitoring plan would accompany future training corridor projects such as the Beach to Combat Town Maneuver Corridor (BCTMC). Camp Lejeune would proceed with the development of the BCTMC under the assumption that off-road tactical vehicle maneuver is not compatible with RCW management practices. The implementation period for the revised INRMP would be used to monitor and evaluate RCW responses to off-road maneuver to validate or invalidate this assumption. The BCTMC and associated impacts will be addressed in a future biological assessment.

Cluster Management and Protection

Cluster management and protection activities under the revised INRMP would be generally consistent with the terms and conditions and conservation measures of prior consultations. MCB Camp Lejeune’s currently adopted training restrictions would be retained. Newly formed clusters that become established in highly used training areas through pioneering would remain unmarked for training purposes. These clusters would become part of the installation’s approved percentage of unmarked clusters.

Current practices for marking and unmarking clusters and removing training restrictions from clusters as population milestones are met would continue to apply under the revised INRMP. As an additional new measure to reduce current constraints on training, specific clusters that are currently located in highly used training areas may receive targeted management treatments to adjust the distribution of cavity trees. All methods and techniques used to reconfigure clusters would be consistent with the terms and conditions and conservation measures of prior consultations.

Habitat Management

All RCW habitat management actions under the proposed action would be consistent with the terms and conditions and conservation measures of prior consultations. The proposed action would continue the current practice of partition-level habitat management in all habitats designated for the RCW (see Figure 3-1 of the BA). MCB Camp Lejeune would continue to manage partitions toward a minimum of 120 acres of good quality foraging habitat in accordance with the 2003 RCW recovery plan.

We expect that longleaf pine restoration may result in temporary habitat degradation. During the restoration process, the goal will be to maintain a minimum of 120 acres of suitable foraging habitat (not necessarily good quality foraging habitat in the short-term). The existing silvicultural system and associated methods of treating RCW habitat through timber stand improvements would continue under the revised INRMP. Consistent with the current INRMP, partitions would be treated on a 10-year cycle with more frequent treatments as necessary to address cluster-specific habitat requirements. MCB Camp Lejeune would continue to manage all designated RCW areas for general habitat improvement through the application of ecosystem management, including the restoration of longleaf pine to its historical native distribution on Mainside and Verona Loop and the application of frequent growing season prescribed burns.

Military Training in RCW Clusters

Although not a management action, training in RCW clusters is tied to management through Camp Lejeune's RCW cluster buffer marking and system of population milestones that allow for cluster buffer marking and training restrictions to be removed. Training in clusters has the potential to result in incidental take of RCW. In the 2007 INRMP, impacts due to training activities were minimized by adhering to a set of guidelines adapted from the U.S. Army (MCB Camp Lejeune 2007). These guidelines, found in Table 1 (excerpted from Table 6-1 of the BA), restrict certain training activities within marked RCW clusters. The guidelines are identified as conservation measures in the BA and will remain in effect during implementation of the revised INRMP for marked clusters.

Table 1. Permitted and prohibited activities within marked RCW buffer zones

TRAINING ACTIVITY WITHIN MARKED BUFFER ZONES	PERMITTED
MANEUVER BIVOUAC:	
HASTY DEFENSE, LIGHT INFANTRY, HAND DIGGING ONLY, 2 HOURS MAX	YES
HASTY DEFENSE, MECHANIZED INFANTRY/ARMOR 24 HOURS	NO
DELIBERATE DEFENSE, LIGHT INFANTRY 48 HOURS	NO
DELIBERATE DEFENSE, MECHANIZED INFANTRY/ARMOR	NO
ESTABLISH COMMAND POST, LIGHT INFANTRY 36 HOURS	NO
ESTABLISH COMMAND POST, MECHANIZED INFANTRY/ARMOR 36 HOURS	NO
ASSEMBLY AREA OPERATIONS, LIGHT INFANTRY/MECH INFANTRY/ARMOR	NO
ESTABLISH CS/CSS SITES	NO
ESTABLISH SIGNAL SITES	NO
FOOT TRANSIT THROUGH THE COLONY	YES
WHEELED VEHICLE TRANSIT	YES
ARMORED VEHICLE TRANSIT THROUGH THE COLONY *	YES
CUTTING NATURAL CAMOUFLAGE, HARDWOOD ONLY	YES
ESTABLISH CAMOUFLAGE NETTING	NO
VEHICLE MAINTENANCE FOR NO MORE THAN 2 HOURS	YES
WEAPONS FIRING:	
7.62 AND BELOW BLANK FIRING	YES
.50 CAL BLANK FIRING	NO
ARTILLERY FIRING POINT/POSITION	NO
MLRS FIRING POSITION	NO
ALL OTHERS	NO
NOISE:	
GENERATORS	NO
ARTILLERY/HAND GRENADE SIMULATORS	YES
HOFFMAN TYPE DEVICES	YES
PYROTECHNICS/SMOKE:	
CS/RIOT AGENTS	NO
SMOKE, HAZE OPERATIONS ONLY, GENERATORS OR POTS**	YES
SMOKE GRENADES	YES
INCENDIARY DEVICES TO INCLUDE TRIP FLARES	NO

(Continued)

TRAINING ACTIVITY WITHIN MARKED BUFFER ZONES	PERMITTED
PYROTECHNICS/SMOKE (Cont'd):	
STAR CLUSTERS/PARACHUTE FLARES	YES
HC SMOKE OF ANY TYPE	NO
DIGGING:	
TANK DITCHES	NO
HASTY INDIVIDUAL FIGHTING POSITIONS, HAND DIGGING ONLY, FILLED AFTER USE	YES
DELIBERATE INDIVIDUAL FIGHTING POSITIONS	NO
CREW-SERVED WEAPONS FIGHTING POSITIONS	NO
VEHICLE FIGHTING POSITIONS	NO
OTHER SURVIVABILITY/FORCE PROTECTION POSITIONS	NO

* Vehicles will not get any closer than 50 feet of a marked cavity tree unless on existing roads, trails, or firebreaks.

** Smoke generators and smoke pots will not be set up within 200 feet of a marked cavity tree, but the smoke may drift through the 200-foot cluster buffer.

C. GSRA Incidental Take Agreement

To de-conflict and integrate training and natural resource management objectives, the revised INRMP would establish an agreement with the Service that any new occurrences of threatened and endangered species appearing on GSRA as a result of beneficial fire management and/or other natural resource management practices would not result in additional constraints on training or range development capabilities. Due in large part to rapid RCW population growth and associated reductions in training capabilities on Mainside and Verona Loop, the development and maintenance of minimally constrained tactical vehicle maneuver capabilities on GSRA is now critical to the current and future success of the training mission. Although listed species are not currently a significant training constraint on GSRA, MCB Camp Lejeune is concerned that prescribed burning and other beneficial natural resource management practices may lead to the establishment of new listed species occurrences, thereby further impacting mission capabilities and increasing training pressures on existing listed species populations on Mainside and Verona Loop.

The current emphasis on maintaining the capabilities of GSRA to support as yet undetermined future mission requirements has in turn impeded the implementation of beneficial natural resource management actions on GSRA as well as the development of conservation partnerships for the management of adjacent properties.

The incidental take agreement would ensure continued access to GSRA for minimally constrained tactical vehicle maneuver training, thereby allowing MCB Camp Lejeune to implement beneficial ecosystem management practices and pursue regional conservation

partnerships while significantly minimizing potential impacts on future training missions.

The agreement established with the Service under the revised INRMP would pre-authorize incidental take for any new occurrences of listed species on GSRA above an established baseline. The agreement would reaffirm and clarify an agreement already in place for the RCW on GSRA, but would also cover all species currently listed under the ESA, as well as any species that might become federally listed in the future. In the case of the RCW, the established baseline for the entire GSRA would be zero clusters. The baseline for rough-leaved loosestrife would include all currently known occurrences on GSRA. The baseline for all other currently listed species within the recently surveyed TVMA study area would also be zero. A map showing the survey area for the TVMA is contained in Figure 3-2 of the BA.

Baselines for currently listed species on remaining portions of GSRA would be established as surveys are completed. In the case of species that may become listed in the future, baselines would not apply and the agreement would pre-authorize incidental take for all existing occurrences and all occurrences that may become established in the future either prior to or after listing. This agreement would apply to any incidental take resulting from all training activities and range development projects, as well as any supporting infrastructure and facility development projects. All consultation requirements associated with this agreement would be completed during this current consultation for the revised INRMP. Subsequent to the revised INRMP consultation, any listed species that appear as a result of prescribed fire or other habitat management activities could be taken without further Service approval or consultation. Camp Lejeune would notify the Service of any incidental take in annual INRMP updates.

D. Forest Management

Most of the forest management actions implemented under the revised INRMP would be consistent with the terms and conditions and conservation measures of prior consultations. Consistent with the current INRMP, forest compartments would be treated on a 10-year cycle with more frequent treatments as necessary to address specific RCW habitat requirements. MCB Camp Lejeune would continue to restore longleaf pine to its native distribution on Mainside and Verona Loop. Methods of longleaf pine regeneration would continue in accordance with those described in the current INRMP. The only changes in forest management that would not be consistent with prior consultations would involve the suspension of longleaf pine restoration efforts on GSRA during the ongoing planning process for the Tactical Vehicle Maneuver Areas (TVMA) range development initiative, and discontinuation of five-acre patch cuts as a method of timber stand regeneration. The ongoing process of planning and designing maneuver ranges on GSRA precludes the identification of suitable longleaf pine restoration sites at this time. In order to avoid inefficient and ineffective resource allocation, longleaf pine restoration on GSRA would be put on hold pending completion of the range planning and design process. Potential longleaf restoration sites on GSRA would be reevaluated upon completion of the planning/design process

or at the end of the five-year INRMP period, whichever comes first. The elimination of five-acre patch cuts for regeneration will leave two options; modified two-aged management, and uneven aged management, which are consistent with 2003 RCW recovery plan.

E. Wildland Fire Management

Wildland fire management under the revised INRMP would continue in a manner consistent with the terms and conditions and conservation measures of prior consultations. The revised INRMP would pursue a strategy of increasing both the frequency of prescribed burning and the proportion of prescribed burns that are conducted during the growing season. These changes in prescribed burning would be designed to more closely replicate the historical natural fire regime on MCB Camp Lejeune by burning as much of the base as possible during the growing season on a 3-year rotation, especially in designated RCW habitat. As a strategy to meet this goal, MCB Camp Lejeune would also seek expanded use of aerial ignition to conduct prescribed burning.

F. Coastal Area Management

The training areas on Onslow Beach support specialized amphibious training operations, in addition to recreational use. Amphibious training and beach driving have the potential to accelerate natural erosion of beach and barrier dunes, and impacting maritime communities. In addition, Brown's Island is in the N1/BT-3 impact area and is critical for live fire operations. MCB Camp Lejeune may stabilize and protect coastal dunes through seasonal driving restrictions, replanting dune grasses, and periodic installation of sand fences to facilitate dune formation.

G. Conservation Measures

Silvicultural activities will be accomplished within the guidelines of the Service 2003 RCW Recovery Plan and would benefit RCW. These activities include thinning of mature pine timber to no less than 40 square feet of basal area, removal of mature canopy hardwoods (canopy hardwoods are not to exceed 10 percent in good quality RCW habitat), retention of potential cavity trees, and two-aged and uneven-aged management for pine. Care will be taken to reduce damage to high-quality native ground cover.

Harvest will not occur within 200 feet of active clusters during the primary nesting season. The least intensive site preparation method will be applied when prescribing site preparation for forest regeneration. Any combination of natural, mechanical, or chemical methods may be used depending on site conditions.

Fire management outlined in the revised INRMP would increase both the frequency of controlled burns and the proportion of prescribed burns that are conducted during the growing season. These changes in fire management would closely replicate the historical natural fire patterns on

MCB Camp Lejeune by maximizing fire returns in fire-maintained ecosystems during the growing season on a 3-year rotation, especially in designated RCW habitat. MCB Camp Lejeune would use aerial ignition to enhance prescribed burning capabilities.

II. RED-COCKADED WOODPECKER

A. Status of the Species/Critical Habitat

1) Species/critical habitat description

The U. S. Department of the Interior identified the red-cockaded woodpecker as a rare and endangered species in 1968 (USDI 1968). In 1970, the red-cockaded woodpecker was officially listed as endangered (Federal Register 35:16047). With passage of the Act in 1973, the red-cockaded woodpecker received the protection afforded listed (endangered) species under the Act. The current distribution of this non-migratory, territorial, species (endemic to open, mature and old growth pine ecosystems) is restricted to the remaining fragmented parcels of suitable pine forest in 11 southeastern states; it has been extirpated in New Jersey, Maryland, Missouri, Tennessee and Kentucky (Service 2003). As of January 2006, there were an estimated 15,263 red-cockaded woodpeckers living in 6,105 active clusters across 11 states (Service 2003, unpublished data). This is less than 3% of estimated abundance at the time of European settlement.

Despite the protection of the Act in 1973, all monitored populations (with one exception, see Hooper et al. 1991) declined in size throughout the 1970's and into the 1980's. Although populations have become more fragmented and isolated, the red-cockaded woodpecker is still rather widely distributed. Red-cockaded woodpeckers survive as very small (1-5 groups) to large (groups of 200 or more) populations. Small populations in the interior are found in southeastern Oklahoma, southern Arkansas, and southeastern Virginia. The majority of the largest populations remaining are located in the longleaf pine forests of the Sandhills of North and South Carolina and the Coastal Plain longleaf pine forests of North and South Carolina, Georgia, Florida, and Louisiana; and loblolly/shortleaf pine forests of eastern Texas. No critical habitat has been designated for the red-cockaded woodpecker.

2) Life history

The RCW is unique in that it is the only North American woodpecker that exclusively excavates its cavities for roosting and nesting in living pines. It is a territorial, non-migratory, cooperative breeding species (Lennartz et al. 1987; Walters et al. 1988). Usually, the trees chosen for cavity excavation are infected with a heartwood-decaying fungus (*Phellinus pini*) (Jackson 1977;

Conner and Locke 1982). The heartwood associated with the fungus and typically required for cavity excavation is not generally present in longleaf pine until 90 to 100 years of age (Clark 1992a, 1992b). Large trees also are required because the cavity is constructed and placed entirely within heartwood where pine resin will not flow. Each group member has its own cavity, although there may be multiple cavities in a cavity tree. RCWs chip bark and maintain resin wells on the bole around the cavity where the fresh flow of sticky resin is a deterrent against predatory snakes (Rudolph et al. 1990) and indicates an active cavity tree. The aggregate of cavity trees is called a cluster (Walters 1990). Cavities within a cluster may be complete or under construction (starts) and either active, inactive, or abandoned. Clusters with one or more active cavity tree are considered as active RCW clusters.

RCWs live in social units called groups. This cooperative unit usually consists of a monogamous breeding pair, offspring of the current year, and 0 – 4 adult helpers (Walters 1990). Helpers typically are male offspring from previous breeding seasons that assist the breeding pair by incubating eggs, feeding the young, excavating cavities, and defending the territory (Ligon 1970; Lennartz and Harlow 1979; Lennartz et al. 1987; Walters et al. 1988). Some large populations have instances, although very infrequent, of female helpers (Walters 1990; Delotelle and Epting 1992; Bowman et al. 1998). Some clusters are only occupied by a single adult male, which classifies them as single bird groups.

RCWs have large home ranges relative to their body size. RCWs tend to forage within 0.5 miles of their cluster. A 0.5-mile radius circle around a cluster center encompassed an average of 91 percent of the actual home ranges of RCW groups in a North Carolina study (Convery and Walters 2004). RCW groups forage with a home range that is highly variable, from as little as 86 acres to as much as 556 acres (Conner et al. 2001; Service 2003). Home range size is variable within and between populations, but tends to reflect foraging habitat quantity and quality, boundaries of adjacent RCW territories, and possibly cavity trees resource availability (Conner et al. 2001; Service 2003).

Each RCW group defends its home range from adjacent groups (Hooper et al. 1982; Ligon 1970). The defended territory includes habitat used for cavity trees and foraging. RCWs feed mostly on a variety of arthropods, particularly ants and wood roaches, by foraging predominantly on and under the bark of larger and older living pines (Hooper 1996; Hanula and Franzreb 1998). Group members forage together each day in pairs in their territory. Males tend to forage in crowns and branches, while females commonly forage on the trunk. Dead and dying pines are important temporary sources of prey and hardwoods are used occasionally.

Approximately 90 percent of PBGs nest each year. A PBG is an adult male and female, with or without helpers, occupying the same cluster. The nesting season occurs from April to July. Females usually lay 3 to 4 eggs in the cavity occupied by an adult male. The short incubation

period lasts approximately 10 days, and eggs hatch asynchronously. Nestlings fledge after 24 to 29 days, although all nestlings rarely survive to fledglings. Partial brood loss of nestlings is common in RCWs, although number of hatchlings successfully fledged tends to increase with group size. Older and more experienced breeders have greater reproductive success (i.e., number of fledglings), which is maximized at about seven years of age, after which it declines sharply at 9 or greater years of age (Reed and Walters 1996). About 20 percent of nests will fail completely, without producing a single fledgling. Groups with helpers experience whole brood loss less frequently than breeding groups without helpers. Re-nesting rates are geographically and annually variable. In good years, up to 30 percent of breeding groups will re-nest. Productivity of the second nest is lower.

Juvenile males remain in their natal territory or disperse. Those remaining become helpers or, if the breeding male dies before the next breeding season, the male juvenile becomes a breeder. Dispersing juvenile males search for positions as breeders in nearby territories where they either become breeders, helpers, or floaters.

Most adult male helpers remain on their natal territory as helpers, where about 15 percent will inherit the territory as a breeding male in any given year. Some adult helpers disperse to other territories becoming breeders, solitary males, helpers, and floaters; however, breeding males are highly territorial and most will remain even without a breeding female. In contrast, about 10 percent of breeding females will break the pair-bond between breeding seasons and disperse to another territory as breeder with a different male (Walters et al. 1988; Daniels and Walters 2000).

Subadult/juvenile females from the current year breeding season normally disperse prior to the next breeding season or are driven from the group's territory by the group (Walters et al. 1988). Juvenile females remain at their natal territory to assume the breeding vacancy of the female only when the breeding male dies and the breeding female disperses or dies. Breeding females will disperse, creating a breeding vacancy, when her male offspring inherit the male breeding position (i.e., incest avoidance). Dispersing juvenile females move to nearby RCW territories in search of a breeding vacancy. These females either become breeders in a territory or floaters among more than one territory where they are not associated with a single group.

3) Population dynamics

RCW population size during a given year is the number of surviving adults plus the number of surviving offspring produced and the number of immigrants to the population minus the individuals that dispersed from the population. These are the demographic rates of birth, death, immigration, and emigration that affect population dynamics; however, RCW population dynamics are significantly affected by the cooperative breeding system and behavior of territorial

RCW groups with helpers. The spatial distribution and aggregation of groups affects the likelihood that breeders in a group will be replaced upon their death or upon dispersal by other RCWs in their group. All of these factors regulate population size, stability, and viability as mediated by the effects of habitat, genetics, demographic and environmental stochasticity and environmental catastrophes.

Population Size

The term “population” is applied for RCWs in various contexts, just as it is for other species. A RCW population can be the number of clusters occupying a particular geographic area or a specific property managed by a particular agency or entity; however, RCW population size is most important as an attribute of a biologically functional population of spatially distinct demographic and/or genetic groups (e.g., Wells and Richmond 1995). Demographically, a RCW population is strongly affected by the dispersal distances of males and females from their natal group or group territories to other groups in which they may compete for breeding vacancies. Dispersing juvenile and helper males rarely move and assume breeding vacancies at clusters located more than two miles from their natal site at North Carolina study areas (Daniels 1997; Walters et al. 1988). Juvenile females from the same study areas are capable of longer forays, becoming breeders in clusters up to 3.7 miles away (Walters et al. 2008). In western Florida, from a study with a smaller number of observations, adults disperse an average distance of 1.1 miles, juvenile females 2.0 miles, and juvenile males 5.0 miles (Hardesty et al. 1997); thus, the spatial structure and distribution of groups are crucial factors defining a demographically functional RCW population and its size.

RCW population size is commonly measured as the number of groups instead of the number of individuals. The number of PBGs is an important metric for population dynamics and persistence. A single-bird (male) group is a solitary territorial male at a cluster without a female. Single-male groups, while not breeders, are important because a large proportion of single-bird groups are indicative of a declining population. Although the total number of birds in a population can be measured or estimated, this number includes non-breeding adults as helpers and floaters. Population measures of all individuals do not account for group and territory dynamics or the buffering effect of helpers as a replacement pool for breeders.

A PBG is determined by confirmation of nesting or careful observation of a coexisting adult pair in the cluster and territory in the absence of nesting or during the non-nesting season. Single-male groups are determined using the same observational methods of following birds during foraging in the early morning after they have exited their cavities. In the absence of data for the number of groups and group composition, the number of active clusters is an index estimate of population size (number of groups). An active cluster is a group cluster where fresh resin from RCW activity at a suitable cavity occurs on one or more cavity trees. An active cluster may be

occupied by PBG or a single-male group. In large populations, the number of PBGs and single-male groups frequently are estimated by an active cluster census to determine the number and composition of groups. The proportion of PBGs and single-male groups in a sample is extrapolated to find the total number of active clusters and an estimate of the total number of PBGs and single-male groups.

RCW populations under natural conditions increase in size by two primary processes: pioneering and budding. Pioneering is the creation of new cavities and colonization of a new, previously unoccupied territory. Pioneering rarely occurs under current conditions, with new group formation rates of only 0.06 to 1.5 percent per year (Service 2003). Budding is the creation of a new group by subdividing an existing group territory and its cavity trees, usually by a group helper or immigrant male (Conner et al. 2001). Annual budding rates are low, from 0.6 to 2.1 percent.

Population Response to Habitat Quality

RCW populations experience environmental variation within and between physiographic regions, ecosystems, forest communities, forest stands, and individual trees; however, the fundamental ecology of RCWs remains the same where populations occupy fire-maintained, open pine forests, with pine of a sufficient age and size for cavities and foraging.

The majority of RCW populations reside in the longleaf pine ecosystem where longleaf pine historically dominated the forest community, providing cavity resources and foraging substrate. Populations in other vegetation types occur at the periphery of the longleaf pine ecosystem; however, variation among forest ecosystems is not known to significantly alter RCW population demographics or dynamics under natural conditions. But, the variation in habitat quality and quantity can be associated to some extent with the structural characteristics of some forest community types. For example, longleaf community types and forest structure vary in response to soil moisture and drainage, from xeric excessively well-drained types on sandy soils to wet types in flatwoods and savannas with seasonally perched water tables (Peet and Allard 1993; Christensen 2000). The density and size of longleaf pine is reduced at these most xeric and wet communities, which results in slower pine growth rates than at more productive mesic sites and community types.

RCW home range size has been directly correlated to variation in the productivity of pine stands. Home range size has been related to the areas of suitable habitat within 1.24 miles of the cluster, pine basal area, pine density, pine density greater than 9.84 inches diameter breast height (DBH), RCW group density, hardwood midstory, and other factors (Hooper et al. 1982; DeLotelle et al. 1987; Bowman et al. 1998; Hardesty et al. 1997; Walters et al. 2000a, 2002a). Larger areas of low quality habitat are generally required and smaller areas are sufficient in high quality habitat.

In small habitat patches, patches within stands, and stands within a landscape, RCWs selectively forage in their home ranges on larger and older pines more frequently than on younger and smaller trees, although more smaller trees are available (Zwicker and Walters 1999; Walters et al. 2002a). Overall, RCWs preferentially use pine 12 to 20 inches DBH, prefer trees greater than 20 inches DBH, but use trees less than 20 inches DBH depending on the availability of larger trees, and avoid trees less than 12 inches DBH when larger trees are available (Walters et al. 2000a). RCW group fitness or reproductive success is directly and indirectly affected by the age and size of available pine, as well as the development of herbaceous plant ground cover. RCW group size, fecundity, or both is positively related to a specific and relatively open arrangement of old and large pine and an increase in herbaceous ground cover. It is negatively related to an increasing density of small young pine, intermediate-size pine, and the density and height of the hardwood midstory (Conner and Rudolph 1991a; Rudolph and Conner 1994; Hardesty et al. 1997; Engstrom and Sanders 1997; James et al. 1997, 2001; Walters et al. 2002a). Group size affects productivity because the number of fledglings increases with group size, generally with an average of two fledglings in groups of 4 to 5 adults and helpers, and one fledgling on average with groups of just two breeding RCWs (Conner et al. 2001).

Habitat quality is not a function of any single attribute. For example, RCW fitness is not solely related to the number, basal area, or density of pine greater than 10 inches DBH (Hooper and Lennartz 1995; Beyer 1996; Wigley et al. 1999; James et al. 2001; Walters et al. 2002a). Collectively, the attributes of RCW habitat use affecting RCW fitness are the characteristics of habitat structure, which include the density and size-class distribution of pine. High quality RCW forage habitat consists of an open fire-maintained pine forest, with no or a sparse midstory, low densities of small pine (<10 inches DBH), moderate densities of medium-sized (10 to 14 inches DBH) and large (>14 inches DBH) pine, low and high densities of old growth pine, and well-developed herbaceous plant ground cover (James et al. 2001; Walters et al. 2002a). Understanding the contribution of old growth to habitat quality has been limited by the rarity of this habitat, although RCWs from the old-growth tracts in southern Georgia have the smallest average home ranges and the greatest average group size and productivity known; thus, old growth is expected to be an important element of habitat quality, both for foraging and cavity resources.

Population Stability

Viable RCW populations are robust and highly persistent, in contrast to a population vulnerable to future declines and extirpation. RCW population viability depends on a sufficient number of stable groups to avoid adverse effects of inbreeding and impacts from stochastic genetic, demographic, environmental, and catastrophic events (Shaffer 1981). Inbreeding depression is a consequence of breeding among closely related adults producing offspring with deleterious

homozygous recessive alleles that reduce fitness. Genetic drift is the loss of alleles and genetic diversity by the fluctuation of gene frequencies from random mating events. Demographic stochasticity is the random or chance variation in survival and reproductive rates. Environmental stochasticity is variation in vital demographic rates and processes in response to annual, seasonal, or other changing environmental events such as rainfall, temperature, predation, food resources, and other factors. Catastrophes are naturally occurring but infrequent events such as hurricanes, tornadoes, and large-scale pine beetle outbreaks that affect mortality, reproduction, or other features of RCW population dynamics at a great magnitude over a short period of time. All of these factors operate simultaneously to affect RCW population dynamics and viability. Small populations are particularly more sensitive to exacerbating effects of these stochastic factors (Shaffer 1981; Soule 1987; Clark and Seebeck 1990), which can drive local extirpation or extinction (Gilpin and Soule 1986).

Demographic Stochasticity

With the added effects of demographic stochasticity, Letcher et al. (1998) found that small RCW populations with 49 highly aggregated clusters were stable over 100 years, and smaller populations of 25 highly aggregated clusters were highly persistent for about 60 years. Highly aggregated clusters share common territorial boundaries. Even smaller, highly aggregated populations of 20 and 10 clusters had good persistence for 20 years, although annual geometric population growth rates were less than 1.0 and projected to slowly decline with time (Crowder et al. 1998). Highly aggregated populations of 49 clusters were more stable than minimally aggregated populations of 169 or 250 clusters. Populations with less than 100 clusters that were not highly aggregated declined and were not viable. Regardless of the aggregation or clumping of the modeled populations in their study (Letcher et al. 1998), populations of 500 clusters were viable and moderately aggregated clusters of 250 were stable.

The density of populations with 49, 100, and 169 clusters modeled on the simulated landscape (189,776 acres) at different aggregations by Letcher et al. (1998) represented the density of known populations, respectively, from Croatan NF (one group per 3,873 acres), MCB Camp Lejeune (one group per 1,898 acres), and North Carolina Sandhills (one group per 1,123 acres) landscapes. Species with populations of 50 or more individuals generally are not vulnerable to declining and extirpation by demographic stochasticity (Meffe and Carrol 1994); however, spatial structure strongly affects viability of RCW populations with fewer than 50 clusters under stochastic demographic fluctuations. The strong persistence of highly aggregated RCW populations with less than 50 clusters reflects the demographic effect of a non-breeding class (helpers) of individuals. Variation in breeder mortality is dampened by helpers that replace breeders. Fluctuating periods of greater breeder mortality tends to reduce the size of the helper class instead of reducing the number of breeding groups (Walters et al. 2002b).

Environmental Stochasticity

RCW environmental stochasticity is represented by the variation in demographic rates and group structure among years. The RCW individual-based, spatially-explicit population model (IBSEPM) with demographic and environmental stochasticity (Walters et al. 2002b) used the same simulated landscape (189,776 acres) as Letcher et al. (1998), although only populations of 25, 49, 100, 250, and 500 groups were modeled at minimally (random) aggregated and moderately aggregated densities. Moderately aggregated groups reflected the level of aggregation Walters et al. (2002b) considered most representative of the majority of current RCW populations. Two higher levels of density were investigated, while controlling for the effects of population size.

Overall, Walters et al. (2002b) concluded that RCW population persistence and viability in response to demographic and environmental stochasticity was similar to that of comparable populations affected only by demographic stochasticity. The added effects of environmental stochasticity were relatively small compared to viability analysis of other species. Once again, the non-breeding class of helpers in the RCW cooperative breeding system had a buffering effect on breeder mortality and loss of breeding groups.

Inbreeding

Daniels et al. (2000) used an RCW IB-SEPM to assess potential inbreeding effects with demographic and environmental stochasticity on viability in small populations of 25, 49, and 100 groups with a moderate level of group aggregation. In earlier studies, Daniels and Walters (2000) documented actual effects of inbreeding depression in RCWs that caused reduced egg hatching success and fledgling survival; however, the IB-SEPM assessment of potential inbreeding effects did not directly incorporate reductions in RCW fitness due to demographic variables. Instead, Daniels et al. (2000) computed coefficients of kinship for each breeding pair (i.e., inbreeding coefficient of offspring) and mean kinship of RCW pairs to identify pairs that were unrelated, moderately related, and closely related. Kinship pedigree analyses were compared to inbreeding estimates from population genetics models.

Daniels et al. (2000) found that inbreeding depression is a serious viability threat to small, isolated and declining RCW populations. RCW populations of 25 and 49 groups declined, as in other RCW IB-SEPMs. The stable population of 100 groups was only marginally persistent over their 50-year simulation period, and may not have been stable if simulated for a 100-year period. The mean percentage of closely related breeding pairs increased for all populations. Closely related breeding pairs were more prevalent in populations of 25 and 49 groups, which were at risk of extremely high inbreeding; however, two or more immigrants to these populations per year could stabilize a declining trend and reduce significantly the number of closely related breeding pairs.

Catastrophes

Hurricanes, tornados, and southern pine beetles are the primary catastrophic events affecting RCW population stability. These events damage or destroy habitat, reducing the number of breeding groups by the loss of cavity trees and foraging habitat. Within a 70-mile radius of MCB Camp Lejeune which encompasses the entire Onslow Bight landscape 11 hurricanes have occurred since 1981 (NOAA 2012; NCSU 2011; Table 2).

Table 2. Hurricane Occurrences within the Project Area from 1981 – 2011.

Year	Name	Category	Wind (knots)	Distance (miles)
1984	Hurricane Diana	4	115	36.00
1986	Hurricane Charley	1	65	48.25
1996	Hurricane Bertha	1	65	28.28
1996	Hurricane Fran	3	100	60.00
1998	Hurricane Bonnie	2	85	10.31
1999	Hurricane Floyd	2	90	4.20
2003	Hurricane Isabel	2	85	65.64
2004	Hurricane Alex	2	85	64.26
2005	Hurricane Ophelia	1	75	41.02
2011	Hurricane Irene	1	75	45.88

Data from National Oceanic and Atmospheric Administration (NOAA 2012) and State Climate Office of North Carolina (NCSU 2011)

Hurricanes are the greatest catastrophic threat, as indicated by their frequency, widespread distribution, intensity, and effects (Hooper and McAdie 1995). Hurricane Hugo, a category IV storm, destroyed about 87 percent of RCW cavity trees in the Francis Marion NF, reducing the estimated pre-storm population of 477 active clusters to 277 clusters with at least one remaining cavity tree (Hooper et al. 1991; Watson et al. 1994). The Francis Marion population, at that time, was one of the largest. Coastal populations, particularly small populations, are highly vulnerable while the most inland populations are at least risk. RCW populations in the Croatan NF (North Carolina), Francis Marion NF (South Carolina), Apalachicola NF (Florida), DeSoto NF (Mississippi), Eglin Air Force Base (Florida), and Conecuh NF (Alabama) and nearby regions are the most vulnerable based on hurricane return periods and intensity (Hooper and McAdie 1995).

Southern pine beetle epidemics adversely affect loblolly pine much more than longleaf, which have greater resin production and resistance to attack. The loss of off-site planted loblolly pine,

which was planted in much of the historic longleaf pine range, as well as loblolly in its natural habitat, can be locally significant. Loss of cavity trees in small populations with limited cavity trees can be locally severe, leading to a reduction in breeding groups and potentially threatening local extirpation in small populations.

Recovery Plan Efforts

The ultimate recovery goal is species viability. This goal is represented by delisting. Once delisting criteria are met, the size, number, and distribution of populations will be sufficient to counteract threats of demographic, environmental, genetic, and catastrophic stochastic events, thereby maintaining long-term viability for the species as defined by current understanding of these processes. Regions and habitat types currently occupied by the species will be represented to the best of our ability, given habitat limitations. According to the RCW Recovery Plan, 14,068 RCWs form 5,627 known active clusters across eleven states. In the early 2000s, 1,296 known active clusters occurred on private land in 11 states (Costa and Walker 1995; Service unpublished data; Service 2003), 631 active clusters occurred on state-owned properties in seven states, and 3,698 active clusters occupied federally owned properties in 9 states (Service 2003; Service unpublished data).

The number of active clusters, their distribution, varying land ownership, habitat fragmentation, increased urban pressures, and other management issues will require novel and imaginative tools and strategies if the ultimate recovery goal is to be met for RCWs. Identifying programs, like the RASP, that can work within the recovery criteria outlined in the RCW Recovery Plan (Service 2003) and expanding on them by improving ecological function within primary and secondary populations is both timely and vital.

4) Status and Distribution

Reason for Listing: The precipitous decline of red-cockaded woodpeckers was caused by an almost complete loss of habitat. Prior to European settlement, the number of red-cockaded woodpecker groups inhabiting longleaf pine forests and all southern pine forests has been estimated at 920,000 (Costa 2001) and 1.5 million (Conner et al. 2001), respectively. Fire-maintained old growth pine savannahs and woodlands that once dominated the southeast (92 million acres pre-European settlement; Frost 1993), on which the woodpeckers depend, no longer exist except in a few small patches (<3.0 million acres today; Frost 1993). Longleaf pine ecosystems, of primary importance to red-cockaded woodpeckers, are now among the most endangered systems on earth (Simberloff 1993, Ware et al. 1993).

Loss of the original pine ecosystems was primarily due to intense logging for lumber and agriculture. Logging was especially intense at the turn of the century (Frost 1993). Two

additional factors resulting in the loss of the original pine systems in the 1800's and earlier were exploitation for pine resins and grazing of free-ranging hogs (Wahlenburg 1946, Frost 1993). Later in the 1900's, fire suppression and detrimental silvicultural practices had major impacts on primary ecosystem remnants, second growth forests, and consequently on the status of red-cockaded woodpeckers (Frost 1993, Ware et al. 1993, Ligon et al. 1986, 1991, Landers et al. 1995). Additionally, longleaf pine suffered a widespread failure to reproduce following initial cutting, at first because of hogs and later because of fire suppression (Wahlenburg 1946, Ware et al. 1993).

Range-wide Trend: The decline of the red-cockaded woodpecker from the time of European settlement through the 1980s has been well documented and is directly related to loss and degradation of its old growth pine habitat (see Reasons for Listing). However, this range-wide decline has been halted and reversed, and in many populations, particularly Department of Defense installations, trends are now increasing or at least stable. In the 1990's and through today, in response to intensive management based on a new understanding of population dynamics and new management tools, e.g., artificial cavities (Copeyon 1990, Allen 1991) and translocation (Costa and DeLotelle 2006), most public land populations, and those private land populations in partnerships with the Service, were stabilized and many showed increases. However, some populations remain in decline and most have small population size, i.e., <50 active clusters.

Species-wide, the population trend of the red-cockaded woodpecker is increasing. In 1993/1994, the range-wide population was estimated at 4,694 active clusters; in 2006 it was 6,105 (see Table 3 for details). However, not all populations required for downlisting and delisting are increasing. For example, of the 57 federal populations (federal populations comprise the majority of populations involved in recovery criteria), and based on a five-year trend period from 2000 to 2005, 12 (21%) were decreasing, 10 (18%) were stable, 31 (54%) were increasing, and 4 (7%) were extirpated. These populations include 13 on national wildlife refuges, 15 on military installations, 26 on national forests, and one each on lands administered by the Department of Energy, Bureau of Land Management, and National Park Service.

Table 3: Range-wide red-cockaded woodpecker population status and trend

Year	# Active Clusters	Source
1993	4,694	Costa and Walker (1995)
2003	5,625	U.S. Fish and Wildlife Service (2003)
2004	5,800	Costa and DeLotelle (2006)
2005	5,903	U.S. Fish and Wildlife Service (unpubl. data 2005)
2006	6,105	U.S. Fish and Wildlife Service (unpubl. data 2006)

A 2005 analysis of the 128 properties (all public [53 federal, 36 state] and 39 private properties harboring red-cockaded woodpeckers) submitting reports via the Annual Report illustrates the status of the species at the property scale (Table 4). When examined from the property perspective it is clear, that although several large populations exist, the vast majority (73%) of properties harbor fewer than 40 active clusters. Indeed, 90% of properties harbor fewer than 100 active clusters.

Table 4. Number of active RCW clusters by ownership for all public and selected private properties.

# Active Clusters	Federal	State	Private	Total	
1-10	9	19	21	49	(38%)
11-40	21	11	13	45	(35%)
41-100	12	5	5	22	(17%)
101-250	5	1	0	6	(5%)
250-350	3	0	0	3	(2.5%)
351+	3	0	0	3	(2.5%)
Total	53	36	39	128	(100%)

Although some recovery populations are composed of one or more properties (e.g., because the properties are adjacent to one another), most recovery populations (64%) are located on one property/ownership. The Recovery Plan identifies 63 properties involved in recovery: 26 primary core (PC), 14 secondary core (SC) and 23 essential support (ES). As of January 2005, four properties (3 PC, 1 SC) were declining, 29 (12 PC, 3 SC, 14 ES) were stable and 30 (11 PC, 10 SC, 9 ES) were increasing (Service 2005 unpublished data). Of the 63 recovery properties, only six (9%) exceed 250 active clusters; 15 (24%) harbor fewer than 10 active clusters, while 14 (22%), 23 (37%) and five (8%) harbor 10-30, 31-100 and 101-250 active clusters, respectively (Table 4) (Service 2005 unpublished data). Fifteen (22%) of the 63 recovery properties have

achieved their recovery population goals. Five (13%) of the 39 recovery populations required for delisting have achieved their recovery population goals.

Table 5. Number and percent of RCW recovery properties by population size (# active clusters).

# Active Clusters	# Properties	% of Properties
< 10	15	24%
10-30	14	22%
31-100	23	37%
101-250	5	8%
250+	6	9%
Total	63	100%

In spite of the relatively small size of most populations, the status of red-cockaded woodpeckers has been consistently improving since the early 1990s (Table 3). This steady increase can be attributed to various factors, including aggressive prescribed burning programs, artificial cavity provisioning and regional translocation cooperatives and strategies (Costa and DeLotelle 2006). Implementation of these habitat and population management tools and techniques has successfully reversed the regional declines of the previous decades. Indeed, these activities have been primarily responsible for the population increases on DoD installations during the past decade.

Recovery Criteria: Recovery criteria in the 2003 Recovery Plan have been formulated on the basis of 11 recovery units delineated according to ecoregions. Populations required for recovery are distributed among recovery units to ensure the representation of broad geographic, ecologic, and genetic variation in the species. The wide geographic distribution reduces the threat of catastrophic habitat destruction and population loss by hurricanes. The distribution of populations and recovery units also will facilitate periodic RCW immigration and emigration among populations, which will be required to offset or reduce the loss of potential adaptive genetic variation within populations by drift.

Population sizes identified in recovery criteria are measured as the number of potential breeding groups (PBGs). A PBG is an adult female and an adult male that occupy the same cluster, with or without one or more helpers, whether or not they attempt to nest or successfully fledge young. A traditional measure of population size has been number of active clusters. Potential breeding groups is a better measure of population status, because this is the basis of population dynamics in this species and number of active clusters can include varying proportions of solitary males and captured clusters.

Estimates of all three parameters-number of active clusters, proportion of solitary males, and proportion of captured clusters-are required to support estimates of PBGs.

To assist in the transition between these two measures, a range of numbers of active clusters considered the equivalents of the required number of PBGs is provided. Estimated number of active clusters is likely to be at least 1.1 times the number of PBGs, but it is unlikely to be more than 1.4 times this number. Thus, an estimated 400 to 500 active clusters will be necessary to contain 350 PBGs, depending on the proportions of solitary males and captured clusters and also on the estimated error of the sampling scheme.

Each recovery unit consists of various designated primary core, secondary core, and essential Support populations. Most populations reside on Federal lands, where the largest remaining populations tend to occur and the largest land base and resources for management are available. All or parts of each recovery population are on designated federal, State, or private properties for management

The 13 primary core populations consist of at least 350 PBGs, the 10 secondary core populations each have at least 250 PBGs, and the 17 essential support populations each have from 15 to 100 PBGs. As the largest populations, the primary core populations will be robust and viable against the threats of extirpation by demographic stochasticity, environmental stochasticity, and inbreeding depression. They are more likely to sustain genetic diversity and avoid adverse losses by genetic drift than smaller secondary core and essential support populations. Secondary core populations are of sufficient size to avoid inbreeding depression and are robust against demographic and environmental stochasticity. Essential support populations, the smallest, will remain potentially vulnerable to inbreeding and demographic environmental stochasticity. The extent of this risk will depend on the density and aggregation and PBGs in each support population. Essential support populations will require more intensive long-term management, including RCW translocations.

Downlisting to threatened status will be considered when each of the following criteria is met.

Criterion 1. There is one stable or increasing population of 350 potential breeding groups (400 to 500 active clusters) in the Central Florida Panhandle.

This criterion has been met. The Apalachicola Ranger District, one of the five properties comprising the Central Florida Panhandle Primary Core population, harbors more than 350 PBGs.

Criterion 2. There is at least one stable or increasing population containing at least 250 potential breeding groups (275 to 350 active clusters) in each of the following recovery units: Sandhills,

Mid-Atlantic Coastal Plain, South Atlantic Coastal Plain, West Gulf Coastal Plain, Upper West Gulf Coastal Plain, and Upper East Gulf Coastal Plain.

Three (Sandhills, Mid-Atlantic Coastal Plain, and South Atlantic Coastal Plain) of the six recovery units required to have a population with 250 PBGs are present.

Three (Sandhills, Mid-Atlantic Coastal Plain, and South Atlantic Coastal Plain) of the six recovery units required to have a population with 250 PBGs are present.

Criterion 3. There is at least one stable or increasing population containing at least 100 potential breeding groups (110 to 140 active clusters) in each of the following recovery units: Mid-Atlantic Coastal Plain, Sandhills, South Atlantic Coastal Plain, and East Gulf Coastal Plain. Note that these populations would be different from those required in Criterion 2 above.

This criterion has been met. Each of the listed recovery units contains at least one population (different from the populations listed under Criterion 2 above) that harbors at least 100 PBGs.

Criterion 4. There is at least one stable or increasing population containing at least 70 potential breeding groups (75 to 100 active clusters) in each of four recovery units, Cumberlands/ Ridge and Valley, Ouachita Mountains, Piedmont, and Sandhills. In addition, the Northeast North Carolina/Southeast Virginia Essential Support Population is stable or increasing and contains at least 70 potential breeding groups (75 to 100 active clusters).

Only the Sandhills recovery unit contains a population harboring at least 70 PBGs (that would not be needed to satisfy either Criterion 2 or 3, which also require Sandhills populations of certain sizes).

Criterion 5. There are at least four populations each containing at least 40 potential breeding groups (45 to 60 active clusters) on State and/or federal lands in the South/Central Florida Recovery Unit.

This criterion has not yet been met.

Criterion 6. There are habitat management plans in place in each of the above populations identifying management actions sufficient to increase the populations to recovery levels, with special emphasis on frequent prescribed burning during the growing season.

Although Criterion 6 is referring to the need for populations to have such plans when they achieve their size goals, the majority of the populations required for delisting already have

management plans that address habitat management (e.g., prescribed burning) and population monitoring. These plans are generally updated at five-year intervals. The plans take the form of Integrated Natural Resource Management Plans (military), Land and Resource Management Plans (U.S. Forest Service), Comprehensive Conservation Plans (national wildlife refuges), and property-specific State wildlife management area and forest land plans.

Delisting will be considered when each of the following criteria is met.

Criterion 1. There are 10 populations of red-cockaded woodpeckers that each contain at least 350 PBGs (400 to 500 active clusters), and one population that contains at least 1,000 PBGs (1,100 to 1,400 active clusters), from among 13 designated primary core populations, and each of these 11 populations is not dependent on continuing installation of artificial cavities to remain at or above this population size.

One population (North Carolina Sandhills East) of the 10 primary core populations required has achieved 350 PBGs but remains dependent on artificial cavities.

Criterion 2. There are nine populations of red-cockaded woodpeckers that each contain at least 250 potential breeding groups (275 to 350 active clusters), from among 10 designated secondary core populations, and each of these nine populations is not dependent on continuing installation of artificial cavities to remain at or above this population size.

None of the 10 secondary core populations harbors 250 PBGs.

Criterion 3. There are at least 250 potential breeding groups (275 to 350 active clusters) distributed among designated essential support populations in the South/Central Florida Recovery Unit, and six of these populations (including at least two of the following: Avon Park, Big Cypress, and Ocala) exhibit a minimum population size of 40 PBGs that is independent of continuing artificial cavity installation.

This criterion has not been achieved.

Criterion 4. There is one stable or increasing population containing at least 100 potential breeding groups (110 to 140 active clusters) in northeastern North Carolina and southeastern Virginia, the Cumberlands/Ridge and Valley recovery unit (Talladega/Shoal Creek), and the Sandhills recovery unit (North Carolina Sandhills West), and these populations are not dependent on continuing artificial cavity installation to remain at or above this population size. One (North Carolina Sandhills West) of the three populations required to exceed 100 PBGs is present, although the population remains dependent on artificial cavities.

Criterion 5. For each of the populations meeting the above size criteria, responsible management agencies shall provide (1) a habitat management plan that is adequate to sustain the population and emphasizes frequent prescribed burning, and (2) a plan for continued population monitoring.

Although criterion 5 is referring to the need for populations to have such plans when they achieve their size goals, the majority of the populations required for delisting already have management plans that address habitat management (e.g., prescribed burning) and population monitoring. These plans are generally updated at five-year intervals. The plans take the form of Integrated Natural Resource Management Plans (military), Land and Resource Management Plans (U.S. Forest Service), Comprehensive Conservation Plans (national wildlife refuges), and property-specific State wildlife management area and State forest plans.

The number of active clusters, their distribution, varying land ownership, habitat fragmentation, increased urban pressures, and other management issues will require novel and imaginative tools and strategies if the ultimate recovery goal is to be met for RCWs. Identifying programs that can work within the recovery criteria outlined in the RCW Recovery Plan (Service 2003) and expanding on them by improving ecological function within primary and secondary populations is both timely and vital.

B. Environmental Baseline

This section describes the effects of past and ongoing human and natural factors leading to the current status of the species, its habitat, and ecosystem, within the Action Area. The environmental baseline is a “snapshot” of a species health at a specified point in time. It does not include the effects of the action under review in the consultation.

Following formal consultation with the Service in 1979, Camp Lejeune adapted forest management practices that more adequately supported RCW conservation. Actions that improved RCW habitat base-wide included extending rotation age for loblolly pine to 80 years; extending rotation age for longleaf and pond pine to 100 years; connecting clusters to a minimum of 200 acres of contiguous pine or pine-hardwood habitat; limiting regeneration stand sizes immediately surrounding clusters to 50 acres; and prescribe burning clusters at 2-3 year intervals (Service 1979).

Intensive RCW monitoring on Camp Lejeune began in 1986, when the base had 32 active clusters. Since that time, Camp Lejeune has seen this number grow by 256% to 114 active clusters in 2013. Camp Lejeune’s RCW population, in terms of active clusters, has grown an average of nine percent per year since 1990. This rate of growth is credited to increased growing season burns, lengthened timber rotation periods (more suitable habitat available), artificial cavity provisioning, and a demographic surplus of non-breeding RCWs in the population (Walters et al. 2000).

Implementation of the 1999 RCW Plan began in 2000. The 1999 RCW Plan and November 30, 1999 biological opinion established a mission compatible RCW goal of 173 active clusters. The 1999 RCW Plan emphasized intensive management of recruitment and replacement stands, protection of the oldest 1/3 of pine and pine-hardwood stands in RCW habitat management areas and proactive prescribed burning, midstory control and longleaf restoration in RCW habitat management areas. The 2001 INRMP (MCB Camp Lejeune 2001) adopted the 1999 RCW Plan with some minor modifications. The 2002 document contained procedures to determine whether restoration sites would be true clearcuts or if these locations would retain some overstory trees (e.g. 6 – 10 trees per acre) for potential foraging or nesting habitat. Camp Lejeune consulted with the Service in October 2003 regarding interim forest management guidelines which limited the size of conversion sites to five acres, but removed the mandate to leave overstory trees post-harvest. The interim guidelines stated that loblolly pine regeneration methods would retain an overstory of 40 ft² per acre and 60 ft² per acre the target for intermediate thins. For the interim guidelines, loblolly rotation age would remain 80 years and longleaf was 120 years. The Service concurred with Camp Lejeune's determination that adoption of the interim forest management guidelines was not likely to adversely affect the red-cockaded woodpecker in a letter dated November 14, 2003.

In December 2014, there were 121 active and inactive RCW clusters present on Camp Lejeune. Of those, 48 are unmarked and subject only to range control regulations. The 73 active, marked clusters account for about 1,350 acres. To comply with RCW conservation established through consultation with the Service, an installation regulation, Base Order P5090.11A, was implemented. Accordingly, the following activities are permitted within marked clusters: Hasty defense, light infantry, hand digging only, two hours maximum; Transient foot travel; Transient wheeled vehicular traffic; Transient armored vehicle traffic; Cutting natural camouflage (hardwood only); Vehicle maintenance (no more than two hours); Blank arms firing (7.62 millimeter and below); Artillery/hand grenade simulators; Hoffman-type devices; Smoke, haze operations only, generators or pots (devices must be activated and discharged more than 200 feet away from marked cavity trees); and Smoke grenades. The following activities are not permitted within marked clusters: Hasty defense, mechanized infantry/army 24 hours; Deliberate defense, light infantry, 48 hours; Deliberate defense, mechanized infantry/armor; Establish command post, light infantry 36 hours; Assembly area operations, light infantry/mechanized infantry/armor; Establish CS/CSS sites; Establish signal sites; Establish camouflage netting; .50-caliber blank firing; Artillery firing point/position; MLRS firing position; Generators; CS/Riot agents; Incendiary devices to include trip flares. Reconstruction or maintenance of existing roads through clusters and recruitment stands is allowed if it is shown that such activities will not adversely affect RCWs and the activities are scheduled before or after the nesting season.

1) Status of the Species within the Action Area

The historic condition of Camp Lejeune's RCW population is well described in the report entitled "The Biology and Management of the red-cockaded woodpecker on Marine Base Camp Lejeune, North Carolina: Progress toward Recovery under the New Management Plan," submitted to Camp Lejeune by Dr. Jeffrey R. Walters (Walters et al. 2005; 2005 Progress Report). The report summarizes the results of an eight year period of intensive monitoring (April 1997 through March 2005) that began in 1986. Between 1986 and 1991, the population was considered stable, ranging between 27 and 31 groups. In 1991, Camp Lejeune's RCW conservation began to include cavity management practices that complemented forest management for RCW habitat, including cavity provisioning and addition of restrictor plates to "cavity-limited" clusters (clusters containing less than four suitable cavities). Use of these conservation tools helped elevate the population from 27 groups in 1991 to 43 groups in 1996, a 59 % increase. Dr. Walter's report characterized the population's response to this cohesive forest and habitat management as "unprecedented." Figure 2 (below), adapted from Appendix 6 of the Revised INRMP, shows the increase in the number of active RCW clusters on base since 1986.

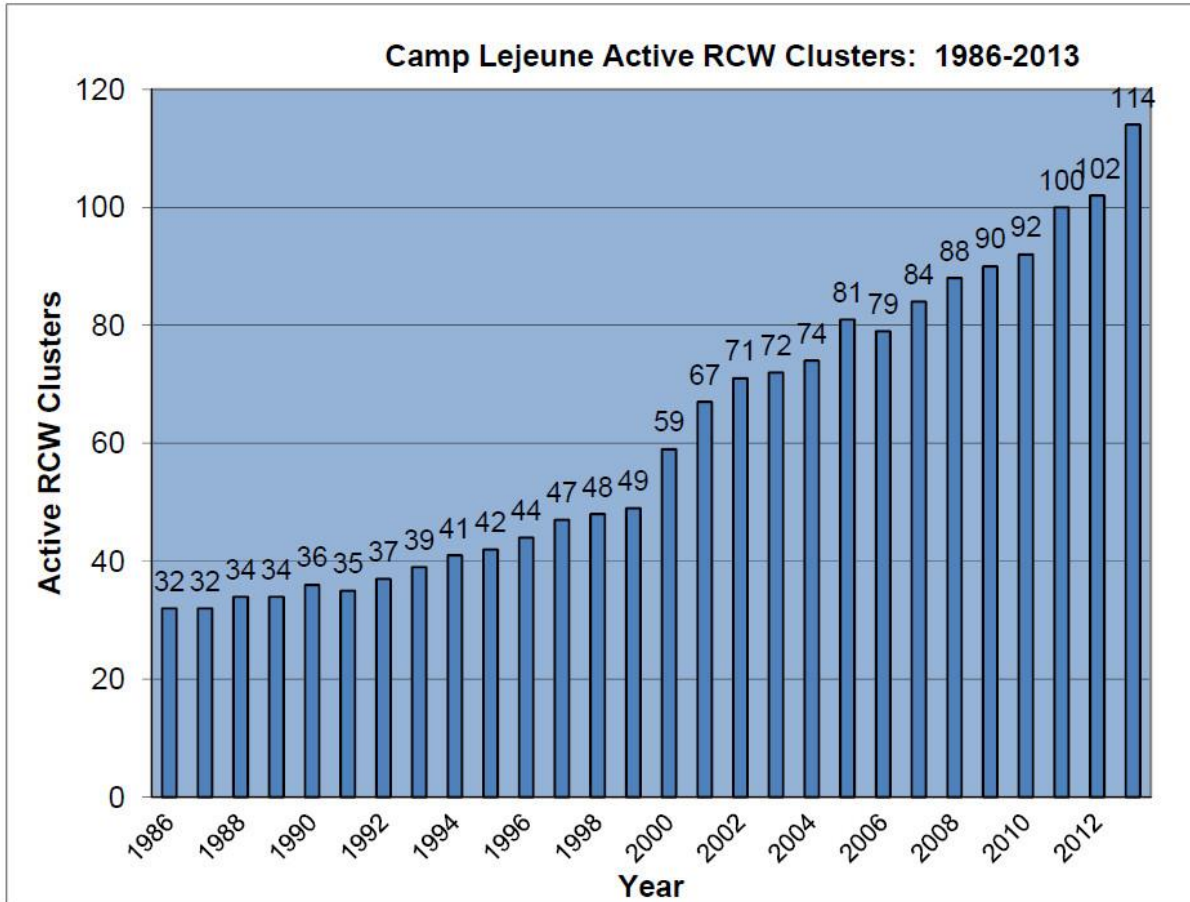


Figure 2. Number of active RCW clusters on MCB Camp Lejeune from 1986 to 2013

2) Factors affecting the species environment within the Action Area

Forest Management

Until the initial implementation of the 1999 RCW Plan, Camp Lejeune’s forest management for RCW conservation adhered to guidance contained in the Service’s 1979 biological opinion. Management included: extending rotation age for loblolly pine to 80 years; extending rotation age for longleaf and pond pine to 100 years; connecting clusters to a minimum of 200 acres of contiguous pine or pine-hardwood habitat; limiting regeneration stand sizes immediately surrounding clusters to 50 acres; and prescribe burning clusters at 2-3 year intervals (Service 1979).

The Service promulgated standards for managing and quantifying RCW foraging habitat supplemental to the 1985 RCW Recovery Plan (first revision) in 1989 (Henry 1989). These standards, referred to as the “bluebook” or “Henry Guidelines,” established target foraging habitat parameters used to direct forest planning and to analyze impacts to RCW foraging habitat

that might occur in the completion of proposed construction activities on the installation.

Following approval of the 1999 RCW Plan, Camp Lejeune began to intensively manage recruitment and replacement stands in 2000. The installation instituted protection of the oldest 1/3 age classes in pine and pine/ hardwood stands in RCW management areas. In 2002, Camp Lejeune consulted with the Service and implemented procedures to determine locations where longleaf restoration would result in true clear cuts and where some overstory pines would be retained. Following additional consultation with the Service in 2003, Camp Lejeune again modified its approach to longleaf conversion by limiting conversion sites to five acres but allowing complete clearcuts to occur in these small patches. Guidelines stated that loblolly pine regeneration methods would retain an overstory of 40 ft² per acre and 60 ft² per acre for intermediate thins. Loblolly rotation age remained at 80 years and longleaf was lengthened to 120 years.

Camp Lejeune operates an active and carefully planned prescribed burning program. Base-wide, about 93,000 acres of forest will receive some level of fuels management (MCB Camp Lejeune 2007). The Base Natural Resources Division began using a prescribed burning prioritization model in fiscal year 2006. Burning is conducted with the primary focus on restoration of the landscape, to more closely mimic that of pre-settlement conditions. A description of the Prescribe Burning Prioritization Model can be found in Appendix N of the 2007 INRMP. The surface danger zone for the G-10 impact area is burned in a checkerboard pattern on a two year cycle. In order to maintain and improve the current training environment, while also working towards the goal of RCW recovery, the annual prescribed burning goal is 20,000-25,000 acres/year.

Military Training

Currently protected clusters are marked with single bands of white paint and signs identifying them as protected areas. Specific activities are prohibited within the marked areas including bivouacking or establishing other fixed positions, girdling trees with wire, burying cable, firing artillery within RCW buffer zones, etc. (see Table 1 above).

To stimulate RCW population growth and at the same time reduce training restrictions associated with RCW conservation, the 1999 RCW Plan authorized Camp Lejeune to designate half of new recruitment clusters (either naturally or artificially formed) as control clusters (marked and protected by the historic protection described above) and half as research clusters (not marked as described above; subject to typical military training within the cluster). This provision of the 1999 RCW Plan allowed the installation to build in an experimental research program to study the impacts of military training activities on the RCW. For the study, 22 recruitment clusters were artificially created; 11 controls and 11 research sites. Additionally, 16 new clusters

naturally formed through budding and pioneering were integrated into the study. The 2005 update states:

“There is no indication in this preliminary analysis of large effects of military training activities on reproduction of red-cockaded woodpeckers. The trend was toward better performance in research clusters for some aspects of reproduction (proportion of recruitment clusters occupied, number of young fledged per successful first nest), and for others there was no clear trend (proportion of occupied recruitment clusters containing potential breeding groups; proportion of groups that attempted nesting). There was a trend toward poorer overall productivity in research clusters, but this difference did not hold in the last year of the study, and the differences observed were small. The only negative impact of reduced training restrictions in research clusters that may exist is increased nest failure, which could be caused by disturbance at nests. This does not have a noticeable impact on overall productivity however.”

The intent of the 1999 RCW Plan was to encourage growth in portions of the Base that were not high priority training zones. In accordance with the Service’s November 30, 1999 biological opinion, Camp Lejeune was authorized to unmark three existing clusters in the Combat Town Management Area for inclusion in the military training study. Additionally, the 1999 RCW Plan directed creation of new recruitment clusters to occur in the more sparsely populated areas (e.g., portions of Verona and the Northeast area; “low-priority training zones”).

Cluster Management

Twenty-two recruitment clusters were constructed following adoption of the 1999 RCW Plan and categorized: 11 control clusters and 11 research clusters. Each was comprised of four artificial cavities created using the drilling technique (Copeyon 1990). Additionally, Camp Lejeune adopted more rigorous standards for ensuring sufficient numbers of cavities are available within each cluster (e.g., pre-1997 breeding season, three good cavities, two of which are not enlarged, per cluster; now, four unenlarged, good cavities per cluster). Therefore, cavities were provisioned in many of the budded and pioneered clusters as well. The 2005 report states:

“...During the current study cavity excavation balanced cavity loss. The number of active, unrestricted, natural cavities increased from 92 in 1997 to 148 in 2004. However, the woodpecker population increased during this period as well, and the number of natural cavities per group did not increase: it was 2.04 in 1997 and 2.06 in 2004... The total number of cavities per group increased from just over 3 in 1997 to just over 4 by 1999, at which level it remained. This increase in total cavities was due to an increase in the number of artificial cavities from 1.2 in 1997 to 2 per group from 2000

on...This pattern clearly reflects the change in cavity management criterion.”

In summary, the primary factors affecting the species environment in the AA include forest management, military training, and cluster management. Lengthened timber rotations in pine stands have allowed the necessary foraging and nesting substrate to mature, enabling Camp Lejeune to foster RCW population growth into areas of the installation that previously had much lower population densities. Prescribed burning has been appropriately applied on the landscape to maintain the desired habitat characteristics within occupied habitat as well as to restore habitat in management areas where midstory presence likely discouraged habitat use by woodpeckers. Where population expansion occurred within high priority training zones (HPTZs), the 1999 RCW Plan enabled Camp Lejeune to investigate the aspects of RCW biology that might be the most vulnerable to training activities. These investigations are still ongoing. Since the study design calls for one half of the newly formed clusters in training areas to be designated as research clusters, population growth has had half the impact on the military training mission thus far than it would without the plan. The process of forming new recruitment clusters through provisioning drilled cavities has had a beneficial effect on the number of potential breeding pairs. Group size and overall survival of individuals have been supported by cavity management conducted in newly formed and “cavity-limited” clusters.

Implementation of the revised INRMP is expected to further enhance these beneficial effects on RCWs and their habitat within the AA. The collaborative efforts by the land management authorities on Camp Lejeune to maintain appropriately distributed, potential foraging habitat within the AA are expected to have a long-term, positive influence on the species. These factors have implications for RCWs within the AA as well as for the survival and recovery of the Mid-Atlantic Coastal Plain Recovery Unit, which will be analyzed in the next section of the Biological Opinion.

C. EFFECTS OF THE ACTION

This section is an analysis of the beneficial, direct and indirect effects of the proposed action on red-cockaded woodpeckers occurring within the Action Area. The analysis includes effects interrelated and interdependent of the project activities. An interrelated activity is an activity that is part of a proposed action and depends on the proposed activity. An interdependent activity is an activity that has no independent utility apart from the action.

1) Factors to be considered

In the 1999 RCW Management Plan, Camp Lejeune, in consultation with the Service calculated the installation’s Mission Compatible Recovery Goal (MCRG) to be 173 active clusters. In developing Camp Lejeune’s revised RCW Management Plan which is a component of the new

INRMP, the MCRG remains unchanged. Under the revised INRMP, the installation would undertake activities to maintain and enhance habitat (i.e., foraging habitat, cavity trees, and potential cavity trees) within occupied RCW territories as well as foraging partitions designated to support recruitment clusters. Management will be guided by the Recovery Standard, as expressed in the RCW Recovery Plan. Specifically, Camp Lejeune will conduct forest management practices that will change or maintain forest structure in a form resembling “good quality foraging habitat:”

- a. There are 18 or more stems/acre of pines that are > 60 years in age *and* 14 inches diameter-at-breast-height (DBH). Minimum basal area for these pines is 20 ft²/acre. Recommended minimum rotation ages apply to all land managed as foraging habitat.
- b. Basal area of pines 10 – 14 inches DBH is between 0 and 40 ft²/acre.
- c. Basal area of pines < 10 inches DBH is below 10 ft²/acre *and* below 20 stems/acre.
- d. Basal area of all pines > 10 inches DBH is at least 40 ft²/acre. That is the minimum basal area for pines in categories (a) and (b) above is 40 ft²/acre).
- e. Groundcovers of native bunchgrass and/or other native, fire-tolerant, fire dependent herbs total 40 percent or more of ground and midstory plants and are dense enough to carry growing season fire at least once every five years.
- f. No hardwood midstory exists, or if a hardwood midstory is present it is sparse and less than 7 feet in height.
- g. Canopy hardwoods are absent or less than 10 percent of the number of canopy trees in longleaf forests and less than 30 percent of the number of canopy trees in loblolly and shortleaf forests. Xeric and sub-xeric oak inclusions that are naturally existing and likely to have been present prior to fire suppression may be retained but are not counted in the total area dedicated to foraging habitat.
- h. All of this habitat is within 0.5 miles of the center of the cluster, and preferably, 50 percent or more is within 0.25 miles of the cluster center.
- i. Foraging habitat is not separated by more than 200 feet of non-foraging areas. Non-foraging areas include (1) any predominantly hardwood forest, (2) pine stands less than 30 years in age, (3) cleared land such as agricultural lands or recently clearcut areas, (4) paved roadways, (5) utility rights of way, and (6) bodies of water.

Consistent with the current (2007) INRMP, forest compartments would be treated on a 10-year cycle with more frequent treatments as necessary to address specific RCW habitat requirements. MCB Camp Lejeune would continue to restore longleaf pine to its native distribution on Mainside and Verona Loop. Methods of longleaf pine regeneration would continue in accordance with those described in the current INRMP.

There will be two changes in forest management that would not be consistent with previous INRMP revisions: (1) longleaf pine restoration in the GSRA will be suspended during the ongoing Tactical Vehicle Maneuver Areas (TVMA) range development initiative; and (2) Forestry will discontinue use of five-acre patch cuts as a method of timber stand regeneration. Potential longleaf restoration sites on GSRA would be reevaluated upon completion of the planning/design process or at the end of the five-year INRMP period, whichever comes first. The elimination of five-acre patch cuts for regeneration will leave two options; modified two-aged management, and uneven aged management, which are consistent with 2003 RCW

recovery plan.

Wildland fire management under the revised INRMP would continue generally as outlined in previous INRMP revisions. In the revised INRMP, MCB Camp Lejeune plans to increase both the frequency of prescribed burning and the proportion of prescribed burns that are conducted during the growing season. These changes in prescribed burning would be designed to more closely replicate the historical natural fire regime on MCB Camp Lejeune by burning as much of the base as possible during the growing season on a 3-year rotation, especially in designated RCW habitat. MCB Camp Lejeune would also seek expanded use of aerial ignition to conduct prescribed burning.

The 1999 RCW Plan directed new recruitment cluster formation to be focused in sections of the installation identified as low priority training zones, leaving natural cluster formation (budding or pioneering) as the primary way in which new clusters would be produced in high-priority training zones (HPTZs). In the 2007 INRMP, controlling growth of the woodpecker population within the HPTZs was no longer a main objective. The 2007 INRMP promoted creation of new recruitment clusters within areas designated as “High-Use Training Areas” (HUTAs). An increasing proportion of newly formed clusters were unmarked and subject to take associated with typical military training activities. For example, at 75 active clusters, 35% could be unmarked. At 150 active clusters, the installation would be authorized to have 65% unmarked. All clusters may be unmarked when the population reaches 173 active clusters.

Under the approach described in the revised INRMP, there will no longer be designated HUTAs. Instead, Camp Lejeune’s Threatened and Endangered Species Section would coordinate with the G3 to ensure that no new artificial recruitment clusters are intentionally established in highly used training areas until all other areas are occupied, unless approved by G3. Whether a new cluster is to be marked will be determined through coordination between Environmental Management Division and G3 at the time of installation based upon the expected impact on tactical maneuver by operating forces. Decisions regarding cluster placement would be made on a case-by-case basis; however, it is expected that this approach would primarily affect cluster placement in the vicinity of highly used training areas surrounding Combat Town and the G-10 impact area.

MCB Camp Lejeune will continue to implement a system established in the 2007 INRMP, by which training restrictions are removed on clusters once population milestones are met. Milestones began in increments of 25 active clusters, (with increments becoming smaller) as MCB Camp Lejeune approaches its recovery goal of 173 active clusters. At the end of the 2014 breeding season, MCB Camp Lejeune had 114 active clusters. The next milestone will be 125 clusters. The percentage of unmarked clusters will increase as each milestone is met. Milestones and percentages of unmarked clusters are as follows:

- 125 active clusters – 60% unmarked
- 150 active clusters – 70% unmarked
- 170 active clusters – 80% unmarked, and
- 173 active clusters – 100% unmarked.

Upon reaching the goal of 173 active clusters, MCB Camp Lejeune will have the option of removing all RCW military training restrictions. This removal of training restrictions will apply as long as the RCW population remains at or above the mission compatible goal of 173 active clusters. As MCB Camp Lejeune approaches its recovery goal, the Base may decide to exceed its recovery goal before removing all training restrictions in order to ensure a buffer against falling below the goal again.

Camp Lejeune will continue to intensively monitor all RCW clusters for effects of military training impacts. The monitoring strategy prescribed in the revised INRMP will ensure that clusters will be tracked after training restrictions are removed. Camp Lejeune may reinstate some training restrictions as necessary to protect certain clusters if they are subject to extensive impacts.

Proximity of the action: Forest management activities (e.g. stand thinnings, longleaf pine restoration, prescribed burning, etc.) may occur within any existing clusters, foraging partitions, proposed new recruitment clusters and interstitial stands between management areas. Military training will occur throughout all management areas, partitions, and interstitial foraging habitat as well as within a varying proportion of new clusters that bud, pioneer or are artificially created within 16 training areas identified in the INRMP, totaling about 14,042 acres of suitable and potentially suitable habitat.

Distribution: The installation contains 114 active and inactive RCW clusters distributed through seven RCW management areas. These management areas comprise 36,922 (plus additional acreage currently containing hardwood on soils that historically supported longleaf) acres of pine-dominated forest on Camp Lejeune. Forest management intended to benefit RCW conservation would occur throughout this acreage. Training activities would occur within any new clusters that form naturally within highly used training areas, which will represent about 14,042 acres of suitable and potentially suitable habitat.

Timing: All forestry activities with the potential to disrupt woodpecker nesting within clusters will be scheduled before or after the RCW nesting season. Habitat improvement activities (e.g., mechanical hardwood control) within clusters will also be restricted during the nesting season, unless such activity during the nesting season is necessary for the continued survival of the RCW group. Prescribed burning within clusters may occur within the nesting season. Normal training

activities may occur within unmarked clusters during any season.

Nature of the effect: The INRMP would promote long-term conservation of existing RCW groups and lays out the installation's strategy for sustaining RCW population growth. Forest management will integrate guidance contained in the RCW Recovery Plan (Recovery Standard) and will include partition level timber management, adaptive prescribed burning models, reforestation techniques that minimize impacts to native ground cover, and scientifically-directed conversion of offset pine species to longleaf pine.

All RCW clusters subject to training restrictions will continue to be marked in accordance with Camp Lejeune's current marking system (e.g., "...marked with... perimeter trees [painted] with white bands approximately one foot wide, four to six feet from the base of the tree. Warning signs 12 inches X 12 inches... posted at reasonable intervals facing the outside of clusters along roads, firebreaks, and other likely entry points into clusters" (MCB Camp Lejeune 2007). However, training restrictions within the marked areas are relaxed to conform to the Army-wide Guidelines (USACERL 1997). Military training will be evaluated in proximity to unmarked clusters to determine any significant effects these activities may have on the species.

The revised INRMP would support RCW conservation, including new formation of clusters within highly used training areas, though new clusters that are created in these areas after the INRMP is implemented will be unmarked and subject to impacts associated with training.

To support additional flexibility in the highly used training areas, Camp Lejeune may apply cluster management (e.g., cavity provisioning) within specific clusters to adjust the distribution of cavity trees.

As the RCW population continues to grow and reach prescribed milestones, a growing proportion of RCW clusters will be unmarked and made available to training. Base range regulations for maintaining training lands, including conservation of pine trees would continue to apply and trees could only be damaged or removed with prior approval. Training activities within unmarked clusters during the RCW nesting season (April – July) have the potential to occasionally cause nest failure but is not expected to significantly affect overall productivity (Walters et al. 2005).

Duration: The revised INRMP is intended to direct natural resource management, including forestry and RCW habitat management for five years. However, pursuit of the objectives identified in the revised INRMP is anticipated to be long term in nature, with implementation occurring over a number of years. Forestry practices commenced or implemented during the period in which this INRMP is effective may not be completed within the next five years. Such activities may be carried on in future INRMP revisions or modified as necessary in consultation

with the Service. Camp Lejeune would continue its population monitoring under this plan. Monitoring would be expanded to assess impacts of tactical vehicle maneuver training. Research and monitoring would continue to be conducted to quantify the effects of training on RCWs and to determine the degree to which expanded tactical maneuver training would degrade RCW conservation and recovery. The results of monitoring and research would provide considerable information regarding the success of management and protective measures proposed in this plan. This information in turn would be used interactively to guide expansion of training operations to meet training standards.

Since RCW management technology and Camp Lejeune training requirements may change over the life of this plan, both agencies (Camp Lejeune and the Service) recognize that modifications to the plan, based on reevaluation of management strategies, their effectiveness, and the status of research clusters, may be required. As indicated in the plan, both agencies would work together in a cooperative framework to implement such changes, as they arise, to meet RCW recovery efforts and national defense training requirements. As proposed, the Service would meet annually with Camp Lejeune to fine-tune technical aspects of the plan, discuss research findings and new technologies in RCW management and military training, and to introduce new natural resource managers working on implementation of the plan. A formal review meeting would take place every five years for the purpose of examining the major tenets of the plan.

Disturbance frequency: Various tasks and functions outlined or addressed in the INRMP, e.g., military training, range management and construction, timber management, etc., take place year round on a daily basis.

Disturbance intensity and severity: The majority of actions result in low intensity effects on RCW and their habitat. Occasionally, activities such as military training or wildland fire management may co-occur within an active, unmarked RCW cluster during the time when RCWs are nesting and rearing young. Such events are not expected to be frequent or widespread within Camp Lejeune's RCW metapopulations.

2) Analyses for effects of the action

The Service considered the beneficial effects and the direct and indirect adverse effects of implementing the revised INRMP on RCWs. Direct effects encompass the direct and immediate effects of the project on the species. Indirect effects are caused by or result from the proposed action, occur later in time, and are reasonably certain to occur. The impacts discussed below are the result of direct and indirect effects of the proposed action. The Service has determined that there are no interrelated or interdependent actions apart from the action under consideration.

Beneficial effects: Overall, the effects of the revised INRMP's implementation are anticipated to

be beneficial for the RCW. The plan would retain the originally projected MCRG of 173 active clusters (currently the installation contains 114 active clusters). Camp Lejeune will continue managing the number of recruitment clusters necessary to accommodate anticipated annual population growth. The revised INRMP will direct forest management to focus on the need for timber stands to be assessed at the RCW foraging habitat partition-level in addition to the historical compartment-level.

Forest management will focus on conversion of off-site overstory species to longleaf pine as well as RCW conservation. Conversion to longleaf pine will have long term benefits for RCWs but has potential to eliminate existing habitat forested in loblolly pine. The installation will offset this short-term conflict by emphasizing RCW habitat partitions as the primary driver of forest management. Management at the partition level will allow MCB Camp Lejeune to assess, for each RCW group and recruitment cluster, the need for habitat improvement and the acreage available for conversion to longleaf. Additionally, where feasible, MCB Camp Lejeune will attempt to conserve old loblolly pine trees in stands that will be restored to longleaf pine. Camp Lejeune may experimentally underplant (e.g., planting longleaf under a sparse canopy of loblolly). The highest priorities for underplanting will be where an intact pyrogenic groundcover such as wiregrass is in place. This will have the dual benefit of conserving high-quality groundcover while ensuring that competition from loblolly regeneration can be controlled with fire in these areas. The decision to leave loblolly overstory on restoration sites will be made on a case-by-case basis.

Partitions will be identified that each has sufficient acreage of suitable or potentially suitable habitat to support an RCW group. Partition acreage will be based on several factors, including habitat quality, acreage in longleaf and loblolly pine, and spatial arrangement and density of clusters. Additional acreage, beyond what is necessary to support a cluster will be included in a partition to allow for landscape flexibility for future projects and management actions, such as conversion to longleaf pine that may impact habitat quality in the short term. Where necessary, partitions may be larger than 200 acres, but only if partition spacing allows for a cluster density mimicking that of natural clusters (i.e. $\frac{1}{4}$ - $\frac{3}{4}$ mile between cluster centers).

MCB Camp Lejeune will continue to use mechanical methods to control hardwoods within suitable and potentially suitable RCW foraging and nesting habitat on the installation as needed. This practice will allow Camp Lejeune to convert pine stands with dense, tall midstory components into suitable habitat in a relatively short amount of time. Additionally, once mechanical control is done, prescribed fire can be applied safely in areas where the risk of crown fires would otherwise be too great.

Prescribed burning will continue to be the primary technique for maintaining midstory control in RCW foraging and nesting habitat. To maintain and improve the current training environment, and while also working towards the RCW recovery goal, Camp Lejeune's annual prescribed

burning objective will be 20,000 to 25,000 acres per year during the five-year period covered by the revised INRMP.

Hardwood presence that would otherwise be unlikely to be controlled by prescribed burning within partitions and clusters will be managed through employment of mechanical methods (e.g. feller buncher or hydro axe/mower); manual methods (e.g. chainsaw, brush hooks, etc.); herbicides (applied by injection, hypo-hatchet, hand sprayer, etc.); or a combination of these methods. Midstory will be implemented within at least ten acres of each cluster, including a 50-foot radius of all active and inactive cavity trees. No more than 10 % of the canopy trees will be comprised of hardwoods in treated locations. The revised INRMP will prioritize hardwood midstory management in the following order: 1) active clusters, 2) inactive clusters and provisioned recruitment clusters, 3) future recruitment stands, and 4) foraging habitat.

Direct effects: Approximately 36,922 acres of forested land will be managed for RCW habitat throughout Mainside and Verona. New RCW clusters that form in the highly used training areas will not be marked. Typical training activities (e.g., see list of authorized and prohibited activities contained in Table 1) would be allowed within clusters and within 50 feet of active cavity trees for unmarked clusters. Additionally, restrictions on training activities will be removed from an increasing proportion of clusters as the RCW population grows. Out of 121 total active and inactive clusters, 48 are currently unmarked.

Presently, there are no known active RCW clusters or territories within the Greater Sandy Run Area (GSRA). For approximately five years, Camp Lejeune would not reforest GSRA with longleaf on appropriate sites, until the installation completes planning for the Tactical Vehicle Maneuver Areas ranges. Appendix 6 of the revised INRMP states that the GSRA contains about 23,111 acres of woodland forested in southern yellow pines and mixed pine hardwood – habitat that has the potential to support RCWs. Any new clusters that form in the GSRA may be affected by military training, facilities development and forest management practices.

One immediate effect of growing season fire is the destruction of nests. However, for species associated with southeastern pine habitats, the benefits of prescribed burning far outweigh the occasional loss of nests (Service 2003a). Military training within unmarked clusters also has the potential to affect roosting and nesting RCWs.

Indirect effects: Prescribed burning can indirectly affect RCWs by killing and/or injuring cavity trees, either making them immediately, or eventually rendering them, unsuitable for RCWs. Controlled burns also could result in crown fires, killing pine trees that comprise foraging habitat within RCW partitions.

There are situations when following the requirement to provide foraging habitat at the

recommended levels may indirectly adversely affect RCW, over the short-term, by conflicting with other management activities deemed necessary to benefit the RCW over the long-term. Those situations include thinning pine stands, reducing southern pine beetle risk, encouraging advanced regeneration, improving quality of foraging habitat, and restoring off-site species to longleaf pine. Potential adverse effects on RCWs, caused by going too far below the foraging habitat standards when implementing actions to address one of the situations discussed above, will be avoided by adhering to the standard for managed stability guidelines described in Appendix 5 of the Recovery Plan (Service 2003a).

New clusters that develop or are provisioned in highly used training areas (as defined by G3 in consultation with the Threatened and Endangered Species Section) will be free from restrictions on training associated with RCW conservation. Additionally, the revised INRMP includes a strategy by which Camp Lejeune will remove training restrictions on an increasing proportion of active clusters as the number of active clusters increases. As training restrictions are lifted, there is the potential for habitat degradation within clusters due to greater impact from vehicles and from prolonged occupation. Heavier impacts within clusters may lead to reduced density of desired groundcover, which may reduce the ability of that site to carry fire, which in turn may favor undesirable shrubs and hardwoods.

The list of allowed and prohibited activities within marked clusters would be modified to allow a greater range of activities within the cluster to take place. Because only the cavity trees will be buffered within protected sites there is the potential for increased soil compaction, rutting, and root damage around non-cavity trees, which may lead to reduced survival of the non-cavity trees within the cluster. This reduced survival rate may have an impact on the future cavity trees available to a cluster. Finally, the increased disturbance may lead to reduced survival of longleaf pine seedlings within the cluster site, further limiting potential future cavity trees.

3) Species' response to the proposed action

At the end of the 2014 RCW breeding season, the AA contained 121 RCW clusters, 114 of which were active. All currently existing territories would be affected by prescribed burning and forest management activities. Adoption of the revised list of authorized training activities that apply within marked clusters would affect all marked clusters (n = 73; 1,350 acres).

The proposed project is intended to benefit the RCW on Camp Lejeune by enhancing RCW habitat quality to conform to the Recovery Standard, with the intention of attaining a MCRG which is essential to the recovery of the species. The strategies of removing training restrictions as the population reaches the established milestones, and promoting population growth within highly used training areas through the establishment of unmarked clusters, are intended to

remove a disincentive to such growth in areas that have high RCW habitat potential but are also highly valued locations for training.

Camp Lejeune determined its Mission Compatible Goal by considering the acreage and distribution of suitable pine and pine/hardwood stands, military training, operational, and infrastructural requirements, and biological needs of the red-cockaded woodpecker in the Atlantic Coastal Plain population. The MCRG, 173 active clusters, was adopted in the 1999 RCW Plan and remains the standard the installation intends to achieve through implementation of the revised INRMP.

Overall, implementation of the revised INRMP should facilitate Camp Lejeune's attainment of the MCRG. Provisioning planned recruitment clusters, combined with any new natural occurrences of budded and pioneered clusters are expected to sustain population growth on the installation. Based on the average population growth rate of Camp Lejeune's RCW population, as many as 45 new groups could be formed by the year 2020.

As many as 19 new active clusters could form within the highly used training areas during the next five years. Monitoring of training impacts within the Camp Lejeune training areas involving 22 recruitment clusters and 14 naturally budded or pioneered clusters over four years (Walters et al. 2005) found little difference between occupation of marked, protected clusters and unmarked clusters. The research conducted during the four year study didn't detect any large effect of military training on RCW reproduction. There is a potential for nest failure associated with disturbance at nests to occur, but the study suggested this would not affect overall productivity.

D. Cumulative Effects

Cumulative effects include the effects of future State, Tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

Actions adjacent to Camp Lejeune, such as resource extraction operations, urban development, and associated activities, will all continue to reduce and degrade available habitat, creating island populations of RCWs on federal land. Conversely, Camp Lejeune's continued role in community-related conservation partnerships such as the Onslow Bight may help reduce the likelihood for this to occur. Currently, there is no State or private land within the action area considered in this consultation. Consequently, the Service did not identify any State or private activities that are reasonably certain to occur within the action area that would constitute cumulative effects.

III. CONCLUSION

After reviewing the current status of the RCW, the environmental baseline for the action area, the effects of implementing the revised INRMP, the effects of the minimization measures offered in the BA and the cumulative effects, it is the Service's biological opinion that the revised INRMP, as proposed, is not likely to jeopardize the continued existence of the RCW. No critical habitat has been designated for the RCW, therefore none will be affected.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered or threatened species, respectively, 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. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, carrying out an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited under the Act provided that such taking is in compliance with the terms and conditions of this incidental take statement.

The measures described below are non-discretionary, and must be undertaken by Camp Lejeune so that they become binding conditions of any grant or permit issued to Camp Lejeune, as appropriate for the exemption in section 7(o)(2) to apply. Camp Lejeune has a continuing duty to regulate the activity covered by this incidental take statement. If Camp Lejeune (1) fails to assume and implement the terms and conditions or (2) fails to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permits or grant documents, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, Camp Lejeune must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement. [50 CFR §402.14(1)(3)]

Sections 7(b)(4) and 7(o)(2) of the Act generally do not apply to listed plant species. However, limited protection of listed plants from take is provided to the extent that the Act prohibits the

removal and reduction to possession of Federally listed endangered plants or the malicious damage of such plants on areas under Federal jurisdiction, or the destruction of endangered plants on non-Federal areas in violation of state law or regulation, or in the course of any violation of a State criminal trespass law.

Although this Incidental Take Statement only addresses take anticipated during the 5-year implementation period of this INRMP, the agreement established with the Service under the revised INRMP pre-authorizes incidental take for any new occurrences of listed species on GSRA above an established baseline. In the case of species that may become listed in the future, baselines will not apply and the agreement pre-authorizes incidental take for all existing occurrences and all occurrences that may become established in the future either prior to or after listing.

AMOUNT OR EXTENT OF TAKE ANTICIPATED

In meeting the provisions for incidental take in Section 7(b)(4) of the Act, the Service has reviewed the best available information relevant to this proposed action. Based on this review, which included discussions with Camp Lejeune staff, the Service believes that implementation of the revised INRMP may result in the following levels of incidental take for the five-year period 2015 through 2020:

(1) Six groups in the cantonment area; note that these groups currently do not exist. This take would be in the form of harass, e.g., change in group status (i.e., potential breeding group to solitary male) or reductions in reproductive output as a result of military training activities, or harm, e.g., loss of the group related to degradation or loss of nesting or foraging, due to mission-related construction activities that occur in the cantonment area.

(2) Five RCW groups that form in the GSRA; note that these groups currently do not exist. This take would be in the form of harass, e.g., change in group status (i.e., potential breeding group to solitary male) or reductions in reproductive output as a result of military training activities, or harm, e.g., loss of the group related to degradation or loss of nesting or foraging due to mission-related construction activities that occur in the GSRA.

Additionally, the Service believes that the following levels of incidental take may result annually:

(3) Up to 10% of the total number of new groups formed naturally or artificially (i.e., via recruitment clusters) in highly used training areas: i.e., a maximum of two groups (10% of 19) during the 5-year period; note that these groups currently do not exist. This take would be in the form of: (a) harass, e.g., change in clusters status (i.e., active to inactive), change in group status

(i.e., potential breeding group to solitary male), or reduction in reproductive output, as a result of military training activities, or (b) harm, e.g., destruction of a cavity tree due to damage from military training activities.

(4) Up to 10% of the total number of clusters de-marked in accordance with the installation's attainment of population milestones; i.e., a maximum of five (~10% of 45) during the five-year period. This take would be in the form of: (a) harass, e.g., change in clusters status (i.e., active to inactive), change in group status (i.e., potential breeding group to solitary male), or reduction in reproductive output, as a result of military training activities, or (2) harm, e.g., destruction of a cavity tree due to damage from military training activities.

(5) Three active cavity trees may be lost to harm, e.g., destruction of a cavity tree due to damage from prescribed burning or wildland fire management.

In summary, the Service anticipates incidental take for up to 19 RCW groups (five – GSRA, six – cantonment, two – highly used training areas, and five – demarked) during the five-year period during which the revised INRMP is being implemented. No loss of active clusters due to fire management is anticipated.

The Service acknowledges the possibility that management, research, and monitoring activities for the RCW could result in a low incidence of take. Most of these activities would be undertaken by Camp Lejeune staff or academic researchers who would be fully covered under Section 10(a)(1)(A) permits, which are the subject of separate actions. The loss of RCW cavity trees as a result of prescribed burning is an exception, however. The Service believes that with the proper precautions, the likelihood of actually causing a lethal take of RCWs through prescribed burning is low. In fact, prescribed burning is necessary in most cases to avoid the loss of RCW groups due to habitat degradation. Since take was specifically requested by Camp Lejeune for prescribed burning activities, the Service has estimated that this take would not exceed the loss of three active cavity trees over the five years following implementation of the revised INRMP. No other sources of incidental take are anticipated during the five years the revised INRMP is implemented.

EFFECT OF THE TAKE

The potential taking of RCWs within unmarked clusters will not reduce the number of currently existing active clusters on Camp Lejeune. Management, research, and monitoring activities for the RCW on Camp Lejeune are necessary for the maintenance and expansion of the RCW population. Incidental take of the RCW from these activities is anticipated to be very low and

would be offset by their beneficial effects. In the accompanying biological opinion, the Service determined that the above-estimated level of anticipated take is not likely to result in jeopardy to the species.

IV. REASONABLE AND PRUDENT MEASURES

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize the impacts of incidental take of RCWs.

1. Avoid damaging, destroying, or felling pine trees in size and age classes that serve as foraging or potential nesting substrate within unmarked clusters and minimize tree loss in unmarked clusters, except as prescribed silviculturally to enhance RCW habitat.
2. Inspect and monitor all unmarked (including de-marked) clusters and collect demographic information relative to RCWs and military training activities pursuant to the proposed monitoring program.
3. Whenever prescribed burning will take place in the vicinity of active RCW clusters or recruitment clusters, Camp Lejeune personnel will take appropriate measures to protect cavity trees prior to general ignition of the burn unit. Motorized and heavy equipment use in RCW clusters will be minimized to the greatest extent possible during burning operations.
4. Following prescribed burning activities, Camp Lejeune will inspect all active RCW clusters. If any RCW cavity trees are found to be damaged to the point that they can no longer be used, Camp Lejeune will replace that tree by creating an artificial cavity in close proximity as soon as qualified personnel can be mobilized and on the site.
5. Prior to construction within the cantonment areas and GSRA, conduct surveys of suitable habitat for the presence of RCWs.

V. TERMS AND CONDITIONS

In order to be exempt from the prohibitions of section 9 of the Act, Camp Lejeune must comply with the following terms and conditions, which implement the reasonable and prudent measures, described above and outline required /monitoring requirements. These terms and conditions are non-discretionary.

1. [RPM (1)] Ensure, via all required environmental training programs at Camp Lejeune, that specific emphasis is placed on the importance of protecting all natural and artificial RCW cavity

trees.

2. [RPM (2)] A report form (supplied by the Service), containing the results of all monitoring and reporting requirements will be provided to the Service by January 31 of each year. This report will be provided to the Service's Raleigh Field Office and the RCW Recovery Coordinator at the Mississippi Field Office:

U.S. Fish and Wildlife Service
Raleigh Ecological Services Field Office
Post Office Box 33726
Raleigh, North Carolina 27636-3726

U.S. Fish and Wildlife Service
Mississippi Field Office
6578 Dogwood View Parkway, Suite A
Jackson, Mississippi 39213

3. [RPM (3)] For all active RCW clusters and recruitment clusters, Camp Lejeune personnel will utilize raking or other means to remove all live and dead fuel for a distance of 10 feet from active cavity trees in order to protect them prior to prescribed burning. Other measures including back burning around cavity trees will be utilized as necessary in advance of the general ignition.

4. [RPM (4)] Post burn monitoring will take place in all active RCW clusters following prescribed burning activities. If any cavity trees are damaged to the point that they can no longer be used, Camp Lejeune will replace that tree by creating an artificial cavity in close proximity as soon as qualified personnel can be mobilized and on the site.

5. [RPM(5)] The taking of any currently existing clusters, if discovered by surveys on GSRA, will require further Section 7 consultation prior to any activities which could affect them.

These reasonable and prudent measures, together with their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action. The Service believes that no RCWs will be incidentally taken. If, during the course of the action, this level of incidental take is exceeded, such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided. The Federal agency must immediately provide an explanation of the causes of the taking, and review with the Service the need for possible modification of the reasonable and prudent measures.

VI. REPORTING REQUIREMENTS

Information required in the above Terms and Conditions should be submitted to the following address:

Pete Benjamin, Supervisor
Raleigh Field Office
U.S. Fish and Wildlife Service
Post Office Box33726
Raleigh, North Carolina 27636-3726
(919) 856-4520

The Service believes that in the five years following plan implementation, no more than 19 RCW groups will be incidentally taken as a result of the proposed action. This includes any potential future clusters that may be naturally formed within the GSRA and six that may occur in the housing and main cantonment area. The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action. If, during the course of the action, this level of incidental take is exceeded, such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided. The Federal agency must immediately provide an explanation of the causes of the taking and review with the Service the need for possible modification of the reasonable and prudent measures.

Upon locating a dead, injured, or sick individual of an endangered or threatened species, initial notification must be made to the Service's Law Enforcement Office below. Additional notification must be made to the Service's Ecological Services Field Office identified above and to the North Carolina Wildlife Resources Commission at (252) 241-7367. Care should be taken in handling sick or injured individuals and in the preservation of specimens in the best possible state for later analysis of cause of death or injury.

Special Agent Tom Chisdock
U.S. Fish and Wildlife Service
160 Zillicoa St.
Asheville, NC 28801
828-258-2084

RCWs: all procedural and reporting requirements as outlined in the Service's region-wide biological opinion on monitoring and management (Service 2003b) will be followed.

VII. COORDINATION OF INCIDENTAL TAKE STATEMENT WITH OTHER LAWS, REGULATIONS, AND POLICIES

The Service will not refer the incidental take of any migratory bird for prosecution under the Migratory Bird Treaty Act of 1918, as amended (16 USC S 703-712), if such take is in compliance with the terms and conditions specified herein. Take resulting from activities that are not in conformance with the INRMP or this biological opinion (e.g. deliberate harassment of wildlife, etc.) are not considered part of the proposed action and are not covered by this incidental take statement and may be subject to enforcement action against the individual responsible for the act.

VIII. CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. The recommendations provided here relate to the proposed action only and do not necessarily represent complete fulfillment of the agency's Section 7(a)(1) responsibility for the species.

1. Prior to unmarking currently marked clusters, document the present condition of native grass and forb groundcover within the marked areas where the greatest amount of training access is anticipated. This process could involve: (a) development of a standardized method of describing the quality, quantity and distribution of native grass and forb groundcovers that are associated with the good quality habitat for the RCW, and/or (b) establishment and documentation of permanent photo plots, focusing on the state of ground cover within clusters.

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, the Service requests notification of implementation of any conservation recommendation.

IX. REINITIATION NOTICE – CLOSING STATEMENT

This concludes formal consultation on the action outlined in the February 27, 2015, request. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Camp Lejeune involvement or control over the action has been retained (or is authorized by law)

and if: (1) the amount of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species not considered in this opinion; or, (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operation causing such take must cease pending reinitiation of consultation.

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Glossary of Terms

Active cavity	A completed cavity or start exhibiting fresh pine resin associated with cavity maintenance, cavity construction, or resin well excavation by red-cockaded woodpeckers.
Active cavity tree	Any tree containing one or more active cavities.
Active cluster	A cluster containing one or more active cavity trees.
Augmentation	Increasing the size of a population by translocating individuals between populations.
Basal area	The area of a horizontal cross section of a tree's stem, generally measured at breast height.
Breeding dispersal	Movement of individuals between consecutive breeding locations.
Budding	One of two processes of new group formation in red-cockaded woodpeckers (see also pioneering), referring to the splitting of one territory into two.
Canopy	The uppermost layer of foliage in a forest or forest stand.
Captured cluster	A cluster that does not support its own group of red-cockaded woodpeckers, but contains active cavity trees in use or kept active by birds from a neighboring cluster.
Clearcut	An area in which all trees have been removed in one cutting.

Glossary of Terms

Cluster	The aggregation of cavity trees previously and currently used and defended by a group of woodpeckers, or this same aggregation of cavity trees <i>and</i> a 61 m (200 ft) wide buffer of continuous forest. Here, the second definition is used. For management purposes, the minimum area encompassing the cluster is 4 ha (10 ac). Use of the term “cluster” is preferred over colony because colony implies more than one nest (as in colonial breeder).
Cluster, active	See active cluster.
Cluster, captured	See captured cluster.
Coastal Plain	In the United States, an ecoregion or physiographic province located near the Atlantic Ocean or Gulf of Mexico.
Cooperative breeding	A breeding system in which one or more adults assist a breeding pair in rearing of young. These extra adults, called helpers, delay their own dispersal and reproduction and are generally related to the offspring of the breeding pair.
Dispersal	Movement of individuals from natal to first breeding location (natal dispersal), or between consecutive breeding locations (breeding dispersal).
Ecoregion	A system of classification based on physiography.

Glossary of Terms

Effective population size	The size of the ideal, hypothetical population in which all individuals mate randomly and all contribute equally to reproduction. Variation in reproductive success and other processes in a real population affect how many genes are conserved in subsequent generations. The concept of effective population size is used to control for the effects of such processes when discussing genetic conservation.
Environmental stochasticity	Random changes in environmental conditions and their effects on populations.
Even-aged management	A silvicultural method designed primarily for timber production, in which all trees in a stand are of one age/size class. The forest is regulated by developing equal areas in each age/size class.
Extirpation	Loss of a population or all populations within a specified region.
Flatwoods	Mesic pine communities on the Gulf and Atlantic Coastal Plains with a well-developed woody shrub or midstory layer.
Floater	An adult bird not associated with a breeding group.
Forb	A herbaceous plant that has broad leaves; not a grass.
Fragmentation	Habitat loss that results in isolated patches of remaining habitat.

Glossary of Terms

Gene flow	The movement of genetic material among populations or within a population.
Genetic drift	Random sampling of genetic resources within a population from one generation to the next. In populations of finite size, this sampling will always result in loss of variation. In populations of large size, such loss may be offset by new variation arising through mutation.
Genetic stochasticity	Random changes in gene frequencies.
Group	The social unit in red-cockaded woodpeckers, consisting of a breeding pair with one or more helpers, a breeding pair without helpers, or a solitary male.
Habitat selection	Use of a resource above what is expected based on the availability of that resource.
Heartwood	The inner, un-living, inactive core of a tree.
Helper	An adult that delays its own reproduction to assist in the rearing of another breeding pair's young. Typically, helpers are related to the breeding pairs that they assist.
Herbs	Grasses and forbs.
Herbaceous	Non-woody.

Glossary of Terms

Heterozygosity	Genetic diversity within an individual or population, as measured by the proportion of loci containing two different alleles.
Home range	The area supporting the daily activities of an animal, generally throughout the year.
Homozygosity	Genetic similarity within an individual or population, as measured by the proportion of loci containing two identical alleles.
Immigration	Movement of one or more individuals into a population.
Inbreeding	Mating between relatives.
Inbreeding depression	Loss of fitness due to the increase in homozygosity that results from inbreeding.
Increasing population trend, recommended rate of	Five percent increase in active clusters from one year to the next.
Kleptoparasitism	Theft by one species of resources procured by another species, resulting in positive effects for the parasite and negative effects for the species being parasitized. Generally this term is applied to theft of food, but has recently been expanded to include theft of spatial resources.
Local adaptation	Traits conferring higher fitness in a local environment.

Glossary of Terms

Metapopulation	A set of interacting populations.
Midstory	A layer of foliage intermediate in height between canopy and groundcover, litter layer, or soil surface.
Mission Compatible Goal	A military installation's known capacity to integrate RCW management with on-going/planned mission requirements, determined in consultation with the Service.
Mitigation	Reduction of negative impacts.
Mutation	A heritable change in a DNA molecule.
Natal dispersal	Movement of individuals from their place of birth to their first breeding location.
Partition	The geographic area, potentially extending out to a one half-mile radius from the center of a cluster, in which habitat is managed to support an RCW group. A partition boundary will not reach out to a half-mile where it abuts the partition of another cluster with an epicenter less than one mile from the first cluster.
Pioneering	One of two processes of new group formation in red-cockaded woodpeckers (see also budding), by which a group colonizes previously unoccupied areas. Because of the difficulty of cavity excavation, this process occurs at very low frequencies.
Plate	On a cavity tree, the area surrounding the cavity entrance

Glossary of Terms

	where bark has been removed by red-cockaded woodpeckers. Newly completed cavities may not exhibit a well-developed plate.
Pocosin	A wetland dominated by a dense cover of evergreen and deciduous shrubs.
Population	<p>A group of individuals of the same species occupying a given area. Methods of specifying such an area may differ according to purpose.</p> <p>A common specification is the area within which gene flow is sufficient to avoid genetic differentiation.</p>
Population augmentation	Translocation between populations to increase population size.
Population dynamics	Properties of a population such as trend and regulation of population size.
Population trend	See increasing population trend, decreasing population trend, and stable population trend.
Potential breeding group	An adult female and adult male that occupy the same cluster, whether or not they are accompanied by a helper, attempt to nest, or successfully fledge young.
Predation	The acquisition of food by killing and eating another organism.
Prescribed burning	Fire applied to the landscape to meet specific management

Glossary of Terms

	objectives.
Primary cavity nester	Species that nest in cavities they created.
Primary core population	A population identified in recovery criteria that will hold at least 350 potential breeding groups at the time of and after delisting. Defined by biological boundaries.
Recovery	Species viability.
Recovery population	One of a set of populations designated as necessary for the recovery of the species.
Recovery Standard	A set of guidelines to direct forest management within foraging partitions for the conservation and recovery of the RCW. Implementing these guidelines should not only ensure that RCW populations remain stable but should result in increased population viability.
Recovery unit	One of a set of geographical areas, delineated according to ecoregions, that likely represent broad-scale geographic and genetic variation in red-cockaded woodpeckers. Viable populations in each recovery unit, to the fullest extent that available habitat allows, are considered essential to the recovery of the species.
Recruitment	The addition of individuals into a breeding population through reproduction and/or immigration and attainment of a breeding position.
Recruitment cluster	A cluster of artificial cavities in suitable nesting habitat,

Glossary of Terms

	located close to existing groups.
Regeneration	A silvicultural method of simultaneously harvesting and establishing reproduction in a stand of trees.
Regulation	A process of implementing silvicultural techniques to establish equal areas of tree size classes, to sustain a given level of timber production over time.
Reintroduction	Translocation of individuals from a captive or wild population to previously occupied, but currently unoccupied habitat.
Resinosis	A process through which injured sapwood in a pine tree becomes saturated with hardened resin, reducing and eventually preventing loss of resin.
Resin well	A wound in a pine tree's cambium, created and maintained by red-cockaded woodpeckers, for the purpose of resin production.
Restrictors	Metal plates used to prevent or repair enlargement of cavity entrances.
Rotation	In even-aged management of forests, the number of years between regeneration events.
Sandhills	Xeric and sub-xeric longleaf pine communities on deep sandy soils. Also, the ecoregion encompassing the Fall-line Sandhills communities, between the mid- and south-

Glossary of Terms

Atlantic Coastal Plains and
Piedmont.

Sapwood	The outer, active layer of tissue in a tree, lying just inside the cambium.
Savanna	A mesic and seasonally wet pine community, often transitional between xeric pine systems and wetlands, characterized by diverse grass and forb groundcovers.
Secondary cavity nester	Species that inhabit cavities they did not create.
Secondary core population	A population identified in recovery criteria that will hold at least 250 potential breeding groups at the time of and after delisting. Defined by biological boundaries.
Seed-tree	A method of timber regeneration in which most trees in a site are cut, and tree seedlings become established under remnant large trees. Remnant large trees are retained at lower densities than under the shelterwood method.
Selection cutting	A method of timber regeneration in which single trees or patches of trees (0.8 ha or less, 2 ac or less) are cut.
Shelterwood	A method of timber regeneration in which many, but not all trees in a site are cut, and tree seedlings become established under remnant large trees. Remnant large trees are retained at higher densities than under the seed-tree method.

Glossary of Terms

Silviculture	The theory and practice of controlling the establishment, composition, structure, and growth of forests to achieve management objectives. Silviculture was developed primarily for the purpose of timber production, but can be used for other purposes including biological conservation.
Snag	A standing, dead tree.
Solitary male	An unpaired male that is the sole resident of a cluster.
Stable population	A population that exhibits neither an increasing or decreasing population trend.
Stand	A silvicultural term for an area of trees that is or has been treated as a single management unit.
Standard for Managed Stability	Guidelines for forest management that will result in the conservation of the bare minimum foraging and nesting resources required for sustaining an active cluster. Adherence to these guidelines would prevent a direct “take” of RCWs (as defined by section 9 of the ESA), but does not address the long term sustenance and recovery of RCW populations.
Start	An incomplete cavity.
Strategic recruitment	Placement of recruitment clusters in locations strategically chosen to enhance the spatial arrangement of breeding groups. Breeding groups aggregated in space rather than isolated are

Glossary of Terms

beneficial to population dynamics and viability.

Stochasticity

Random events.

Support population

All known populations not designated as a primary or secondary core are designated support populations. Support populations (other than essential supports) are defined by ownership rather than biological boundaries. There are three classifications for support populations: 1. Essential support populations are those populations, identified in recovery criteria, that represent unique or important habitat types that cannot support a larger, core population. They are located on federal and state lands and two private properties. 2. Significant support populations are populations, not identified in recovery criteria, that contain and/or have a population goal of 10 or more active clusters. They are located on federal and state lands and on private lands enrolled in agreements with the U.S. Fish and Wildlife Service. 3. Important support populations are populations, not identified in recovery criteria, that contain and have a population goal of less than 10 active clusters. They are located on federal and state lands and on private lands enrolled in agreements with the U.S. Fish and Wildlife Service.

Take

As defined by the Endangered Species Act, take means to “harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct” (Section 3.18 of the Act). Habitat destruction and alteration are considered forms of take, following a Supreme Court ruling on this issue (Sweet Home vs. Babbitt).

Glossary of Terms

Taxonomy	Hierarchical classification system for all life forms.
Territory	A region within an animal's home range that is defended from conspecifics.
Thinning	A silvicultural treatment removing some trees in a stand to reduce tree density.
Translocation	The artificial movement of wild organisms between or within populations to achieve management objectives. Originally, translocation referred to the movement of animals from captive to wild populations, but the term has been expanded to include movements (by artificial means) within and between wild populations.
Two-aged management	A silvicultural method designed primarily for timber production, in which trees of two age/size classes are present in the same stand. The forest is regulated by developing equal areas in each age/size class.
Uneven-aged management	A silvicultural method designed primarily for timber production, in which trees of at least three age classes are present in the same stand. Stands are regulated by size class structure or volume.
Viability	The ability of a population or species to persist over time.

Appendix 20:

Environmental Assessment

MCB Camp Lejeune

2015-2020 INRMP

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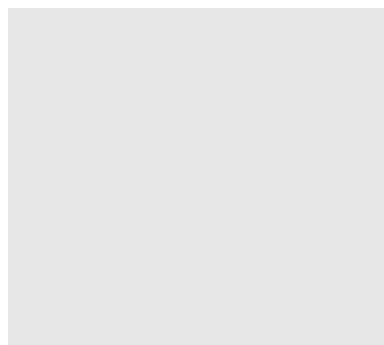
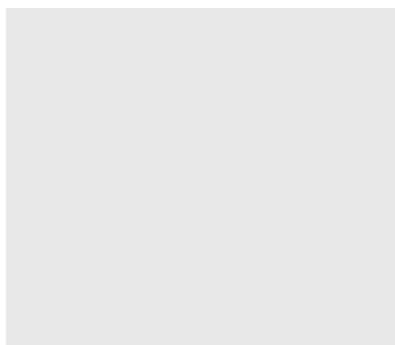
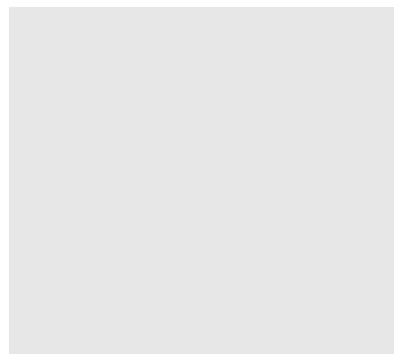
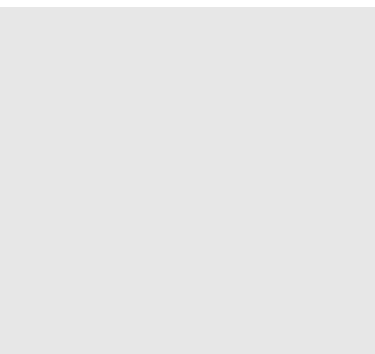
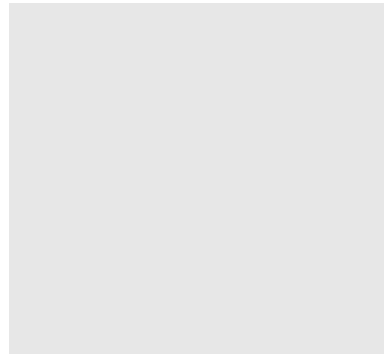
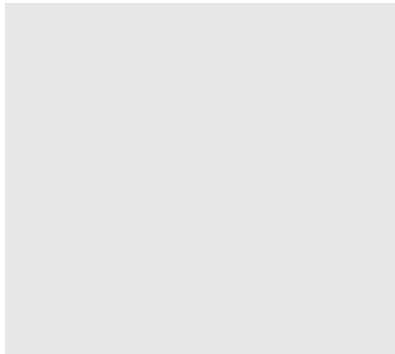


Final Environmental Assessment for the

Marine Corps Base Camp Lejeune

2015-2020 Integrated Natural Resources Management Plan

July 2015



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FINAL ENVIRONMENTAL ASSESSMENT
for the
2015-2020 INTEGRATED NATURAL RESOURCES MANAGEMENT
PLAN
Marine Corps Installations East - Marine Corps Base Camp Lejeune
Onslow County, North Carolina

Responsible Officer:

R. F. CASTELLVI
Brigadier General, U.S. Marine Corps
Commanding General
MCI EAST, MCB Camp Lejeune

Point of Contact:

STEPHANIE McCARY
Environmental Management Division
MCI EAST, MCB Camp Lejeune

July 2015

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LIST OF ACRONYMS AND ABBREVIATIONS

AIWW	Atlantic Intracoastal Waterway
ASPP	Annual Silvicultural Prescription Plan
BA	Biological Assessment
BASH	Bird/animal Aircraft Strike Hazard
BGEPA	Bald and Golden Eagle Protection Act
BO	Base Order or Biological Opinion
BCTMC	Beach to Combat Town Maneuver Capability
CAAAC	Combined Arms Amphibious Assault Capability
CAMA	Coastal Area Management Act
C.F.R.	Code of Federal Regulations
CNCPC	Coastal North Carolina Primary Core
CZMA	Coastal Zone Management Act
DoD	Department of Defense
DoDI	Department of Defense Instruction
EA	Environmental Assessment
EIS	Environmental Impact Statement
EO	Executive Order
ESA	Endangered Species Act
ECS	Ecological Classification System
GSRA	Greater Sandy Run Area
INRMP	Integrated Natural Resources Management Plan
IWG	INRMP Working Group
LTP	Land Type Phases
MBTA	Migratory Bird Treaty Act
MCAS	Marine Corps Air Station
MCB	Marine Corps Base
MCO	Marine Corps Order
MEB	Marine Expeditionary Brigade
MEF	Marine Expeditionary Force
MEU	Marine Expeditionary Unit
MMPA	Marine Mammal Protection Act

MOU	Memorandum of Understanding
msl	Mean sea level
NAAQS	National Ambient Air Quality Standards
NCMFC	North Carolina Marine Fisheries Commission
NCNHP	North Carolina Natural Heritage Program
NCWRC	North Carolina Wildlife Resources Commission
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanographic and Atmospheric Administration
NRE	New River Estuary
RASP	Red Cockaded Woodpecker Recovery and Sustainment Plan
SAIA	Sikes Act Improvement Act
SAR	Species at Risk
SOC	Species of Concern
TVMC	Tactical Vehicle Maneuver Capability
U.S.C.	U.S. Code
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USMC	U.S. Marine Corps
UXO	Unexploded Ordnance

EXECUTIVE SUMMARY

Marine Corps Installations East – Marine Corps Base Camp Lejeune (Camp Lejeune) has prepared this environmental assessment (EA) to evaluate the potential impacts on the environment of implementing its *2015-2020 Integrated Natural Resources Management Plan* (2015 INRMP). The 2015 INRMP provides for the management of natural resources on Camp Lejeune in accordance with the requirements of the Sikes Act Improvement Act (SAIA) (16 U.S.C. 670a *et seq.*) as well as the implementing policies established in Department of Defense Instruction (DoDI) 4715.3, *Environmental Conservation Program* and Marine Corps Order (MCO) P5090.2A/CH 1-3, *Environmental Protection and Compliance Manual*. The 2015 INRMP updates and replaces the last INRMP prepared in 2007.

The 2015 INRMP outlines the natural resources management goals and objectives that guide Camp Lejeune in the comprehensive conservation and sustainment of its natural resources while maintaining modern training ranges, training facilities and maneuver areas. The INRMP identifies actions needed to meet these goals and objectives. The mandatory nature of the natural resources management actions established in the INRMP triggers compliance with the National Environmental Policy Act of 1969 (NEPA). This EA assesses the potential impacts of those actions in accordance with NEPA, the Council on Environmental Quality's (CEQ) Regulations for Implementing the Procedural Provisions of NEPA (40 C.F.R. 1500-1508), and Marine Corps Order (MCO) P5090.2A/CH 1-3, Chapter 12.

The purpose and need for the 2015 INRMP is to guide the management of Camp Lejeune's natural resources in a manner that supports the base's training mission with "no net loss" in mission capability while also providing for the conservation, rehabilitation, and sustainable multipurpose use of these natural resources.

The EA considers two alternatives: the No Action Alternative, under which the 2007 INRMP would not be updated and would remain in effect for the foreseeable future; and the Proposed Action Alternative, under which the 2015 INRMP would be implemented and replace the 2007 INRMP.

The EA assesses the potential impacts of the alternatives on the following resources: land use, vegetation, fish and wildlife communities, protected and sensitive species and habitats, water resources and wetlands, geology and soils, and air quality. Impacts on the following resources are not considered in detail because implementation of the INRMP has no potential to measurably affect them: noise, socioeconomics (including Executive Order [EO] 12898, *Environmental Justice* and EO 13045, *Protection of Children*), infrastructure, cultural resources, and hazardous materials and waste.

Anticipated impacts under both alternatives are summarized in Table ES-1.

Table ES-1: Summary of Impacts

Resource Area	No Action Alternative	Proposed Action Alternative
Land Use	Moderate adverse impacts on land use on base, as the 2007 INRMP would not be updated to take new training needs into account. No impacts on off-base land use.	Beneficial impact on land use on base, as the updated 2015 INRMP would fully support new training needs in balance with natural resources regulatory requirements. No impacts on off-base land use.
Vegetation	Minor short-term adverse impacts from habitat and forest activities and vegetation control, including prescribed burns. Long-term beneficial impacts.	Minor short-term adverse impacts from habitat and forest activities and vegetation control, including prescribed burns. Minor long-term adverse impact on longleaf restoration due to its suspension in the Greater Sandy Run Area (GSRA) for up to five years. Minor long-term adverse impacts from accommodation of new training needs, including provision of combined arms amphibious assault capability.
Fish and Wildlife Communities	Minor short-term adverse impacts from habitat and forest activities and vegetation control, including prescribed burns. Long-term beneficial impacts.	Minor short-term adverse impacts from habitat and forest activities and vegetation control, including prescribed burns. Minor long-term adverse impacts from accommodation of new training needs, including provision of combined arms amphibious assault capability.
Protected and Sensitive Species and Habitats	No adverse impacts on federally-protected species, or species at risk. However, species federally listed since the 2007 INRMP (red knot (<i>Calidris canutus</i>) and Hirst's panic grass (<i>Dichanthelium hirstii</i>) would remain without specific management measures in the INRMP. Any impacts would be avoided, minimized, or mitigated through Section 7 of the Endangered Species Act (ESA) consultation. Impacts on species at risk similar to those on common species: minor short-term adverse impacts and beneficial long-term impacts. No impacts on sensitive habitats.	The 2015 INRMP would not affect, or may affect but is not likely to adversely affect federally-listed species with the exception of the red-cockaded woodpecker (<i>Picoides borealis</i>), which it may affect and is likely to adversely affect. Potential adverse impacts on the woodpecker could occur due to removal of training restrictions and other activities increasing the risk of disturbance. Camp Lejeune has conducted formal consultation with the US Fish and Wildlife Service (USFWS) in accordance with Section 7 of the ESA. USFWS issued a Biological Opinion (BO) on July 17, 2015, finding that implementation of the 2015 INRMP may result in an incidental take of up to 19 red-cockaded woodpecker groups. USFWS found this take not likely to result in jeopardy to the species. Compliance with the reasonable and prudent measures defined in the BO and with the terms and conditions implementing these measures would ensure that the adverse impact is minimized and not significant.

Resource Area	No Action Alternative	Proposed Action Alternative
		Impacts on species at risk similar to those on common species: minor short-term adverse impacts and beneficial long-term impacts. No impacts on sensitive habitats.
Water Resources and Wetlands	Minor short-term adverse impacts on surface waters and wetlands from habitat and forest management activities and vegetation control measures. Long-term adverse impacts from training and other activities avoided, minimized, or mitigated through compliance with Section 404 of the Clean Water Act. Beneficial long-term impacts from soils management and shoreline stabilization activities.	Minor short-term adverse impacts on surface waters and wetlands from habitat and forest management activities and vegetation control measures. Potentially greater long-term impacts from new training activities, which would continue to be avoided, minimized, or mitigated through compliance with Section 404. Increased long-term beneficial impacts from several new measures, including splash point evaluation and "thin layer disposal project" to restore saltmarshes and promote barrier island stabilization.
Geology and Soils	Short-term minor adverse impacts on soils from habitat and forest activities and vegetation control, including prescribed burns. Long-term beneficial impacts from soil management measures and shoreline stabilization actions.	Possibly greater short-term impacts from new training operations (e.g., combined arms amphibious assault capability), minimized through specific soil management measures. Greater long-term beneficial impacts from coastal resources management measures such as the monitoring of splash points.
Air Quality	Minor short-term impacts from prescribed burns and negligible short-term impacts from the operation of motorized equipment for forest management and vegetation control. No or negligible long-term impacts.	Minor short-term impacts from prescribed burns and negligible short-term impacts from the operation of motorized equipment for forest management and vegetation control. No or negligible long-term impacts.
Cumulative Impacts	Negligible to minor short-term adverse impacts are not likely to result in significant cumulative impacts when added to those of past, present, and foreseeable future actions because they would be temporary, with no adverse long-term consequences. In the long term, positive impacts would mitigate, rather than aggravate, the impacts of past, present, and future projects and actions.	Negligible to minor short-term adverse impacts are not likely to result in significant cumulative impacts when added to those of past, present, and foreseeable future actions because they would be temporary, with no adverse long-term consequences. In the long term, positive impacts would mitigate, rather than aggravate, the impacts of past, present, and future projects and actions.

Implementation of either the No Action Alternative or the Proposed Action Alternative would result in no significant impacts on the environment. Preparation of an environmental impact statement is not required.

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APPENDICES

Appendix A - Federal Coastal Zone Consistency Determination

Appendix B - Comments on the Pre-Final EA

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1.0 PURPOSE AND NEED FOR THE PROPOSED ACTION

1.1 Introduction

Marine Corps Installations East - Marine Corps Base Camp Lejeune (henceforth, Camp Lejeune) has prepared this environmental assessment (EA) to evaluate the potential impacts on the environment of implementing its *2015-2020 Integrated Natural Resources Management Plan* (2015 INRMP). The 2015 INRMP provides for the management of natural resources on Camp Lejeune in accordance with the requirements of the Sikes Act Improvement Act (SAIA) (16 U.S.C. 670a *et seq.*) as well as the implementing policies established in Department of Defense Instruction (DoDI) 4715.3, *Environmental Conservation Program* and Marine Corps Order (MCO) P5090.2A/CH 1-3, *Environmental Protection and Compliance Manual*. The 2015 INRMP updates and replaces the last INRMP prepared in 2007.

The 2015 INRMP outlines the natural resources management goals and objectives that guide Camp Lejeune in the comprehensive conservation and sustainment of its natural resources while maintaining modern training ranges, training facilities and maneuver areas. The INRMP identifies actions needed to meet these goals and objectives. The mandatory nature of the natural resources management actions established in the INRMP triggers compliance with the National Environmental Policy Act of 1969 (NEPA). This EA assesses the potential impacts of those actions in accordance with NEPA, the Council on Environmental Quality's (CEQ) Regulations for Implementing the Procedural Provisions of NEPA (40 C.F.R. 1500-1508), and Marine Corps Order (MCO) P5090.2A/CH 1-3, Chapter 12.

1.2 Background

Camp Lejeune consists of more than 143,000 acres of land in Onslow County, North Carolina. The installation is located 45 miles southwest of New Bern, 125 miles southeast of Raleigh, and 47 miles northeast of Wilmington (Figures 1-1 and 1-2). The main base (Mainside), east of the New River, consists of about 80,000 acres; west of the New River, Camp Lejeune comprises Verona Loop, approximately 22,000 acres in size, bounded by US Highway 17 to the west, and to west of Highway 17, the Greater Sandy Run Area (GSRA), encompassing about 41,000 acres. Marine Corps Air Station (MCAS) New River also lies west of the New River, to the north and adjacent to Verona Loop. MCAS New River is included in the area covered by the INRMP.

The primary mission of Camp Lejeune is to provide training support in the form of training ranges, training facilities, and maneuver space for the warfighting forces assigned to II Marine Expeditionary Forces (II MEF) and other tenant organizations (including, but not limited to, the Marine Corps Engineer School, Field Medical School, Coast Guard's Special Mission Training Center, MCAS New River, and Marine Special Operations Command).

The base supports individual and unit-level maneuver training, and live-fire and amphibious operations both at-sea and ashore. Camp Lejeune is home to the II MEF and, as such, supports all aspects of combined arms training, including ground combat elements, aviation elements, combat logistics support elements and command and control elements.

To support its training mission, Camp Lejeune maintains and operates 98 active ranges and three impact areas. The base contains 96 designated training areas organized in five major blocks; 47 Tactical Landing Zones; and 10 major drop zones. Tactical Landing Zones and Drop Zones are multiple-use areas often containing artillery gun positions as well. Camp Lejeune also has eleven water training areas and two ocean training areas adjacent to training beaches. Consistent with the requirements of its training mission, much of Camp Lejeune is undeveloped and rich in natural resources.

1.3 Purpose and Need

The purpose of the 2015 INRMP is to guide the management of Camp Lejeune's natural resources in a manner that supports the base's training mission with "no net loss" in mission capability while also providing for the conservation, rehabilitation, and sustainable multipurpose use of these natural resources.

To fulfill its training mission, Camp Lejeune must have modern and state-of-the-art ranges, facilities, and maneuver areas that promote realistic and relevant training for combat units destined for deployment throughout the world. The short- and long-term focus for training range managers is to provide the best available training opportunities and capabilities supporting amphibious training, live fire, tactical vehicle maneuver, and ultimately combined arms tactical maneuver with live fire.

The INRMP is needed to ensure that the training needs of the installation are met and existing deficiencies in training capabilities are addressed in a manner that (1) conserves and enhances natural resources as well as promotes their sustainable use with no net loss in training capabilities and (2) supports Camp Lejeune's long-term and short-term training objectives.

Long-term (more than five years) training objectives include:

- Establishing a Combined Arms Amphibious Assault Capability (CAAAC) to provide a training capability on Mainside allowing units to conduct seamless combined arms training with live fire and maneuver transitioning from amphibious shipping through or over the training beaches/barrier islands to subsequent land-based training and operations ashore.



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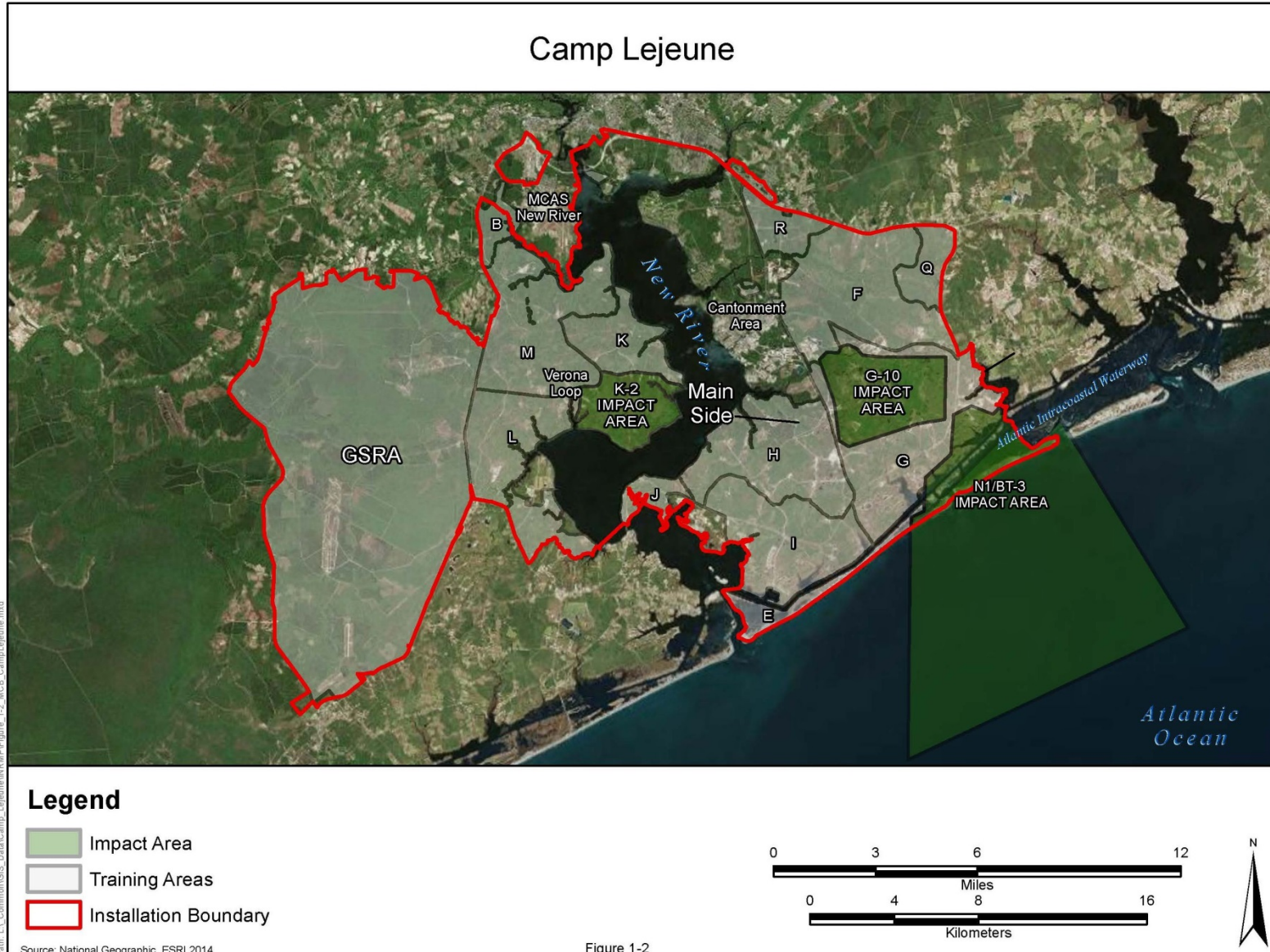


Figure 1-2

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- Ensuring the viability of MCAS New River as an aviation facility capable of accepting new aviation platforms through runway extensions and improvements and through the elimination of bird and wildlife strike hazards to aircraft while complying with the Endangered Species Act (ESA) and other wildlife regulatory requirements.
- Evaluating land use management impacts for future weapon systems well in advance of fielding plans.

Short-term (five years or less) training objectives include:

- Develop Phase 1 of the CAAAC - Beach to Combat Town Maneuver Capability.
- Develop a Tactical Vehicle Maneuver Capability (TVMC) in the GSRA to support tactical vehicle maneuver Mission Essential tasks integrated with live fire opportunities. This project is of immediate priority as TVMC represents a significant training (capability) gap that was identified in 1979 and has yet to be overcome.
- Develop the training capabilities of the barrier islands. The training beach and barrier islands support one of the Marine Corps' critical (core) training requirements, i.e., amphibious operations and subsequent operations ashore. This capability will be enhanced through the re-activation of a designated (duded) impact area on Brown's Island for Precision Guided Munitions and Landing Craft Air Cushioned artillery raids conducted on the north end of Onslow Beach. Regulatory compliance and management of Threatened and Endangered species has not significantly impacted the use of the barrier islands for training.
- Increase off-road maneuver training opportunities in red-cockaded woodpecker habitat around Combat Town, designated tank trails, and the Military Operations in Urban Terrain (MOUT) Complex.
- Determine if there is an operational training requirement to clear the G-10 Impact Area out to the secondary impact area.
- Explore requirements to conduct periodic maintenance dredging of transit lanes for tactical vehicle movement from Mainside to Verona Loop across the New River.

Both the long-term and short-term objectives will assist the managers of Camp Lejeune to provide the operational forces with a comprehensive training range complex that prepares them for the full range of military missions.

Accomplishing these objectives will require close cooperation with Camp Lejeune's Environment Management Division in conducting specific resource management actions as follows:

- Using the Red-cockaded Woodpecker (*Picoides borealis*) Recovery and Sustainment Program (RASP; see Section 2.3.3.1 for more information) as the primary program to free up large acreages of encumbered training lands from threatened or endangered species, recognizing that independent formal consultations outside the RASP may be required.
- Exploring hardening the Atlantic Intracoastal Waterway (AIWW) tactical vehicle splash points to preserve the integrity of the shoreline and the transit of tactical vehicles from the barrier islands to Mainside and developing a long-term management plan for these splash points.
- Use tidal area stabilization in the AIWW as an opportunity to develop a project referred to as thin layer sediment application in select areas of the AIWW to help protect the marshlands to preserve terrain suitable for the conduct of amphibious operations.
- Ensuring Camp Lejeune maintains compliance with the Clean Water Act during military training and when performing Operational Range Clearance in the New River, the AIWW, and Onslow Bay.
- Exploring potential mutual cooperation with North Carolina State Marine Fisheries on New River oyster beds/reefs and shrimp trawling areas in advance of establishing specific areas to ensure safety of personnel in and around impact areas.
- Explore and define Camp Lejeune's regulatory obligations to manage species of concern and Natural Heritage Areas in the light of their impact on training.

In the accomplishment of its objectives, Camp Lejeune will remain committed to:

- Meeting the installation's red-cockaded woodpecker recovery goal and reducing restrictions on military training by increasing the bird's population on non-military lands through RASP agreements.
- Range-wide efforts to restore longleaf pine (*Pinus palustris*) focusing on suitable areas on Mainside and in Verona Loop, wherever practicable and where there is no conflict with the mission.
- Continued maintenance of the GSRA Wetlands Mitigation Bank.

1.4 Environmental Review Process

1.4.1 National Environmental Policy Act (NEPA)

NEPA requires that federal agencies consider the potential environmental consequences of their proposed actions in their decision-making process. To that end, agencies must prepare an EA or an environmental impact statement (EIS) for any federal action that may have an impact on the

environment, except those actions that are determined to be “categorically excluded.” An EIS is prepared for those federal actions that may significantly affect the quality of the human environment. An EA is a concise public document that provides sufficient analysis for determining whether the potential environmental impacts of a proposed action are significant, which would require preparation of an EIS, or if they are not significant, supporting the issuance of a finding of no significant impact (FONSI).

1.4.2 Decision to Be Made

If Camp Lejeune were to determine that the implementation of the goals and actions defined in the 2015 INRMP would have a significant impact on the quality of the human environment, an EIS will be prepared. Should Camp Lejeune conclude that there would be no significant impacts, a FONSI will be prepared. The Commanding General of Camp Lejeune will sign the FONSI and a notice of availability will be published in local newspapers.

1.5 Coordination and Scope of the EA

The INRMP was prepared by the Camp Lejeune Environmental Conservation Branch, Environmental Management Division, and the INRMP Working Group (IWG), whose members include representatives of GF, G3/5, G7 and Eastern Area Counsel. The IWG worked with the US Fish and Wildlife Service (USFWS), the National Oceanic and Atmospheric Administration (NOAA), the North Carolina Wildlife Resources Commission, and the North Carolina Department of Environment and Natural Resources to ensure that the relevant issues and concerns pertaining to the interface of the installation’s training missions with the management of natural resources were identified and addressed in the INRMP and this EA.

Consistent with 40 C.F.R. 1501.7(a)(3), this EA considers in detail impacts on those resources that have the potential to be affected by the implementation of the proposed action. These include: land use, air quality, geology and soils, water resources, biological resources (including threatened and endangered species), and hazardous materials.

The following resources are not considered in detail in the EA because the proposed action has no potential to measurably affect them:

Noise: the performance of a wide range of training activities at Camp Lejeune generates noise both on and off base. However, the natural resources management objectives and actions defined in the 2015 INRMP have no potential to affect existing noise levels. A small amount of noise would be associated with mechanical vegetation control activities, but such noise would be temporary and localized, with no potential to affect overall ambient noise levels at and near Camp Lejeune. Therefore, noise is not considered further in this EA.

Socioeconomics, Environmental Justice, and Protection of Children: the objectives and actions defined in the 2015 INRMP have no potential to affect socioeconomic conditions. They

involve no gain or loss of personnel and, therefore, have no potential to affect local or regional demography, housing, or public services such as schools or medical facilities. The proposed actions and procedures would take place on base and would not affect minority or low-income populations protected under Executive Order (EO) 12898; nor do they have potential to affect the health or welfare of children, protected under EA 13045. Therefore, these issues are not considered further in this EA.

Infrastructure: the proposed action would not affect the utilities serving Camp Lejeune or increase demands on these utilities. While some natural resources management activities would generate vehicular traffic, including trucks or motorized equipment, such occurrences would be sporadic and temporary, with no potential to affect the transportation infrastructure and its operation both on and off base. Therefore, infrastructure issues are not considered further in this EA.

Cultural Resources: the proposed action does not involve any use of or alteration to buildings or structures that require consideration under Section 106 of the National Historic Preservation Act. Activities requiring ground disturbance in undeveloped areas would be reviewed on a project-by-project basis by the base archaeologist for potential impacts on known or potential archaeological sites and measures would be taken to avoid, minimize, or mitigate any impacts, as applicable, in accordance with Section 106. Therefore, cultural resources are not considered further in this EA.

Hazardous Materials and Hazardous Waste: the proposed action would not affect the storage, use, or disposal of hazardous materials and hazardous wastes at Camp Lejeune. Therefore, these are not considered further in this EA.

1.6 Related Environmental Documentation

In parallel with the 2015 INRMP and this EA, and in accordance with Section 7 of the Endangered Species Act (ESA), Camp Lejeune has prepared a biological assessment (BA) to address the effects of the proposed action on federally threatened and endangered species. In July 2015, the US Fish and Wildlife Service issued a Biological Opinion, which is included in Appendix 19 of the 2015 INRMP.

The Coastal Zone Management Act of 1972 (16 U.S.C. § 1451, et seq., as amended) provides assistance to states, in cooperation with federal and local agencies, for developing land and water use programs in the coastal zone. The act 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 the fish and wildlife supported by those habitats.

Coastal Zone Management Act policy is implemented through state coastal zone management programs. Federal lands are excluded from the jurisdiction of these state programs. However, the

Coastal Zone Management Act requires that any federal agency activity that is reasonably foreseeable within or outside the coastal zone and affects any land or water use or natural resource of the coastal zone be carried out in a manner that is consistent, to the maximum extent practicable, with the enforceable policies of National Oceanic and Atmospheric Administration-approved state management programs.

Camp Lejeune prepared documentation assessing the consistency of the 2015 INRMP with the enforceable policies of the North Carolina Coastal Area Management Program (CAMA) and determining that the INMRP is consistent to the maximum extent practicable with the applicable enforceable policies. This consistency determination was submitted for review to the state of North Carolina on March 3, 2015 (copy in Appendix A). By letter dated June 17, 2015, the North Carolina Department of Environment and Natural Resources concurred with Camp Lejeune's finding. A copy of the concurrence letter is included in appendix A.

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2.0 PROPOSED ACTION AND ALTERNATIVES

2.1 Introduction

The CEQ's regulations implementing NEPA establish a number of policies for federal agencies, including "...using the NEPA process to identify and assess the reasonable alternatives to the proposed action that will avoid or minimize adverse effects of these actions on the quality of the human environment" (40 C.F.R. 1500.2(e)). This chapter describes the alternatives assessed in the EA.

2.2 Alternatives Development Process

2.2.1 Background

The natural resources objectives and actions defined in the 2015 INRMP were developed through an iterative process led by the IWG in collaboration with the agencies listed in Section 1.5. In particular, the USFWS Raleigh Ecological Field Office actively contributed to the development of the 2015 INRMP through multiple meetings, conference calls, and written communications. Through this process, several key actions were identified as essential to meeting Camp Lejeune's purpose and need. These foundational actions in turn underlay and guided the development of the specific management objectives and actions defined in the INRMP, which make up the proposed action. These foundational actions are described in the INRMP (Section 1.4.1) and briefly summarized below:

- **GSRA Incidental Take Authorization:** to maximize the availability of unconstrained training lands on Camp Lejeune, USFWS agreed that any new threatened and endangered species appearing as a result of beneficial natural resource management actions will not result in additional constraints on training or range development. This agreement includes species currently listed under the ESA as well as species such as the eastern diamondback rattlesnake (*Crotalus adamanteus*) and Carolina gopher frog (*Rana capito*) that may be listed in the future. In the specific case of the red-cockaded woodpecker, the agreement will cover all clusters that may become established in the GSRA.
- **GSRA Longleaf Pine:** the ongoing process of planning and designing tactical vehicle maneuver ranges in the GSRA precludes the identification of suitable longleaf pine restoration sites. To avoid inefficient and ineffective resource allocation, longleaf pine restoration in the GSRA will be put on hold pending completion of the planning and design process for the GSRA Tactical Vehicle Maneuver Capability (TVMC) or for up to five years.
- **GSRA Pocosin as Red-cockaded Woodpecker Benefit:** the concept that pocosin (a type of wetland occurring in the coastal plain) habitat in the GSRA provides a conservation

benefit to the red-cockaded woodpecker has not previously been recognized. The pocosins and pocosin fringes may serve as dispersal habitat as well as marginal nesting and foraging habitat. In the past, only the uplands that support or could potentially support longleaf pine were seen as providing a benefit to the species. However, observation of birds using non-typical habitat have shown that pocosin habitat can still provide a benefit.

- **CAAAC Phase 1/Beach to Combat Town Maneuver Capability (BCTMC):** on Mainside, the operational requirement exists to provide tactical vehicle maneuver corridors or areas for transit of tracked and wheeled vehicles from the beach to tactical objectives located inland. These corridors or areas are intended to incorporate existing tank trails to the maximum extent possible but in some cases, they will be expanded to include lanes of travel permitting tactical maneuver. Corridors may appear as open maneuver areas with little vegetation or as lanes separated by significant vegetation. The five-year INRMP period will be used to establish whether mechanized maneuver is compatible with red-cockaded woodpecker management and whether these maneuver corridors can continue to be included as manageable habitat.
- **Vegetation Management within Impact Areas:** the impact areas of Camp Lejeune are critical to the performance of live-fire training for air, ground, and naval forces. Visibility of targets is essential for target acquisition by forward observers, pilots, and personnel using direct fire weapons to evaluate hits and proximity of munitions delivery. Maintenance of the impact areas to provide that necessary visibility requires vegetation management to maintain ground cover at desirable heights. Fires resulting from munitions generally maintain ground cover within the desired threshold in portions of the impact areas. However, many other portions require additional vegetation management. Due to the danger of unexploded ordnance (UXO), the high cost of UXO removal, and weather conditions, mechanical vegetation management and prescribed fire are not always practical. Consequently, aerial application of herbicides within the impact areas may be a method of control.

2.2.2 Selection Criteria

NEPA calls for the consideration of reasonable alternatives to the proposed action. To be considered reasonable, an alternative would need to:

1. Meet the purpose and need for the proposed action as described in Section 1.3.
2. Incorporate or support the foundational actions listed above, which Camp Lejeune, in coordination with USFWS, has determined to be essential to meeting its purpose and need.

3. Be in full compliance with applicable laws and regulations pertaining to natural resources, including, though not limited to, the Endangered Species Act and Clean Water Act.

The proposed action, developed through the iterative process described in Section 2.2.1, meets all three criteria. It is described in Section 2.3.2 below. Section 2.2.3 briefly describes alternatives considered but dismissed.

2.2.3 Alternatives Considered but Dismissed

During the iterative process described in Section 2.2.1, a number of alternative actions were considered and dismissed from consideration because they would not meet one or more of the above criteria. They included:

2.2.3.1 Permanently Stopping All Longleaf Pine Conversion and Burning in the GSRA

This action would reduce future conflicts between environmental resources management and training requirements but it would also make managing the area's natural resources more difficult. Ultimately, it would adversely impact training because, over time, the areas would become overgrown, often impassable even by foot, and prone to wildfires that would close the training areas and create potential hazards to off-base areas. Thus, in the long term, this action would not adequately meet Criterion 1.

2.2.3.2 Planting of Long-leaf Pine in Limited and Confined Areas

This course of action would continue to promote the growth of longleaf Pine in the GSRA. However, it could result in poor use of resources until such time as the TVMC is clearly defined, thus not adequately meeting Criterion 1.

2.3 Alternatives Considered in the EA

2.3.1 No Action Alternative

Under the No Action Alternative, Camp Lejeune would continue to manage natural resources in accordance with the objectives and actions defined in the previous (2007) INRMP. These procedures and actions are summarized in Table 2-1.

Because many of these objectives and actions are obsolete or do not adequately support current training needs, the No Action Alternative is not considered reasonable. However, consistent with CEQ guidance, it is analyzed in this EA to provide a baseline against which the impacts of the proposed action can be assessed.

2.3.2 Proposed Action Alternative

Under the Proposed Action Alternative, natural resources at Camp Lejeune would be managed over the next five years in accordance with the objectives and actions laid out in the 2015 INRMP.

Table 2-1 lists the different components of the proposed action as shown in Chapter 4 of the 2015 INRMP. Table 2-1 also shows the No Action Alternative, that is, the measures and actions included in the 2007 INRMP for the same resources. Section 2.3.3 presents a brief summary of some key features of the Proposed Action Alternative. Detailed descriptions are provided in Chapter 4 of the 2015 INRMP.

2.3.3 Key Features of the Proposed Action

2.3.3.1 Red-cockaded Woodpecker Management

Under the Proposed Action Alternative, Camp Lejeune would continue to manage red-cockaded woodpecker habitat at the partition level according to the procedures introduced in the 2007 INRMP and partition level management would remain essentially unchanged. Camp Lejeune would continue to manage for a minimum of 120 acres of good quality habitat as defined in the 2003 red-cockaded woodpecker USFWS Recovery Plan.

Under the Proposed Action Alternative, however, Camp Lejeune would increase the frequency of burning across the base and move closer to an average of a three-year return interval, with an increasing percentage of burning occurring in the growing season. Also, the proposed action incorporates a number of red-cockaded woodpecker population and habitat management changes that are designed to alleviate constraints on military training capabilities. Unlike the 2007 INRMP, in which placement of new, unmarked red-cockaded woodpecker recruitment clusters was allowed in highly used training areas, no new recruitment clusters would be deliberately drilled in such areas until other areas have been filled. Additionally, the 2015 INRMP would simplify the system of population milestones introduced in the 2007 INRMP for demarking clusters.

An overarching goal of the 2015 INRMP is to facilitate off-road mechanized maneuver training. Management of red-cockaded woodpecker plays a critical role in the development of off-road mechanized maneuver training capabilities. To support this goal, under the Proposed Action Alternative, Camp Lejeune would suspend planting longleaf pine and other management in the GSRA aimed specifically at red-cockaded woodpecker habitat improvement pending completion of the planning and design process for the GSRA TVMC or at the end of the five-year INRMP period, whichever comes first. Prescribed burning for ecosystem restoration and general habitat improvement would continue in the GSRA during the interim planning period and Camp Lejeune would continue to implement timber stand improvement projects to increase productivity and reduce fuel levels.

The Red-cockaded Woodpecker Recovery and Sustainment Program (RASP) would be used by Camp Lejeune as a new management tool. The RASP was developed by Camp Lejeune and USFWS as a strategy to establish new woodpecker subpopulations or add to existing subpopulations within the Coastal North Carolina Primary Core (CNCPC) population while simultaneously alleviating constraints on the Marine Corps training mission. The RASP would allow Camp Lejeune to enter into agreements with agencies, non-governmental organizations, and private landowners to establish new red-cockaded woodpecker groups on off-base properties that contribute to the CNCPC. In return, Camp Lejeune's on-base recovery goal could be reduced, thereby alleviating constraints on mission-critical range and training area capabilities. Rigorous modeling analyses would be used to evaluate the potential biological functionality of individual RASP properties as well as their potential to contribute to the ecological functionality of the overall CNCPC population. RASP property agreements would be required to provide for the management and protection of the properties and their associated red-cockaded woodpecker groups in perpetuity.

2.3.3.2 Forest Management

Camp Lejeune's Annual Silvicultural Prescription Plan (ASPP) would guide the professional management of the forest ecosystems on the base. Implementation of the ASPP includes development, timber marking, volume computation, harvesting inspections, and closure procedures on five to seven timber sales annually on an estimated 1,500 to 2,500 acres. Implementation would also include forest access road construction, repair, and maintenance. Forest compartments would continue to be treated on a 10-year prescription cycle while requirements for red-cockaded woodpecker habitat would be addressed outside the 10-year prescription and be consistent with the 2003 Recovery Plan. The majority of actions necessary to implement the ASPP, including timber harvest and sales, and forest regeneration would be consistent with actions assessed and taken for the implementation of past forest management plans. Timber stand improvement projects, prescribed burns, and other vegetation management projects would be adjusted as necessary to establish and maintain TVM and BCTM training standards for cover, concealment, speed, and mobility.

In the GSRA, longleaf pine conversion would be put on hold for up to five years to allow for the planning and designing of tactical vehicle maneuver ranges. Potential longleaf restoration sites in the GSRA would be reevaluated upon completion of the period. Prescribed burning for ecosystem restoration and fuel reduction would continue, however.

The restoration and enhancement of longleaf pine communities on Camp Lejeune would continue where they historically occurred on Mainside and Verona Loop according to procedures similar to those laid out in the 2007 INRMP. The number of acres and locations of restoration to longleaf pine would be dependent on mission requirements, Red-cockaded woodpecker habitat requirements, the acreage available for conversion, and the acreage currently designated as

longleaf pine regeneration areas. Sites would be determined using the Ecological Classification System (ECS) and Land Type Phases (LTP), which are fully described in the INRMP. Restoration involves reintroducing longleaf pine to locations that longleaf pine historically occupied but that are currently occupied by other species. Natural regeneration would be preferred where residual timber can provide an adequate seed source and the LTP is appropriate. Artificial regeneration would be used in areas where longleaf restoration is desired but a suitable seed source is not available. Regenerated sites would be prepared through a combination of natural, mechanical, or chemical methods, depending on site conditions. The methods chosen would be site-specific and any natural resource management concerns such as undesirable impacts on native vegetation would be considered prior to implementation.

Thinning in regenerated stands would be used to reduce tree density to desired stocking levels to reduce competition for seedlings, improve wildlife habitat, and help eliminate the buildup of forest fuels. This would be accomplished through the use of mechanical methods such as drum chopping or Hydro-ax usage. Prescribed burning is the preferred treatment to maintain regenerating longleaf stands. However, in regenerating stands containing high concentrations of competing brush and/or hardwood species, herbicides such as Velpar®, Arsenal®, or Garlon® may be used.

2.3.3.3 Wildland Fire Management

The primary function of Camp Lejeune is the training of combat-ready Marines. As Marines train, they use a number of pyrotechnic devices and fire incendiary rounds, resulting in the ignition of a large number of wildfires every year. Prescribed burning treatments help reduce the intensity of wildfires by reducing the amount of fuel available to a wildfire.

Training ranges in the GSRA would be scheduled for annual prescribed burns due to the high occurrence of wildland fires and the increased potential for catastrophic wildfire. The Verona and Mainside training ranges would continue to be scheduled on a 2-year cycle to reduce fuel load and the potential for catastrophic wildfire. In red-cockaded woodpecker recovery areas, prescribed burn treatments would be on a 3- to 5-year cycle with an emphasis on prescribed fire frequency and growing season burns rather than the number of acres burned per year. In areas in which understory fuels have not been maintained at a level for effective prescribed burning, mechanical treatments (i.e., mowing) would be used to restore these areas to a condition suitable for the reintroduction of prescribed burning. Before prescribed burning treatments, data on fuel loads, fuel conditions and smoke sensitive areas would be collected for each of the treatment areas. Fuel loading describes the type and amount of vegetation available to sustain a fire. Fuel conditions describe the orientation of the fuels and fuel hazards. Smoke sensitive areas include population centers, hospitals, schools, highways, and recreational areas where smoke can negatively affect health, safety, and aesthetics. The North Carolina Forest Service's Smoke Management Guidelines would be followed.

Table 2-1: No Action Alternative and Proposed Action Alternative

No Action Alternative (2007 INRMP) ¹	Proposed Action (2015 INRMP)
Red-cockaded Woodpecker	
<p>OBJECTIVE TES1: Treat red-cockaded woodpecker partitions as management units for silvicultural practices.</p> <p>Action 4-01: Develop red-cockaded woodpecker Habitat/Ecosystem management model.</p> <p>Action 4-02: Evaluate red-cockaded woodpecker partitions covered in current forest prescription.</p> <p>Action 4-03: Evaluate high-priority red-cockaded woodpecker partitions that are outside the timber prescription cycle.</p> <p>OBJECTIVE TES2: Manage for 120 acres “good quality” habitat for each partition.</p> <p>Action 4-04: Produce a red-cockaded woodpecker habitat inventory of red-cockaded woodpecker management areas based on 2003 Recovery Plan criteria for good quality habitat.</p> <p>Action 4-05: Modify base forest data collection to better quantify variables contributing to good quality habitat.</p> <p>Action 4-06: Restore longleaf pine within the guidelines of the 2003 Recovery Plan for the Red-cockaded Woodpecker.</p> <p>Action 4-07: Use mechanical treatments for midstory vegetation control and maintenance.</p> <p>Action 4-08: Promote high-quality red-cockaded woodpecker habitat by removing canopy hardwoods and thinning of mature pine stands.</p> <p>OBJECTIVE TES3: Promote red-cockaded woodpecker population growth toward 173 active clusters through cluster management and protection and population manipulation.</p> <p>Action 4-9: Maintain sufficient number of cavities per cluster and use cavity restrictors when necessary.</p> <p>Action 4-10: Maintain sufficient number of unoccupied recruitment clusters.</p> <p>Action 4-11: Translocation of red-cockaded woodpeckers.</p> <p>Action 4-12: Protect red-cockaded woodpecker cavity trees from fire.</p>	<p>GOAL/OBJECTIVE TES1: Manage red-cockaded woodpecker habitat to increase “good quality” habitat for each partition</p> <p>Action 4.1-01: Camp Lejeune will manage for red-cockaded woodpecker habitat at the partition level, both within and outside of the normal silvicultural prescription cycle.</p> <p>Action 4.1-02: Restore longleaf pine within the guidelines of the 2003 Recovery Plan for the red-cockaded woodpecker on Mainside. Longleaf pine restoration in the GSRA will be reevaluated upon completion of the TVMC range planning and development process.</p> <p>Action 4.1-03: Make progress toward burning all existing and potential red-cockaded woodpecker habitat on a 3-year rotation, and increasing growing season burning to greater than 50 percent.</p> <p>GOAL/OBJECTIVE TES2: Promote red-cockaded woodpecker population growth toward active clusters through cluster management and protection and through population manipulation</p> <p>Action 4.1-04: Implement monitoring and protection plan for red-cockaded woodpecker.</p> <p>Action 4.1-05: Maintain minimum growth rate of 5 percent per year (average over 10 years).</p>

No Action Alternative (2007 INRMP) ¹	Proposed Action (2015 INRMP)
<p>Action 4-13: Inspect cavity trees after prescribed fire.</p> <p>Action 4-14: Educate Marines to reduce impacts from training on cavity trees.</p> <p>Action 4-15: Maintain and update red-cockaded woodpecker cluster buffer markings.</p> <p>Action 4-16: Inspect high traffic clusters weekly to assess impact.</p> <p>Action 4-17: Maintain minimum growth rate of 5% per year (average over 10 years).</p> <p>OBJECTIVE TES4: Develop and maintain a complete and current data set to effectively manage red-cockaded woodpecker on Camp Lejeune.</p> <p>Action 4-18: Create a new GIS feature class representing red-cockaded woodpecker partitions.</p> <p>Action 4-19: Monitor 100% red-cockaded woodpecker population annually.</p> <p>Action 4-20: Survey annually for new cavities.</p> <p>Action 4-21: Continue military impact monitoring.</p> <p>Action 4-22: Track development of habitat.</p> <p>Action 4-23: Conduct home-range follows of selected red-cockaded woodpecker groups.</p> <p>Action 4-24: Assess benefits of pond pine habitat.</p> <p>OBJECTIVE TES5: Manage Camp Lejeune’s red-cockaded woodpecker population to increase mission flexibility for future training and range development needs.</p> <p>Action 4-25: Apply red-cockaded woodpecker population model to forecast impacts on demographic stability from range and facility development.</p> <p>Action 4-26: Monitor Company Battle Course.</p> <p>Action 4-27: Implement management strategy which allows for removal of training restriction as population milestones are met.</p> <p>Action 4-28: Promote population growth by placing unmarked clusters in High Use Training Areas.</p> <p>Action 4-29: Implement relaxed training restrictions within 200-foot cluster buffer.</p>	<p>GOAL/OBJECTIVE TES3: Develop and maintain a complete and current data set to effectively manage red-cockaded woodpecker on Camp Lejeune.</p> <p>Action 4.1-06: Monitor 100 percent red-cockaded woodpecker population annually.</p> <p>Action 4.1-07: Survey annually for new cavities.</p> <p>GOAL/OBJECTIVE TES4: Manage Camp Lejeune’s red-cockaded woodpecker population to increase mission flexibility for future training and range development needs</p> <p>Action 4.1-08: Apply red-cockaded woodpecker population model to forecast impacts on demographic stability from range and facility development.</p> <p>Action 4.1-09: Implement management strategy which allows for removal of training restriction as population milestones are met.</p> <p>Action 4.1-10: Maintain 200-foot cluster buffer.</p> <p>Action 4.1-11: Direct red-cockaded woodpecker management to allow for future mechanized maneuver corridors through red-cockaded woodpecker habitat.</p> <p>Action 4.1-12: Implement a study to monitor the effects of mechanized maneuver in the BCTMC corridors.</p>

No Action Alternative (2007 INRMP) ¹	Proposed Action (2015 INRMP)
Sea-Turtles	
<p>OBJECTIVE TES6: Continue current management and monitoring of sea turtles on Onslow Beach.</p> <p>Action 4-30: Protect sensitive habitat at South Onslow Beach.</p> <p>Action 4-31: Submit annual report to USFWS re: implementing terms and conditions of Beach Biological Opinion (2002).</p> <p>Action 4-32: Enforce Base order (BO) 11017.1f.</p> <p>Action 4-33: Rake ruts in front of sea turtle nests.</p> <p>Action 4-34: Implement Camp Lejeune sea turtle protocol.</p> <p>Action 4-35: Conduct aerial surveys for sea turtle nests on Brown’s Inlet and North Onslow.</p> <p>Action 4-36: Monitor Browns Island fence for potential sea turtle impacts.</p> <p>Action 4-37: Reduce sources of artificial lighting on Onslow Beach.</p> <p>Action 4-38: GPS mid-tide level at least once per year.</p>	<p>GOAL/OBJECTIVE TES5: Continue current management and monitoring of sea turtles on Onslow Beach and Browns Island</p> <p>Action 4.1-13: Protect sensitive habitat at South Onslow Beach.</p> <p>Action 4.1-14: Enter sea turtle data into NCWRC database via seaturtle.org.</p> <p>Action 4.1-15: Continue to implement protective measures for sea turtles in-water.</p> <p>Action 4.1-16: Implement Camp Lejeune sea turtle protocol.</p> <p>Action 4.1-17: Continue to reduce sources of artificial lighting on Onslow Beach.</p>
Rough-leaved Loosestrife	
<p>OBJECTIVE TES7: Maintain a complete and current data set to effectively manage Rough-leaved Loosestrife on Camp Lejeune.</p> <p>Action 4-40: Implement rough-leaved loosestrife monitoring protocol.</p> <p>Action 4-41: Update GIS layer for rough-leaved loosestrife on a yearly basis.</p> <p>Action 4-42: Survey high-probability rough-leaved loosestrife habitat in areas to be affected by management or development actions.</p> <p>OBJECTIVE TES8: Carry out management activities that will promote conservation of Rough-leaved Loosestrife.</p> <p>Action 4-43: Mechanically treat rough-leaved loosestrife habitat with DR mower.</p> <p>Action 4-44: Prescribe burn rough-leaved loosestrife habitat.</p> <p>Action 4-45: Maintain and update buffer areas around rough-leaved loosestrife sites.</p> <p>Action 4-46: Protect rough-leaved loosestrife sites from soil disturbance and changes to hydrology.</p>	<p>GOAL/OBJECTIVE TES6: Maintain a complete and current data set to effectively manage Rough-leaved Loosestrife on Camp Lejeune</p> <p>Action 4.1-18: Continue to implement reduced rough-leaved loosestrife monitoring protocol.</p> <p>Action 4.1-19: Update GIS layer for rough-leaved loosestrife on a yearly basis.</p> <p>Action 4.1-20: Survey high-probability rough-leaved loosestrife habitat in areas to be affected by management or development actions to include the entire GSRA.</p> <p>GOAL/OBJECTIVE TES7: Carry out management activities that will promote conservation of Rough-leave Loosestrife</p> <p>Action 4.1-21: Prescribe-burn rough-leaved loosestrife habitat every 2 to 3 years.</p> <p>Action 4.1-22: Maintain and update buffer areas around rough-leaved loosestrife sites.</p>

No Action Alternative (2007 INRMP) ¹	Proposed Action (2015 INRMP)
	Action 4.1-23: Protect rough-leaved loosestrife sites from soil disturbance and changes to hydrology.
Seabeach Amaranth	
<p>OBJECTIVE TES9: Protection of seabeach amaranth and habitat on Onslow Beach</p> <p>Action 4-47: Survey all possible habitat on Onslow Beach for seabeach amaranth every year.</p> <p>Action 4-48: Mark and protect Seabeach Amaranth sites.</p>	<p>GOAL/OBJECTIVE TES8: Protection of seabeach amaranth and habitat on Onslow Beach</p> <p>Action 4.1-24: Protect sensitive habitat at South Onslow Beach.</p> <p>Action 4.1-25: Annually survey potential seabeach amaranth habitat on Onslow Beach.</p> <p>Action 4.1-26: Mark and protect seabeach amaranth sites.</p>
Bald Eagle	
<p>OBJECTIVE TES10: Protect bald eagles found on Camp Lejeune</p> <p>Action 4-49: Maintain protective buffers for known nest.</p> <p>Action 4-50: Monitor for nesting activity and nesting success.</p> <p>Action 4-51: Conduct annual surveys for potential nests along New River corridor.</p>	<p>GOAL/OBJECTIVE TES13: Protect bald eagles found on Camp Lejeune</p> <p>Action 4.1-35: Maintain protective measures required as a condition of the Bald and Golden Eagle Protection Act (BGEPA) take permit</p> <p>Action 4.1-36: Monitor each nest according to conditions of the BGEPA permit.</p> <p>Action 4.1-37: Conduct periodic surveys for potential nests along the New River corridor.</p>
Piping Plover	
<p>OBJECTIVE TES11: Conserve piping plover populations</p> <p>Action 4-52: Conduct biweekly surveys for piping plover activity in accordance with monitoring protocol for piping plover.</p> <p>Action 4-53: Protect piping plover habitat from training and outdoor recreation impacts.</p>	<p>GOAL/OBJECTIVE TES9: Conserve piping plover populations</p> <p>Action 4.1-27: Conduct bi-weekly surveys for piping plover and during the breeding season census window.</p> <p>Action 4.1-28: Protect piping plover nests and habitat from training and outdoor recreation impacts.</p> <p>Action 4.1-29: Report plover sightings to NCWRC.</p>
American Alligator	
<p>OBJECTIVE TES12: Maintain current data on American alligator population</p> <p>Action 4-54: Continue yearly surveys for alligators in likely habitat.</p>	<p>GOAL/OBJECTIVE TES10: Maintain current data on American alligator population</p> <p>Action 4.1-30: Cooperate with any State surveys in the New River and tributaries.</p>

No Action Alternative (2007 INRMP) ¹	Proposed Action (2015 INRMP)
Hirst's Panic Grass	
	<p>GOAL/OBJECTIVE TES11: Promote recovery of Hirst's panic grass</p> <p>Action 4.1-31: Annually implement monitoring protocol for Hirst's panic grass.</p> <p>Action 4.1-32: Conduct habitat management actions to maintain and enhance Hirst's panic grass sites at Camp Lejeune when necessary.</p>
Red Knot	
	<p>GOAL/OBJECTIVE TES12: Promote recovery of red knot through continued protection of habitat and monitoring</p> <p>Action 4.1-33: Protect sensitive habitats on the south end of Onslow Beach.</p> <p>Action 4.1-34: Conduct biweekly shorebird surveys.</p>
Species at Risk	
<p>OBJECTIVE COM1: Integrate consideration of at-risk species and natural communities into management to avoid further restrictions on military training</p> <p>Action 5-01: Designate Conservation Areas (when such protection does not interfere with military training requirements).</p> <p>Action 5-02: Monitor species at risk.</p> <p>Action 5-03: Consider the eight high priority natural community types in conservation management.</p> <p>Action 5-04: Post waterbird nest sites to discourage pedestrian traffic.</p> <p>Action 5-05: Continue necessary predator control to protect shorebirds and colonial nesting waterbirds, and implement control strategies as needed.</p>	<p>OBJECTIVE SAR1: Identify, monitor, and manage Species at Risk (SAR) and the habitats in which they occur</p> <p>Action 4.1-38: Conduct SAR inventories prior to land-disturbing activities that may threaten their occurrence. When consistent with the military mission, avoid and minimize impacts on SAR through the NEPA process.</p> <p>Action 4.1-39: Monitor SAR populations on the Installation, in collaboration with the USFWS and NCWRC.</p> <p>Action 4.1-40: Implement ecosystem management practices that support the conservation and management of habitat for SAR.</p>

No Action Alternative (2007 INRMP) ¹	Proposed Action (2015 INRMP)
Marine Mammals	
	<p>GOAL/OBJECTIVE MAR1: Support coastal initiative efforts through impact and avoidance minimization</p> <p>Action 4.1-41: Minimize impacts on endangered species and marine mammals through involvement with the project planning and design process.</p> <p>Action 4.1-42: Evaluate the relative impacts of project alternatives on federally-listed species/marine mammals and identify potential impact mitigation measures.</p> <p>Action 4.1-43: Solicit NMFS/USFWS input during the planning and design phases through ESA/MMPA consultations.</p>
Forest Management	
<p>OBJECTIVE FOR1: Develop, maintain and utilize current timber data to effectively manage the forest</p> <p>Action 7-01: Develop annual Long Range Silvicultural Prescription Plan (LRSPP).</p> <p>Action 7-02: Implement LRSPP.</p> <p>Action 7-03: Maintain current and post-harvest timber data.</p> <p>Action 7-04: Maintain/upgrade GIS custom tools to adapt to changing data and management processes.</p> <p>Action 7-20: Maintain a continuous forest inventory on a 10 year schedule.</p> <p>OBJECTIVE FOR2: Manage the forest to promote a healthy, natural forest ecosystem</p> <p>Action 7-05: Utilize pre-commercial thinning.</p> <p>Action 7-06. Utilize intermediate thinning.</p> <p>Action 7-07. As needed, utilize sanitation and/or salvage harvests.</p> <p>Action 7-08. Control southern pine beetle infestations.</p> <p>OBJECTIVE FOR3: Integrate mission-critical conservation issues with forest management</p> <p>Action 7-09: Reduce the number of acres bedded and/or root-raked to minimize disturbance to desired intact ground cover.</p>	<p>GOAL/OBJECTIVE FOR1: Manage forests to support the military mission and promote a healthy and natural forest ecosystem</p> <p>Action 4.2-01: Develop and implement the ASPP.</p> <p>Action 4.2-02: Restore and manage longleaf pine to its historic range in accordance with the 2003 red-cockaded woodpecker Recovery Plan and consistent with the military mission.</p> <p>Action 4.2-03: Align forest management practices with the military mission through coordination and planning, ensuring forest management practices are accomplished while eliminating or minimizing negative impacts on the military mission.</p> <p>GOAL/OBJECTIVE FOR2: Promote responsible timber harvesting</p> <p>Action 4.2-04: Follow Best Management Practices (2006 NC Division Forest Resources) for all forestry-related activities.</p> <p>Action 4.2-05: Monitor timber harvest and regeneration operations to ensure contract requirements are met.</p> <p>GOAL/OBJECTIVE FOR3: Manage for multiple uses of forest lands</p> <p>Action 4.2-06: Provide a forested environment that meets the needs of the military mission and provides accessibility for recreation opportunities, while ensuring compliance with applicable laws, regulations, and orders.</p> <p>Action 4.2-07: Provide an optimum yield of sustainable forest products.</p>

No Action Alternative (2007 INRMP) ¹	Proposed Action (2015 INRMP)
<p>Action 7-10: Maintain/upgrade the Ecosystem Management Model as management and data processes/requirements change.</p> <p>Action 7-11: Utilize the shelterwood and small patch clearcut methods of natural regeneration for longleaf pine.</p> <p>OBJECTIVE FOR4: Promote responsible timber harvesting</p> <p>Action 7-12: Use Best Management Practices (1989 NC Division Forest Resources) for all forestry-related activities.</p> <p>Action 7-13: Ensure timber marking compliance.</p> <p>Action 7-14: Ensure timber sales contract compliance.</p> <p>OBJECTIVE FOR5: Restore the longleaf pine ecosystem to its historical range based on the Ecological Classification System</p> <p>Action 7-15: Restore forest structure to a condition more typical of an open longleaf pine by thinning to 60-foot basal area.</p> <p>Action 7-16: Experiment with groundcover restoration by collecting native seeds and broadcast planting on degraded areas.</p> <p>Action 7-17: Experiment with planting of longleaf pine under loblolly pine stands to retain suitable red-cockaded woodpecker forage habitat.</p> <p>OBJECTIVE FOR6: Manage for multiple uses of forest lands</p> <p>Action 7-18: Provide a sustainable flow of timber products.</p> <p>Action 7-19: Promote hard mast producing species.</p>	
<p>Forest Protection (2007 INRMP)/Wildland Fire Conservation (2015 INRMP)</p>	
<p>OBJECTIVE PRO1: Prescribe fire to promote wildlife habitat, restore natural communities, and manage fuel-loads</p> <p>Action 8-01: Prescribe burn an average of 20-25K acres annually.</p> <p>Action 8-02: Increase growing season burning to one fourth of total acres treated by prescribed burning per year.</p> <p>Action 8-03: Implement the prescribed burning prioritization model.</p> <p>OBJECTIVE PRO2: Maintain forest protection database in support of management</p> <p>Action 8-04: Collect and maintain data on Southern Pine Beetle infestations.</p>	<p>OBJECTIVE WLF1: Integrate prescribed fire with the military mission to support training and natural, healthy ecosystems</p> <p>Action 4.3-01: Implement annual prescribed burn plan.</p> <p>Action 4.3-02: Monitor long-term changes in landscape conditions.</p> <p>OBJECTIVE WLF2: Manage forests to reduce loss of training time and potential damage to Camp Lejeune and private property due to wildfire</p> <p>Action 4.3-03: Implement Wildland Fire Management Plan.</p> <p>Action 4.3-04: Support the annual table-top exercise to coordinate incident management strategies in response to wildland fires at Camp Lejeune.</p>

No Action Alternative (2007 INRMP) ¹	Proposed Action (2015 INRMP)
<p>Action 8-05: Collect and maintain data in the Gypsy Moth Trapping program.</p> <p>Action 8-06: Collect and maintain data on prescribed burning and wildfire activity.</p> <p>Action 8-07: Maintain fire weather stations and weather data.</p> <p>OBJECTIVE PRO3: Reduce impacts from wildland fire suppression actions.</p> <p>Action 8-08: Apply limited suppression strategies to wildfires when safe and appropriate.</p> <p>Action 8-09: Minimize plow lines.</p> <p>OBJECTIVE PRO4: Mitigate wildland fire hazards in the urban interface</p> <p>Action 8-10: Perform selective harvests and mechanical vegetation control to provide defensible space in identified high hazard areas.</p> <p>OBJECTIVE PRO5: Track long-term changes in landscape conditions</p> <p>Action 8-11: Install a series of basewide photo points.</p>	
Fish and Wildlife Management	
<p>OBJECTIVE WLF1: Maintain an appropriate balance of managed forest openings throughout the Camp Lejeune landscape</p> <p>Action 11-01: Develop annual wildlife clearing management plan.</p> <p>Action 11-02: Manage wildlife clearings.</p> <p>OBJECTIVE WLF2: Provide quality and sustainable hunting opportunities by monitoring and managing populations of game species.</p> <p>Action 11-03: Conduct annual surveys for important game species.</p> <p>Action 11-04: Collect data from harvested game animals.</p> <p>Action: 11-05: Maintain NCWRC Cooperator Agent Status for data reporting.</p> <p>Action 11-06: Manage green-tree reservoirs and impoundments.</p> <p>Action 11-07: Manage artificial nest boxes for wood ducks.</p> <p>Action 11-08: Continue cooperation with North Carolina Wildlife Resources Commission (NCWRC) on restricted airspace access for over-wintering waterfowl surveys.</p>	<p>OBJECTIVE FWL1: Manage fish and wildlife habitat to support game species</p> <p>Action 4.4-01: Manage food plots in support of the game management program.</p> <p>Action 4.4-02: Manage freshwater fishing ponds.</p> <p>Action 4.4-03: Conduct annual surveys for game species, including wild turkey, American woodcock, and northern bobwhite and contribute data to state resource managers.</p> <p>Action 4.4-04: Continue antler-restriction harvest strategy in Hunting Zone 2 to reduce the harvest of immature bucks, and increase hunter opportunity for taking mature deer.</p> <p>Action 4.4-05: Retain mast-producing trees when harvesting timber, where it does not conflict with other habitat management requirements.</p>

No Action Alternative (2007 INRMP) ¹	Proposed Action (2015 INRMP)
<p>OBJECTIVE WLF3: Provide quality and sustainable fishing opportunities by managing recreational fishing ponds and populations of game fishes</p> <p>Action 11-09: Manage shoreline vegetation to promote access for fishing.</p> <p>Action 11-10: Manage aquatic vegetation to promote access for fishing.</p> <p>Action 11-11: Stock game fish within managed Base ponds.</p> <p>Action 11-12: Manage pond shoreline depths and water control devices.</p> <p>Action 11-13: Conduct annual fishing creel surveys.</p> <p>Action 11-14: Monitor fish population levels within ponds.</p> <p>OBJECTIVE WLF4: Conserve sensitive animal species and species that are indicators of habitat and ecosystem health</p> <p>Action 11-15: Conduct annual amphibian surveys.</p> <p>Action 11-16: Maintain artificial nest boxes for blue birds, purple martins, and other non-game species.</p> <p>Action 11-17: Survey natural freshwater depression ponds for native and endemic fishes.</p> <p>OBJECTIVE WLF5: Protect the health and safety of Installation tenants and aircraft from the threats of bird-animal aircraft strike hazards (BASH), disease, animal-vehicle collisions, poisonous plants or animals, and general nuisance situations</p> <p>Action 11-18: Implement BASH Program.</p> <p>Action 11-19: Implement Wildlife Damage Management/Control program.</p> <p>Action 11-20: Maintain updated Special Airfield Depredation permits.</p> <p>Action 11-21: Update other Special Depredation permits to address wildlife damage control situations.</p> <p>Action 11-22: Develop educational materials for base residents and other tenants on preventative measures to reduce wildlife/human interactions.</p> <p>Action 11-23: Respond to nuisance wildlife complaints.</p> <p>OBJECTIVE WLF6: Eliminate invasive exotic species from Camp Lejeune in order to conserve and enhance native flora and fauna and the functional value of natural systems</p>	<p>OBJECTIVE FWL 2: Conserve and promote non-game wildlife and their habitats</p> <p>Action 4.4-06: Continue programs that benefit non-game wildlife including nest box programs for species such as eastern blue birds and purple martins, cover board surveys for reptiles, and calling amphibian survey routes.</p> <p>Action 4.4-07: Perform annual surveys and monitor population trends for non-game wildlife.</p> <p>OBJECTIVE FWL 3: Manage nuisance wildlife to protect the health and safety of tenants on Camp Lejeune</p> <p>Action 4.4-08: Trap and remove nuisance wildlife.</p> <p>Action 4.4-9: Coordinate depredation actions required for nuisance wildlife management with the NCWRC and USFWS.</p> <p>Action 4.4-10: Provide guidance to installation personnel to assist them in solving problems associated with nuisance wildlife.</p> <p>OBJECTIVE BAS1: Implement BASH Plan per MCAS ASO 3710.40C</p> <p>Action 4.6-01: Continue wildlife management programs, including survey, harassment, relocation, and depredation of BASH species as well as maintenance of permits for Migratory Bird Depredation, Special Airport Depredation, and Bald Eagle Depredation, and other permits.</p> <p>Action 4.6-02: Manage habitat on and around air fields and landing zones in a manner that minimizes bird-animal strike hazards.</p> <p>GOAL/OBJECTIVE INV1: Continue implementation of the Invasive Species Management Plan to survey, control, and monitor invasive species at Camp Lejeune in order to conserve and enhance native flora and fauna and maintain quality habitat for the military training mission</p> <p>Action 4.10-1: Monitor non-native and exotic invasive plant and animal species on Camp Lejeune.</p> <p>Action 4.10-2: Implement necessary control actions on known populations of non-native and exotic infestations of invasive species.</p>

No Action Alternative (2007 INRMP) ¹	Proposed Action (2015 INRMP)
<p>Action 11-24: Monitor non-native and exotic invasive plant and animal species on Camp Lejeune.</p> <p>Action 11-25: Implement necessary control actions on known populations of non-native and exotic infestations of invasive species.</p> <p>Action 11-26: Establish and monitor sentinel site for invasive cactus moth.</p>	
Migratory Birds	
<p>OBJECTIVE MIG1: Support the conservation and management of migratory birds and their habitat</p> <p>Action 6-01: Participate in/conduct annual Audubon Christmas Bird Count.</p> <p>Action 6-02: Participate in/conduct annual International Migratory Bird Day summer bird count.</p> <p>Action 6-03: Conduct coordinated waterfowl and shorebird surveys in support of South Atlantic Migratory Bird initiative.</p> <p>Action 6-04: Promote the restoration of native warm season grass habitats with as much associated longleaf pine forest habitat as feasible.</p> <p>Action 6-05: Exclude timber harvesting in bottomland hardwood drains.</p>	<p>OBJECTIVE MIG1: Continue land management activities in support of military training through conservation and management of migratory birds and their habitat</p> <p>Action 4.5-01: Conduct annual migratory bird surveys, including planning level surveys that support long range master planning efforts and migratory bird conservation initiatives.</p> <p>Action 4.5-02: Protect priority migratory bird habitats where such protections provide a benefit to species and can be integrated with training activities.</p>
Wetlands	
<p>OBJECTIVE WET1: Integrate wetland conservation into Camp Lejeune's facility and range development process</p> <p>Action 09-01: Delineate wetlands and update Camp Lejeune's GIS wetland layer.</p> <p>Action 09-02: Comply with Section 404 Clean Water Act permits issued by the US Army Corps of Engineers for DOD action on Camp Lejeune.</p> <p>Action 09-03: Identify and develop suitable wetland restoration areas.</p> <p>OBJECTIVE WET2: Conserve wetlands so that training lands remain available for military training</p> <p>Action 09-04: Monitor sensitive wetland areas to ensure impacts are minimized/mitigated.</p> <p>OBJECTIVE WET3: Establish full success criteria in the GSRA Mitigation Bank</p>	<p>OBJECTIVE WET1: Integrate wetland conservation into Camp Lejeune's facility and range development process</p> <p>Action 4.7-01: Delineate wetlands and update Camp Lejeune's GIS wetland layer.</p> <p>Action 4.7-02: Comply with Section 404 Clean Water Act permits issued by the US Army Corps of Engineers for DOD action on Camp Lejeune.</p> <p>Action 4.7-03: Perform Annual Inspections of the GSRA Mitigation Bank.</p> <p>OBJECTIVE WET2: Conserve wetlands so that training lands remain available for military training</p> <p>Action 4.7-04: Implement standard operating procedures for off road vehicle movement to minimize impacts on wetlands. Monitor sensitive wetland areas to ensure impacts are minimized/mitigated.</p>

No Action Alternative (2007 INRMP) ¹	Proposed Action (2015 INRMP)
<p>Action 09-05: Continue maintenance and monitoring of the GSRA Mitigation Bank until performance criteria are met.</p> <p>Action 09-06: Perform Annual Inspections of the GSRA Mitigation Bank</p>	<p>Action 4.7-05: Use Best Management Practices when maintaining vegetation on live-fire ranges, helicopter landing zones, parachute drop zones, runway clear zones, and other mission-support openings.</p>
Coastal Resources	
	<p>GOAL/OBJECTIVE COA1: Manage, protect, and preserve coastal resources</p> <p>Action 4.8-01: Support oyster management in the New River Estuary (NRE) by providing North Carolina Division of Marine Fisheries access to store oyster shell (at Mile Hammock Bay) used for oyster cultch planting in sites at selected locations in the NRE and support public access to existing Division of Marine Fisheries Shellfish Management Areas for shellfishing and fishing consistent with the military mission.</p> <p>Action 4.8-02: Implement living shoreline stabilization projects along the New River where site conditions support shoreline protection and habitat restoration designs.</p> <p>Action 4.8-03: Stabilize, enhance, protect and restore coastal dunes using native vegetation and other approved methods within the training section of the beach.</p> <p>Action 4.8-04: Implement and monitor seasonal beach driving restrictions.</p> <p>Action 4.8-05: Participate in the planning process for range development projects in the coastal zone to help avoid and minimize impacts on coastal resources.</p> <p>Action 4.8-06: Develop a monitoring program for the purpose of evaluating the effect of “splash points” on the surrounding wetlands and to develop measures to counter those effects.</p> <p>Action 4.8-07: Evaluate the feasibility of a “Thin Layer Disposal Project” to restore saltmarsh and promote barrier island stabilization.</p>

No Action Alternative (2007 INRMP) ¹	Proposed Action (2015 INRMP)
Soils	
<p>OBJECTIVE SOI1: Integrate training and other mission requirements for land use with sound natural resources management</p> <p>Action 10-01: Monitor training effects on soils and coastal dunes.</p> <p>Action 10-02: Close selected areas to training use for restoration and recovery of eroded sites.</p> <p>OBJECTIVE SOI2: Restore eroded sites</p> <p>Action 10-03: Use native warm season grasses where practical in restoring eroded sites.</p> <p>Action 10-04: Implement soil conservation, restoration and maintenance projects.</p> <p>Action 10-05: Implement shoreline stabilization projects along New River.</p> <p>OBJECTIVE SOI3: Stabilize coastal dunes for training and natural resources</p> <p>Action 10-06: Stabilize, enhance, protect and restore coastal dunes using native vegetation and other approved methods within the training section of the beach.</p>	<p>OBJECTIVE SOI1: Integrate training and other mission requirements for land use with sound natural resources management</p> <p>Action 4.9-01: Monitor training effects on inland soils and in coastal areas, and use results to provide recommendations for restoration of eroded sites/soil conservation.</p> <p>Action 4.9-02: Place selected eroded sites in a closed or limited use status during restoration/rehabilitation and maintenance repair projects.</p> <p>Action 4.9-03: Use an interdisciplinary approach to review proposed actions at Camp Lejeune for all land-disturbing projects that will impact one acre or more of land.</p> <p>Action 4.9-03: Improve the maneuver trails network including splash points and other hardened sites to facilitate mechanized training requirements.</p>
Outdoor Recreation	
<p>OBJECTIVE REC1: Manage access of general public to Camp Lejeune’s conservation program</p> <p>Action 12-1: Promote general public awareness of conservation-based recreational opportunities on Camp Lejeune.</p> <p>Action 12-2: Provide boat-launching access to the general public.</p> <p>Action 12-3: Provide hunting and fishing opportunity to general public.</p> <p>OBJECTIVE REC2: Provide mission compatible hunting and fishing opportunities for military personnel and their dependents, civilian employees, and their sponsored guests</p> <p>Action 12-04: Provide hunting and fishing opportunities to authorized patrons.</p> <p>Action 12-05: Create designated disabled person hunting areas.</p> <p>Action 12-06: Enforce BO 5090.115.</p> <p>Action 12-07: Sponsor an annual youth fishing event.</p>	<p>OBJECTIVE REC1: Coordinate access of authorized personnel, their dependents, and sponsored guests to natural resources-based activities</p> <p>Action 4.11-01: Serve as the permitting agent for the sale/issuance of permits for hunting, fishing, trapping, off-road recreational vehicle use, and firewood collection on the Installation.</p> <p>OBJECTIVE REC2: Manage a safe and effective Conservation Law Enforcement program that integrates conservation management objectives with the military mission</p> <p>Action 4.11-02: Ensure conservation law enforcement officers maintain all certifications, licenses, and training necessary to meet Camp Lejeune conservation law enforcement program requirements.</p> <p>OBJECTIVE REC3: Provide opportunities for authorized personnel, their dependents, and sponsored guests to take part in natural resource-dependent outdoor recreation</p>

No Action Alternative (2007 INRMP) ¹	Proposed Action (2015 INRMP)
<p>OBJECTIVE REC3: Provide mission compatible and safe ORRV access to Onslow Beach Action 12-08: Monitor beach off-road recreation vehicle use.</p>	<p>Action 4.11-03: Schedule and coordinate organized annual sporting events, including the Commanding Officer’s Invitational Deer Hunts and Youth Fishing Day.</p> <p>OBJECTIVE REC4: Provide natural resource-dependent outdoor recreation opportunities for persons with disabilities Action 4.11-04: Plan and host special hunts for disabled veterans and other persons with disabilities.</p> <p>OBJECTIVE REC5: Promote natural resource conservation awareness and education Action 4.11-05: Continue participation in conservation outreach initiatives through natural resource-based lectures and presentations at Camp Lejeune Dependent Schools, local community schools and colleges, conservation groups, and special events. Action 4.11-06: Provide instruction to authorized personnel on hunter-based educational programs, including hunter safety courses and archery skills training. Action 4.11-07: Continue to support the Camp Lejeune Conservation Volunteer Program by providing opportunities for volunteers to participate in projects that are consistent with the Installation’s INRMP and mission objectives.</p>
<p>Regional Conservation</p>	
<p>OBJECTIVE CON1: Promote compatible land use and regional habitat conservation with the Onslow Bight Conservation Forum participants, local governments, and others Action 13-01: Continue participation in Onslow Bight meetings. Action 13-02: Refine and update Onslow Bight Conservation design. Action 13-03: Collaborate to identify encroachment partnering opportunities. Action 13-04: Pursue an agreement with USFWS and NCWRC regarding red-cockaded woodpecker habitat conservation off base.</p>	

No Action Alternative (2007 INRMP) ¹	Proposed Action (2015 INRMP)
Conservation Outreach/Education	
<p>OBJECTIVE EDU1: Inform Marines as to the legal and ecological basis for Federal and State environmental laws, DOD Instructions, Marine Corps Orders (MCOs), Base Orders (BOs), and other regulations and instructions</p> <p>Action 14-01: Design and implement an environmental syllabus for different stages of a Marine's career at Camp Lejeune.</p> <p>Action 14-02: Develop protocol to educate visiting foreign units prior to their use of Camp Lejeune.</p> <p>OBJECTIVE EDU2: Provide environmental and conservation education and opportunities to civilian employees, contractors, and the families of marines</p> <p>Action 14-03: Sponsor a Conservation Volunteer Program.</p> <p>Action 14-04: Integrate environmental education into new employee orientation.</p> <p>Action 14-05: Insert environmental considerations clause into contractual documents.</p> <p>Action 14-06: Conduct television interviews and radio shows for the base TV channel.</p> <p>Action 14-07: Develop a program of field trips and presentations to offer to Camp Lejeune DOD and Onslow County schools.</p>	
<p>Notes:</p> <p>1. Some actions were listed under more than one objective. In this table, such actions are shown only once and are listed under the objective to which they originally belonged.</p>	

3.0 EXISTING CONDITIONS AND ENVIRONMENTAL CONSEQUENCES

This chapter provides a summary description of existing resources identified in Section 1.5 and an analysis of the potential impacts of implementing the No Action Alternative or the Proposed Action Alternative. Information on existing conditions is based upon the 2015 INRMP unless otherwise specified. Only the impacts of implementing the existing and proposed INRMP management measures are considered. The impacts of ongoing or planned military training operations and base development or maintenance activities have been or will be addressed in separate NEPA documentation, as applicable. The impacts of the Proposed Action Alternative are assessed relative to those of the No Action Alternative, that is, continued implementation of the 2007 INRMP. The impacts of the No Action Alternative are described mostly based on the analyses in the EA prepared to evaluate the impacts of the 2007 INRMP, while the assessment of the impacts of the Proposed Action Alternative focuses on the anticipated differences between the two plans.

3.1 Land Use

3.1.1 Existing Conditions

3.1.1.1 Camp Lejeune Range Complex

Camp Lejeune encompasses more than 143,000 acres including an administrative cantonment area, air station, impact areas, training and maneuver areas, drop zones, tactical landing zones (TLZs), gun positions, and outlying landing fields. The cantonment area, which contains most of the installation infrastructure including offices, housing, and operational facilities, occupies about 17,000 acres on Mainside.

Consistent with the base's mission, most of it is dedicated to supporting military training. Camp Lejeune has 98 active ranges and three munitions impact areas, most of which are scheduled for daily training exercises. Live-fire ranges occupy approximately 40,000 acres, or 27 percent of the base, while the three impacts areas (G-10, K-2, and BT-3) cover a total of about 11,500 acres. There are also 96 training areas (TAs) on Camp Lejeune, divided into five major blocks with sub-training areas, 47 Tactical Landing Zones, and 10 major drop zones. Tactical Landing Zones and Drop Zones are multiple use areas often containing artillery gun positions. Altogether, training uses occupy almost 96,000 acres.

In addition, Camp Lejeune has eleven water training areas and two ocean training areas adjacent to the training beaches. Camp Lejeune maintains 10.3 nautical miles of Onslow Beach to support amphibious operations. The New River fulfills the Marine Corps' requirement to conduct combat and combat support operations in shallow waters.

Training areas at Camp Lejeune currently support:

- Amphibious Assault Vehicles, Landing Craft Air Cushion, and Landing Craft Utility
- Amphibious raids
- Platoon-level and below mechanized training and movement
- Aviation fires, with delivery parameter (altitude/standoff) limitations
- Most supporting arms, except live fixed-wing ordnance and un-segmented combined arms training.

The training areas at Camp Lejeune are largely undeveloped and rich in natural resources, creating a particularly tight connection between natural resources management and use of the land for military training. Training areas are typically vegetated with pine forest and undergrowth of variable density, dotted with pocosin swamps and wetlands. The vegetation, climate, growing season, and high water table characteristics of these land range assets supply an excellent setting for maneuver, live-fire, amphibious, and tactical training.

3.1.1.2 Regional Land Use

Onslow County encompasses 767 square miles, 42 percent of which belongs to three government-owned facilities: Camp Lejeune, Hofmann Forest, and Hammock Beach State Park (Navy and Camp Lejeune, January 2009). The remaining 448 square miles (58 percent) of the total area is under Onslow County's regulatory jurisdiction. Government-owned facilities are not considered as regional land use as these areas are outside of Onslow County jurisdiction.

Onslow is primarily rural as only a small portion of the county is developed. Land uses in the undeveloped portions of the county include forested lands, much of which are designated as wetlands and agricultural lands (Onslow County Planning Department, March 2000). Of the developed area in Onslow County, the primary land use is residential and the remaining minority is a mix of commercial and industrial.

Residential development in Onslow County is concentrated in the Jacksonville area, north of Camp Lejeune, and the county's several smaller municipalities. Commercial and industrial uses are concentrated within the incorporated areas, with the city of Jacksonville serving as the county seat of government. Jacksonville is the county's commercial center and accommodates its only industrial park. Incorporated areas such as Jacksonville implement their own zoning regulations with an extension of these controls one mile beyond their borders.

3.1.2 Effects on Land Use - No Action Alternative

Under the No Action Alternative, natural resources at Camp Lejeune would continue to be managed in accordance with the 2007 INRMP. The Sikes Act requires periodic reviews of the INRMP at intervals not to exceed five years. Because of the tight connection between military training and natural resources management at Camp Lejeune, regular updates to the INRMP are

essential if the INRMP is to remain an effective mission sustainability tool over the long term. This is because training needs evolve over time and with them, land use needs.

Future land use needs at Camp Lejeune stem from the ongoing force reduction process, which aim to result in a force of 182,000 by 2017, down from 202,000, and the parallel effort of the Marine Corps to strategically design this reduced force based on four principles: (1) be modernized, ready, and based for action, (2) be integrated into the joint force structure, (3) be genuinely expeditionary, and (4) be right-sized while retaining core combined arms and amphibious structures and competencies.

The challenge of restoring combined arms proficiency is particularly acute at the individual unit, Marine Expeditionary Unit (MEU), and Marine Expeditionary Brigade (MEB) levels. As such, the II MEF has supported the development of a Combined Arms and Amphibious Assault Capability (CAAAC) on Mainside and a Tactical Vehicle Maneuver Capability (TVMC) in the GSRA that will allow II MEF tactical maneuver forces to train in individual and (subsequent) unit level collective skills with live-fire in the GSRA. Other, related needed improvements include Unmanned aircraft system (UAS) operations.

As a result, future land use at Camp Lejeune will need to accommodate missions such as:

- Amphibious assault and subsequent operations ashore
- Live-fire engagement of targets by maneuver forces
- Modern fixed-wing precision guided munitions delivery
- Artillery live-fire options in the G-10 and K-2 areas
- Armor and tactical vehicle maneuver and employment
- Mechanized Infantry maneuver and employment

The natural resources management approach in the 2007 INRMP would not appropriately support these future needs. In the medium or long term, this would result in a growing inadequacy between land uses on the base and training requirements, as outdated natural resources management approaches would impede the provision of needed training infrastructure or the performance of certain training operations, undermining Camp Lejeune's ability to optimally use its land to support its mission. Thus, the No Action Alternative would have an adverse impact on land use at Camp Lejeune. This impact would remain moderate in intensity, as many training needs would still be adequately met.

The No Action alternative would have no noticeable impacts on land use outside of Camp Lejeune. The base's natural resources management procedures have no or minimal potential to affect land uses outside the base and this would remain the case.

3.1.3 Effects on Land Use - Proposed Action Alternative

The 2015 INRMP update was prepared specifically to insure a balanced land use and land management approach that supports military operational and training needs while meeting natural resources regulatory requirements. The update translates military drivers into operational training themes and objectives and adjusts land use management to address deficiencies in training capabilities and conserve and enhance natural resources. The specific actions defined in the updated INRMP fully support these themes and objectives. Adoption and implementation of the update would allow Camp Lejeune to adequately support its future land use needs while remaining a good steward of its natural resources. Therefore, the Proposed Action Alternative would have a positive impact on land use on the base. As under the No Action Alternative, natural resources management procedures would continue to have no impacts on land uses outside Camp Lejeune.

3.2 Vegetation

3.2.1 Existing Conditions

3.2.1.1 Ecological Classification

To describe and support the management of its natural resources, Camp Lejeune has developed an ecological classification system based on a synthesis of available information on local climate, geology, soils, current vegetation, potential natural vegetation, fire regimes, and rare species occurrences.

At the local landscape level, ecological units termed “land types” are differentiated on the basis of landscape placement, hydrologic regime, and past and present vegetation communities. Land types are the basic units of ecological classification used on Camp Lejeune and are grouped into five associations:

- The Onslow Maritime Zone, along the shoreline of the Atlantic Ocean and Onslow Bay to the southeast of the base. This area is characterized by active beaches, barrier islands, and coastal rivers.
- The Bogue-Topsail Coastal Sandridge, just inland of the Onslow Maritime Zone. It is characterized by broad ridges and swales that reflect the remnant ocean shoreline and a large percentage of deep sandy, very poorly drained soils.
- The Stella White Oak Dissected Lowlands, characterized by interstream flats with low relief.
- The New River Dissected Uplands, to the east and west of the New River. It is characterized by upland terraces dissected by networks of numerous small streams and the New River.

- The Great Sandy Run Pocosin, which includes most of GSRA and is characterized by large peatlands bordered by very poorly drained mineral soils.

Land types are further subdivided into land type phases, which represent distinct soil or vegetation features within land types. On Camp Lejeune, the distribution of land types is correlated with patterns of disturbance and the occurrence of rare species and communities.

Table 3-1 lists and briefly describes the land types present at Camp Lejeune. The distribution of land types is shown in Figure 2-6 of the 2015 INRMP. Appendix 5 of the INRMP contains detailed descriptions of the different land types and land type phases.

Table 3-1: Land Types at Camp Lejeune

Camp Lejeune Land Type	Approximate Area Covered (Acres)	Description
Inland Tidal Marshes & Tidal Swamps	1,400	<p>This land type is restricted to the outer southeastern coastal plain on the furthest inland sites influenced by tidal waters. It occurs primarily in low lying floodplains adjacent to large rivers and a few major tributary streams. These wetlands are either flooded daily or are flooded frequently and have a water table at or near the surface throughout the year. They are influenced by fresh to slightly brackish water and occur on clay loams and deep muck soil. The potential natural vegetation dominants include both marsh plants such as sawgrass (<i>Cladium jamicense</i>), black needlerush (<i>Juncus roemerianus</i>), southern cattail (<i>Typha latifolia</i>), and swamp forest trees.</p> <p>In Onslow County this land type occurs along the New and White Oak rivers, Queens Creek, and a few major tributary streams. Outside of the base, it covers about 5,000 acres.</p>
Small Stream Swamps & Streamhead Pocosins	8,700	<p>This land type, with its gradient from pocosin streamheads to brackish tidal marsh at sea level estuaries, is peculiar to the outer southeastern coastal plain. These wetlands are seasonally to semi-permanently flooded, associated with small to moderately large streams, strongly fire-influenced only at their origin and where they empty into marshland, and occur on loamy to mucky loam soils. The potential natural vegetation dominants include Bald cypress (<i>Taxodium distichum</i>), Oaks (<i>Quercus laurifolia</i>, <i>Q. michauxii</i>), Swamp tupelo (<i>Nyssa biflora</i>), giant cane (<i>Arundinaria gigantea</i>), and pines (<i>Pinus taeda</i>, <i>P. serotina</i>).</p> <p>This land type is located throughout Camp Lejeune but is uncommon on the coastal sandridge. The most extensive small stream swamps and streamhead pocosins occur in Great Sandy Run. There are about 25,000 acres of it outside the base in Onslow County. This land type occurs along all tributaries of the New River, White Oak River, Shelter Swamp Creek, and Juniper Creek.</p>

Camp Lejeune Land Type	Approximate Area Covered (Acres)	Description
Drainage Slopes	8,800	<p>This land type occurs on side slopes along small to large streams and rivers, and in drainage headlands. These sites are above floodplains, have good drainage, are partly protected from periodic burning, and occur on soils having loamy or sandy texture. The potential natural vegetation dominants include oaks (<i>Q. stelata</i>, <i>Q. falcata</i>, <i>Q. alba</i>), hickories (<i>Carya glabra</i>, <i>C. tomentosa</i>), other hardwoods (<i>Liriodendron tulplifera</i>, <i>Oxydendrum orboreum</i>, <i>Carpinus caroliniana</i>, <i>Cornus florida</i>) and pines (<i>P. palustris</i>).</p> <p>This land type is common throughout Onslow and adjacent counties. In Onslow County, outside of Camp Lejeune, it covers over 23,000 acres. Within the base, it extends along all of the small tributaries of the New River on about 8,700 acres. In general, this type occurs anywhere there is a downcutting drainage and sufficient elevation to provide topographic relief.</p>
Interstream Flats	8,500	<p>This land type occurs throughout the southeastern coastal plain within the upland coastal terrace on broad interfluvs and narrow depressions in slightly convex landforms. These somewhat poorly to poorly drained sites are subject to occasional ponding of surface water in low places, periodic burning, and have loamy to sandy soils. The potential natural vegetation dominants include pond pine, longleaf pine, and loblolly pine, usually growing together in mixed stands.</p> <p>At Camp Lejeune, this land type occurs mostly in the GSRA. In Onslow County outside of Camp Lejeune, it covers over 53,000 acres.</p>
Pocosin Fringes	7,700	<p>This land type is restricted to the southeastern coastal plain, occurring on very poorly drained soils in peat-mantled uplands, and broad interstream flats. These wetlands have a seasonal high water table at or near the soil surface, water ponding during the winter, periodic burning (under natural fire regimes), and loamy or mucky loam soils. The potential natural vegetation dominants include giant cane, broadleaf evergreen shrubs and small trees (<i>Gordonia lasianthus</i>, <i>Persea palustris</i>, <i>Magnolia virginiana</i>, <i>Ilex glabra</i>, <i>Lyonia lucida</i>), and pond pine (<i>Pinus serotina</i>).</p> <p>The land type is most extensive in the GSRA Pocosin and east of Camp Lejeune at Horse Swamp. Outside the base, it covers about 36,000 acres in Onslow county. It is most often associated with pocosins.</p>
Broad Pocosins	16,800	<p>This land type is primarily restricted to the southeastern coastal plain from Virginia to Georgia, occurring in broad, shallow basins, in drainage basin heads, and on broad, flat uplands. These wetlands have long hydroperiods, temporary surface water, periodic burning, and soils of sandy humus, muck or peat. The potential natural vegetation dominants include broadleaf, evergreen shrubs (<i>Cyrilla racemiflora</i>, <i>Lyonia lucida</i>, <i>Ilex glabra</i>, <i>Myrica heterophylla</i>, <i>Smilax laurifolia</i>) and pines (<i>Pinus serotina</i>).</p> <p>The land type is most extensive in the GSRA Pocosin, north of Camp Lejeune in Hofmann Forest, and in Croatan National Forest. It covers about 33,000 acres in Onslow County outside the base.</p>

Camp Lejeune Land Type	Approximate Area Covered (Acres)	Description
Wet-Mesic & Wet Pine Savannas	17,800	<p>This land type occurs throughout the southeastern coastal plain in upland flats and interstream areas. These somewhat poorly to poorly drained sites have a seasonal high water table, periodic to frequent burning, and mostly sandy soils. The potential natural vegetation dominants include longleaf pine, pond pine, and wiregrass (<i>Aristida stricta</i>).</p> <p>The land type is most common in the GSRA Pocosin area. In Onslow County outside of Camp Lejeune, it extends over 42,000 acres.</p>
Mesic Pine Savannas	13,900	<p>This land type occurs throughout the southeastern coastal plain on upland terraces in broad flats and rolling topography. Sites are mesic, have a seasonal high water table within 1.5 to 2 feet from the soils surface, frequent burning, and are found on well-drained to moderately well-drained deep loam soils. These sites have optimal drainage and soil texture for agriculture and have been sought out for that purpose. The potential natural vegetation dominants include longleaf pine, wiregrass, and a diverse mixture of graminoids and forbs. Both loblolly pine and pond pine were common co-dominants but have now become the dominant species.</p> <p>This is one of the more extensive land type on Camp Lejeune and the most extensive type found outside it in Onslow county, where is covers over 85,000 acres. On the base, it is found primarily in the upland terrace and at the GSRA Pocosin.</p>
Xeric & Dry-Mesic Pine Savannas	24,300	<p>This land type occurs in the southeastern coastal plain on upland terraces, sandhills, and other undulating uplands. These xeric to dry-mesic habitats have a seasonal high water table below a depth of five feet, frequent burning, and are found on well-drained to excessively drained deep sands. The potential natural vegetation dominants include longleaf pine, wiregrass, and scrub oaks (<i>Quercus laevis</i>, <i>Q. incana</i>, <i>Q. marilandica</i>, <i>Q. margarettae</i>).</p> <p>The land type is the most extensive ecological type found on Camp Lejeune. It is the predominant type in the coastal sandridge and in the upland terrace on both sides of the New River. Outside of the Base in Onslow County, it occurs on about 32,000 acres.</p>
Maritime Influenced Woodlands & Savannas	7,400	<p>This land type occurs throughout the southeastern coastal plain within lowland terraces adjacent to ocean-influenced wetlands. These landscapes are a complex of excessively drained and well drained low ridges and somewhat poorly drained broad interstream flats. In general, all upland landscapes that are maritime-influenced are placed in this land type, including uplands fringing salt or brackish waters that are dominated by live oak communities. The potential natural vegetation dominants include live oak (<i>Quercus virginiana</i>), longleaf pine, pond pine, and loblolly pine.</p> <p>In Onslow County outside the base, this land type covers about 8,150 acres.</p>

Camp Lejeune Land Type	Approximate Area Covered (Acres)	Description
Maritime Dunes, Swales, & Marshes	3,600	This land type includes shores and dunes of barrier islands, margins of estuaries, other upland margins, and old flood tide deltas near closed inlets. These salt-influenced sea level wetlands and upland sand ridges are strongly influenced by daily tides and wind, and by periodic severe hurricanes and storm wave action. The dominant vegetation is graminoids (<i>Uniola paniculata</i> , <i>Panicum amarum</i> , <i>Eragrostis</i> spp., <i>Spartina patens</i>) and, in more stabilized area, shrubs and trees (<i>Juniperus virginiana</i> , <i>Quercus virginiana</i> , <i>Myrica cerifera</i> , <i>Iva Frutescens</i>).

3.2.1.2 Plant Communities

As indicated in the 2015 INRMP update, two inventories identifying plant communities were conducted in the 1990s by the North Carolina Natural Heritage Program (NCNHP) on Mainside and GSRA. The natural community types identified and described in these studies, including finer divisions of several of them, as well as several additional community types not described in the 1993 and 1994 surveys but subsequently identified at Camp Lejeune are the following (a description of each community is provided in Sections 2.3.6.1 through 2.3.6.29 of the 2015 INRMP update, including how the communities relate to the land types briefly described in Section 3.2.1):

- Mesic pine savanna
- Wet pine flatwoods
- Sandy pine savanna
- Wet loam pine savanna
- Pond pine woodland
- High pocosin
- Low pocosin (Titi subtype)
- Streamhead pocosin
- Pocosin opening (pitcher plant subtype)
- Small depression pocosin
- Small depression pond
- Cypress savanna
- Cypress savanna (depression meadow variant)
- Vernal pool
- Coastal plain small stream swamp
- Cypress-gum swamp
- Mesic mixed hardwood forest
- Dry oak-hickory forest
- Pine/scrub oak sandhill (mixed oak subtype)
- Pine/scrub oak sandhill (coastal fringe subtype)
- Xeric sandhill scrub
- Calcareous coastal fringe forest
- Coastal fringe evergreen forest
- Maritime evergreen forest
- Estuarine fringe pine forest
- Dune grass
- Salt marsh
- Brackish marsh
- Upper Beach

Pre-settlement vegetation at Camp Lejeune is thought to have consisted of pure longleaf pine (*Pinus palustris*) on sandy soils in fire exposed locations, loblolly pine (*P. taeda*) in bottomlands and swamps, pond pine (*P. serotina*) in peatlands and mineral soils, and mixtures of longleaf and

pond pine on moist savanna sites. The Camp Lejeune region has historically experienced frequent fires across much of the landscape. Areas such as upland sand ridges, upland flats, and much of the pocosin areas, where fires generally occurred on a 1- to 3-year intervals, developed fire-dependent plant communities, including the extensive pine savannas and pine flatwoods that dominate the forest landscape at Camp Lejeune today. Because of the area's complex topography, relatively fire-intolerant hardwood communities also developed on naturally protected sites such as steep slopes, ravines, and excessively wet areas. Examples include Cypress-Gum Swamps, Mixed Mesic Hardwoods, and Coastal Plain Small Stream Swamps. Because of its proximity to the coast and its 11-mile shoreline, several maritime communities also occur at Camp Lejeune, including Coastal Fringe Evergreen Forests, Dune Grass, and Salt Marsh.

Nearly all of the natural communities have been altered from their natural conditions because of the intensive longleaf pine harvesting that occurred up to the late 1800s and subsequent conversion to loblolly pine and slash pine (*P. elliotii*) plantations, fire exclusion, and agriculture. Loblolly pine is the dominant species in approximately 60 percent of the pine stands on Camp Lejeune. Blackgum (*Nyssa sylvatica*) is the dominant hardwood species in the bottomland hardwood stands (USMC, 2009).

The base's Forest Management Section has been actively conducting prescribed burns across much of the forested landscape since the early 1970s and restoring longleaf habitat since the late 1980s. Longleaf restoration in a landscape dominated by loblolly pine can be difficult, however, and is complicated by factors such as soil wetness, ground cover, and requirements pertaining to other species such as the red-cockaded woodpecker.

3.2.1.3 Invasive Species and Pest Species

An invasive species survey was conducted at Camp Lejeune between March and December 2008. At least 25 invasive plant species were identified and mapped, totaling nearly 600 acres. Japanese stiltgrass (*Microstegium vimineum*), Chinese wisteria (*Wisteria sinensis*), common reed (*Phragmites australis*), privet (*Ligustrum* spp.), and kudzu (*Pueraria montana*) were the most abundant species; however, mimosa (*Abizia julibrissin*) also occurred very frequently. Florida betony (*Stachys floridana*) and dodder (*Cuscuta* spp.) were the only noxious weeds observed. Figure 4-43 of the 2015 INRMP shows invasive plant species locations.

Diseases that affect forest trees on Camp Lejeune are not considered to be problematic. Fusiform rust, caused by the fungus *Cronartium fusiforme*, is the most common disease infecting southern pines in the Camp Lejeune area. The disease can be especially damaging to slash pine and loblolly pine. The Southern Pine Beetle (*Dendroctonus frontalis*) is an insect pest that has historically caused extensive damage to forest resources on Camp Lejeune. The beetle is always present but causes major problems only when its population levels increase substantially. Population increases are normally in response to stress placed on trees from drought,

windstorms, or hurricanes. Maintaining healthy, vigorously growing trees helps preventing outbreaks. The Forest Protection staff conducts beetle surveys every summer. Additionally, Camp Lejeune actively manages a gypsy moth (*Lymantria dispar*) trapping program. Each summer, gypsy moth traps are deployed and monitored in recreation and housing areas at Camp Lejeune. Since 2005, forestry personnel have trapped one confirmed and one suspected gypsy moth. No defoliations have been documented to date.

3.2.2 Effects on Vegetation - No Action Alternative

Under the No Action Alternative, the management goals and activities established in the 2007 INRMP would remain in effect and natural resources, including vegetation, would continue to be managed as they have been since 2007. The impacts of the 2007 INRMP on vegetation were assessed in the accompanying EA. The 2007 EA found that the fire-adapted terrestrial systems on Camp Lejeune would benefit from the implementation of the 2007 INRMP. This would continue to be the case under the No Action Alternative evaluated in this EA.

Most of the management objectives and actions that would continue to be operative under the No Action Alternative - those pertaining to sea turtles, seabeach amaranth, bald eagle, piping plover, American alligator, Species at Risk, migratory birds, wetlands, soils, outdoor recreation, regional conservation; and conservation outreach/education - would have no adverse impacts on vegetation at Camp Lejeune or would have small, indirect beneficial impacts as they would indirectly contribute to conserving vegetation or favor native over non-native species.

In the long term, fish and wildlife management activities also would have a beneficial effect on vegetation communities at Camp Lejeune, as they would continue to maintain or enhance habitats for the managed species and minimize impacts from ongoing and future training operations. However, some specific activities involving the control or suppression of vegetation would likely result in minor, localized adverse effects on existing plants: these include the management of shoreline vegetation to allow for fishing access and implementation of the BASH program. Measures for the elimination of invasive species may directly or indirectly affect non-targeted plants. Rough-leaved loosestrife management also could have some adverse effects on vegetation through the implementation of mechanical treatment or prescribed burning of habitat areas that would be intended to protect or favor this species but would result in the eradication of other plants. In all cases, the small size of the affected areas and overall long-term beneficial impacts of the measures under consideration make those short-term impacts negligible.

Some other measures would have more noticeable, although still minor, short-term adverse impacts on vegetation. Thus, red-cockaded woodpecker management measures such as longleaf pine restoration in accordance with the 2003 Recovery Plan, the removal of canopy hardwood trees, the thinning of pine trees, and the mechanical treatment of midstory vegetation would directly adversely affect the targeted vegetation and may have indirect adverse impacts through damage by mechanical equipment or changes in hydrology from ruts or soil compaction.

However, in the longer term, these actions also would have beneficial impacts, for instance by providing increased sunlight for an herbaceous layer that supports forage for wildlife, habitat for invertebrate and small mammal species, and fuel for prescribed burning. Overall, any short-term adverse impacts would continue to be more than offset by the long-term positive effects, as red-cockaded woodpecker management efforts would contribute to mitigating the effects of post-settlement disturbance on vegetation communities and help recreate native ecosystems on portions of the base.

Careful forest management would continue to ensure the sustainability of forest resources at Camp Lejeune in the long term. Measures to restore longleaf pine to its historic range would also have a long-term positive impact on vegetation at Camp Lejeune. Direct and indirect short-term adverse impacts from timber harvesting and longleaf pine restoration may include the destruction of understory or midstory plants by mechanical equipment or changes in hydrology from ruts or soil compaction. However, such impacts would be minimized through the implementation of forestry best management practices for all forestry-related activities and would be temporary and localized.

Application of prescribed fire would continue to bring fire return intervals closer to pre-settlement patterns and encourage longleaf pine regeneration. The resulting mosaic of pine species would continue to support plant and wildlife species diversity and help to ensure the perpetuation of the pine ecosystem for species dependent on it. The destruction of non-fire resistant plants within the burn areas would be a minor, unavoidable short-term adverse impact, but would be largely offset by the long-term benefit to the global ecosystem on Camp Lejeune. The continuation of ongoing effort to monitor and address, as needed, diseases and pests, including the Southern pine beetle, would benefit tree and plant health in the short and long terms.

3.2.3 Effects on Vegetation - Proposed Action Alternative

Most of the actions included in the 2015 INRMP would be the same or similar to the actions in the 2007 INRMP and therefore, the anticipated impacts of the Proposed Action Alternative on vegetation would generally be similar to those of the No Action Alternative and would be beneficial overall, with some negligible short-term impacts from some activities.

Compared to the No Action Alternative, the positive impacts pertaining to longleaf pine restoration would be reduced because of the five-year interruption in longleaf planting in the GSRA. However, longleaf restoration efforts outside the GSRA would continue as in the past and longleaf planting of the GSRA would likely resume to some degree after the completion of the planning and design process for the GSRA TVMC or at the end of the five-year suspension period, whichever comes first. The continuation of prescribed burning in the GSRA would also continue to provide opportunities for the natural return of longleaf pine, a species that benefits from regular burnings. Thus, although longleaf pine restoration, and its associated indirect

impacts on other species of plants and animals, would be somewhat less extensive under the Proposed Action Alternative than under the No Action Alternative, the difference would not be such as to result in a significant adverse impact on vegetation at Camp Lejeune.

Under the 2015 INRMP update as under the previous plan, natural resources management would be conducted in a manner that supports Camp Lejeune's training mission. To the extent that training needs have changed since 2007, anticipated effects on vegetation may also change, for instance requiring more clearing or more intensive use of certain areas. This would likely be the case with the need to manage resources in a manner consistent with the provision of a Combined Arms Amphibious Assault Capability (CAAAC) in the long term and of implementing Phase 1 of the CAAAC in the short term. For instance, development of the CAAAC would likely require the construction of new trails for tactical vehicles and possibly the partial or complete clearing of some areas. Similarly, it may be necessary to clear vegetation in the impact areas more extensively than was envisaged in the 2007 INRMP. However, the updated INRMP is specifically intended to ensure that natural resources at Camp Lejeune are managed in a manner that, as much as possible, accommodates both mission requirements and Camp Lejeune's continued commitment to the conservation and enhancement of these resources. Overall, adverse impacts on vegetation would be minimized and would not result in a significant loss or degradation of vegetation on Camp Lejeune relative to what would occur under the 2007 INRMP.

3.3 Fish and Wildlife Communities

3.3.1 Existing Conditions

The diverse plant communities at Camp Lejeune support an abundant and diverse fauna that is typical of the Atlantic Coastal Plains. The fauna varies with the age and stocking level of forest stands, the percentage of deciduous trees, and the proximity to openings, bottom-land forest types, and variations in community structure and composition.

White-tailed deer (*Odocoileus virginianus*), coyote (*Canis latrans*), and black bear (*Ursus americana*) are the large, indigenous mammals known to occur on base. White-tailed deer are habitat generalists that use virtually every successional stage of all forest and grassland ecosystems on the installation. Black bears prefer large expanses of uninhabited woodland or swampland with dense cover. On Camp Lejeune, hardwood drains, swamps, and pocosins provide ideal bear habitat. Along with the wild turkey (*Meleagris gallopavo*), white-tailed deer and black bear are the three large game species found on the base. Approximately 2,000 hunters purchase permits to hunt these species every year.

Medium size common mammals that are present on Camp Lejeune include red fox (*Vulpes vulpes*), gray fox (*Urocyon cinereoargenteus*), and bobcat (*Lynx rufus*). Common small mammals include raccoon (*Procyon lotor*), beaver (*Castor canadensis*), Virginia opossum

(*Didelphis virginiana*), gray squirrel (*Sciurus carolinensis*), fox squirrel (*Sciurus niger*), Eastern cottontail (*Sylvilagus floridanus*), marsh rabbit (*Sylvilagus palustris*), otter (*Lontra canadensis*), mink (*Mustela vison*), and species of ground-dwelling rodents. Coypu or nutria (*Myocastor coypus*) is an invasive, non-native herbivorous, semiaquatic rodent that has been documented at the base.

A recent freshwater stream fish survey documented 18 species of freshwater fish on Camp Lejeune. There are four managed freshwater fishing ponds on the base: Henderson Pond, Hickory Pond, Orde Pond, and a former borrow pit known as the Old Landfill Pond. More than 2,000 fishing permits are sold each year on Camp Lejeune. Freshwater fishing ponds are stocked annually with game fish species that include largemouth bass (*Micropterus salmoides*), bluegill (*Lepomis macrochirus*), redear sunfish (*Lepomis microlophus*), and channel catfish (*Ictalurus punctatus*).

Numerous species of reptiles and amphibians have been documented during surveys, including the endangered American alligator (*Alligator mississippiensis*) and Carolina gopher frog (*Rana capito*) (addressed in Section 3.4).

Northern bobwhite (*Colinus virginianus*), mourning dove (*Zenaida macroura*), and wild turkey are the principal game birds observed on Camp Lejeune. Hawk surveys have identified 13 raptor species that are resident or transient species at the base, including the bald eagle (*Haliaeetus leucocephalus*). Approximately 156 migratory bird species are known to use Camp Lejeune as breeding grounds, wintering grounds, or stop over habitat during migration.

All migratory birds are protected under the Migratory Bird Treaty Act (MBTA). Migratory birds are a large, diverse group of birds that typically fly north to breed in the temperate or Arctic summer, and return to wintering grounds in warmer regions to the south. Migratory birds at Camp Lejeune occur as year-round residents, which live on the installation throughout the year; breeding residents, which breed in the region and migrate to the tropics in the winter; winter residents, which breed farther north and over winter here; or transients, which use the stopover habitat on the Installation during migration. A list of the migratory birds that may be present on Camp Lejeune is provided in Appendix 15 of the 2015 INRMP update.

The bald eagle, in addition to being protected under the MBTA, is protected under the Bald and Golden Eagle Protection Act (BGEPA). The first recorded bald eagle nest on Camp Lejeune was documented in 2000. At the time of the signing of the last 2007 INRMP, there was one documented bald eagle nest on base and the bald eagle was still listed as threatened under the Endangered Species Act (ESA). Since that time, the bald eagle has been delisted and an additional six nests have been found on Camp Lejeune. For the 2013 to 2014 nesting season, five active nests were reported. Camp Lejeune holds an incidental take permit from USFWS under the BGEPA for disturbance from training activities.

3.3.2 Effects on Fish and Wildlife Communities - No Action Alternative

Under the No Action Alternative, the management goals and actions established in the 2007 INRMP would remain effective and natural resources, including fish and wildlife resources, would continue to be managed as they have been since 2007. The impacts of the 2007 INRMP on fish and wildlife resources were assessed in the EA prepared along with the plan. The 2007 EA found that the 2007 INRMP would have a net beneficial effect on those species adapted to a fire maintained ecosystem such as fox squirrel, quail, and, to a lesser degree, wild turkey and white-tailed deer. Density and abundance of some game species may be reduced for those species not truly adapted to a fire maintained ecosystem, but the effects on extant individuals of all species would be positive. This would generally continue to be the case under the No Action Alternative evaluated in this EA.

As with vegetation, adverse impacts, where they would occur, would be short-term and generally negligible or minor. Actions pertaining to prescribed fire would either displace or destroy animals within the burn areas while being beneficial in the long term to those species that thrive in the habitat thus created, for instance wild turkey. Such impacts are similar to what would regularly occur prior to settlement and fire suppression. Forest management activities and vegetation control actions also would have short-term adverse impacts in the affected areas, either directly, through displacement or destruction, or indirectly, through the alteration or destruction of habitat.

The potential effects of the 2007 INRMP on the bald eagle were assessed in the biological assessment (BA) prepared for that document since, at that time, this species was still federally listed under the ESA. The BA found that the eagle had the potential to be affected by disturbance associated with forest management activities; and prescribed burns (through nesting tree destruction). Control measures included a 750-foot buffer around nests exempt from logging and measures to minimize potential effects from burns, which would remain in place under the No Action Alternative.

In the long term, the measures maintaining, enhancing, or creating specific natural communities such as wetlands or longleaf pine stands, would benefit the animal species that make use of those natural communities, largely offsetting any short-term adverse impacts. Continued careful management of game species, particularly white-tailed deer and wild turkey, would continue to help maintain a sustainable balance between population and the natural and human setting, as would the management of fish ponds.

Thus, continuation of the implementation of the 2007 INRMP fish and wildlife management measures would have a positive long-term impact.

3.3.3 Effects on Fish and Wildlife Communities - Proposed Action Alternative

In general, the management of fish and wildlife resources under the Proposed Action Alternative would be similar to what currently occurs under the 2007 INRMP and would continue to occur under the No Action Alternative. Therefore, impacts on these resources can be expected to be beneficial overall, as described in Section 3.3.1.

The suspension of longleaf pine regeneration in the GSRA would eliminate the short-term impacts associated with this vegetation management activity, to the benefit of the species that currently occupy the area, although annual burns and greater intensity of use for training may offset this small improvement. Similarly, development of the CAAAC and vegetation management in the impact areas would result in adverse impacts on some animal species that may not occur under the No Action Alternative. However, as previously noted, the updated INRMP is specifically intended to ensure that natural resources at Camp Lejeune are managed in a manner that, as much as possible, accommodates both mission requirements and the base's continued commitment to the conservation and enhancement of these resources. Overall, adverse impacts on fish and wildlife would be minimized and would not result in a significant loss of species or habitat relative to what would occur under the 2007 INRMP.

3.4 Protected and Sensitive Species & Habitats

3.4.1 Existing Conditions

3.4.1.1 Threatened and Endangered Species

Camp Lejeune is home to nine terrestrial species that are federally listed as threatened (T) or endangered (E), proposed for listing as threatened or endangered (P), or a candidate for federal listing (C) under the Endangered Species Act. They include the following species:

- Red-cockaded woodpecker (*Picoides borealis*) (E)
- Green sea turtle (*Chelonia mydas*) (T)
- Loggerhead sea turtle (*Caretta caretta*) (T)
- Rough-leaved loosestrife (*Lysimachia asperulaefolia*) (E)
- Seabeach amaranth (*Amaranthus pumilus*) (T)
- Piping plover (*Charadrius melodus*) (T)
- Red knot (*Calidris canutus*) (P)
- Hirst's panic grass (*Dichanthelium hirstii*) (C)
- American alligator (*Alligator mississippiensis*) (T for similarity of appearance).

The American alligator is federally listed as threatened due to its similarity of appearance to the endangered American crocodile. The American alligator is considered recovered and actions that may affect it do not trigger Section 7 consultation with the US Fish and Wildlife Service.

Pondberry (*Lindera melissifolia*), a federally-listed endangered plant, was reportedly collected on Camp Lejeune from a single location in the GSRA. However, the presence of pondberry on Camp Lejeune has never been confirmed despite repeated surveys. Cooley's Meadowrue (*Thalictrum cooleyi*), also a federally endangered plant, has been documented within a half-mile of Camp Lejeune but not on the installation, which, however, contains appropriate habitat. Golden sedge (*Carex lutea*), a federally endangered species, has not been documented on Camp Lejeune but all known sites have been found within a four-mile area in the Northeast Cape Fear River watershed in Pender and Onslow Counties.

In addition to protected terrestrial species, several federally-listed aquatic and marine species are or may be present in the waters on and off Camp Lejeune and may potentially be affected by base activities. These species are:

Fish

- Atlantic sturgeon (*Acipenser oxyrinchus*) (E)
- Shortnose sturgeon (*Acipenser brevirostrum*) (E)

Sea turtles

- Leatherback sea turtle (*Dermochelys coriacea*) (E)
- Kemp's ridley sea turtle (*Lepidochelys kempii*) (E)
- Hawksbill sea turtle (*Eretmochelys imbricata*) (E)

Marine mammals

- Fin whale (*Balaenoptera physalus*) (E)
- Humpback whale (*Megaptera novaeangliae*) (E)
- Northern right whale (*Balaena glacialis*) (E)
- Sei whale (*Balaenoptera borealis*) (E)
- Sperm whale (*Physeter catodon*) (E)
- West Indian manatee (*Trichechus manatus*) (E).

All marine mammals, including non-federally-listed species, are further protected by the Marine Mammal Protection Act (MMPA). During a survey conducted by the Duke University Marine Laboratory between 2010 and 2013, bottlenose dolphins (*Tursiops truncatus*) and spotted dolphins (*Stenella frontalis*) were the only marine mammals observed. Bottlenose dolphins were the only species encountered in the New River and Atlantic Intracoastal Waterway (AIWW) and were most common nearshore in ocean surveys. Spotted dolphins were only encountered in the ocean and were generally found further off shore than bottlenose dolphins.

3.4.1.2 Critical Habitat

Of the threatened and endangered species listed above, the piping plover, green sea turtle, and loggerhead sea turtle have had critical habitat designated by USFWS. Of these, only the piping plover and loggerhead have had critical habitat designated in the continental United States.

In 2001, USFWS designated several areas along the North Carolina Coast as critical wintering habitat for the piping plover, with the closest habitat to Camp Lejeune occurring at New Topsail Inlet, just south of the base on the Atlantic coast. There is no designated critical habitat on Camp Lejeune itself.

Critical habitat for the loggerhead sea turtle was designated in 2014. The nesting beaches and nearshore waters surrounding Camp Lejeune were exempted from critical habitat because of protective measures already in place at Camp Lejeune.

3.4.1.3 Species at Risk (SAR)

Species at risk (SAR) are those regarded as vulnerable or imperiled that are not yet federally listed under the ESA. Species at risk on Camp Lejeune include those identified as federal species of concern by USFWS, state-listed species, and other species that are considered especially vulnerable based on International Union for Conservation of Nature Red List rankings.

Camp Lejeune is comprised of a number of diverse natural communities that could provide habitat for up to 99 SAR, including federal Species of Concern (SOC) and species listed as state threatened, endangered, or state SOC. Known or potentially occurring species include 60 vascular plants, 23 birds, 9 reptiles, 4 mammals, 2 amphibians, and 1 invertebrate (see Appendix 13 of the 2015 INRMP). The base hosts several SAR populations, including but not limited to:

- Venus flytrap (*Dionaea muscipula*)
- Coastal goldenrod (*Solidago villosicarpa*)
- Carolina gopher frog (*Rana capito capito*)
- Eastern diamondback rattlesnake (*Crotalus adamanteus*).

3.4.1.4 Resources of Special Conservation Interest

Eight community types that occur in 20 localities on Camp Lejeune and total approximately 780 acres (see Figure 2-7 in 2015 INRMP) are considered high-quality areas that provide habitat for many species that are currently state-listed or classified as federal SOC. Included are unique lime-sink depression complexes that contain a wide range of floral and faunal diversity and serve as breeding and forage areas for avian, amphibian, and reptile species. Another unique habitat complex exists within the bottomland hardwood swamps along creeks and small tributaries. These areas support a rich avian community and provide nesting and foraging habitat for resident and neotropical migrant birds.

Two highly significant areas on Camp Lejeune are specifically designated as Natural Areas and are listed on the North Carolina Registry of Natural Heritage Areas:

- Wallace Creek Cypress Swamp Natural Area, in the northern part of Mainside, consisting of a 115-acre old-growth bald cypress stand.
- C.F. Russell Longleaf Pine Ridge Savanna Natural Area, a 26-acre longleaf pine stand that is one of the few old-growth, naturally regenerating longleaf pine forests remaining on the Coastal Plain.

A formal Memorandum of Understanding (MOU) between the Commanding General, Camp Lejeune and the NC Department of Environment and Natural Resources (NCDENR) precludes the base from making or permitting changes that substantially and negatively affect the exceptional natural resources for which the natural areas are registered.

Additionally, Camp Lejeune is located in a significant natural area, the Onslow Bight landscape, one of region's highest conservation priorities. The Onslow Bight extends from the lower Northeast Cape Fear River to the Pamlico River and from offshore waters to approximately 30 miles inland. The area is a unique landform of barrier islands, marshes, riverine wetlands, pocosins, longleaf pine savannas and many other coastal ecosystems. Significant features in the Bight landscape include federally-threatened and endangered species such as the red-cockaded woodpecker, green sea turtle, and loggerhead sea turtle; Carolina bays and Carolina sandhills; and rare plant and animal communities supported by North Carolina's pocosins, dunes and estuaries. Camp Lejeune is a member of the Onslow Bight Conservation Forum; a collaborative forum composed of several federal and state agencies and non-governmental organizations dedicated to sustainable natural resource management in the region.

3.4.2 Effects on Protected and Sensitive Species & Habitats - No Action Alternative

3.4.2.1 Threatened and Endangered Species

Under the No Action Alternative, the management objectives and actions established in the 2007 INRMP would remain in effect. The effects of these measures on federally listed species were evaluated in the BA prepared in conjunction with the INRMP. The 2007 BA addressed the following species:

- Red-cockaded woodpecker
- Piping plover
- Loggerhead sea turtle
- Green sea turtle
- American alligator
- Rough-leaved loosestrife

- Seabeach amaranth
- Pondberry

It did not address effects on the red knot or Hirst's panic grass, which were not protected under the ESA at the time.

The BA found that only the red-cockaded woodpecker, rough-leaved loosestrife, and Pondberry, had potential to be affected by INRMP implementation. Potential effects on the red-cockaded woodpecker included loss of suitable habitat due to longleaf pine conversion; loss of trees due to prescribed burns; and disturbance from hardwood and midstory control and from removal of cluster restrictions over time.

Potential effects on the rough-leaved loosestrife included damage to plants, the ground, or hydrology caused by timber harvesting and vegetation management activities; and potential destruction by prescribed burning in the growing season (largely offset by long-term benefits to the plant, however). Potential effects on the pondberry were similar to those on the rough-leaved loosestrife. These potential adverse effects were minimized through the measures defined in the INRMP and offset by the beneficial long-term effects from these measures. This would continue to be the case under the No Action Alternative.

Hirst's panic grass was not addressed in the 2007 BA; however, it can be expected that potential effects on this plant would be generally similar to those on the rough-leaved loosestrife. Although Camp Lejeune would address the potential effects of its actions on this plant in accordance with Section 7 of the ESA, the lack of specific measures in the INRMP might result, in the long term, in a less beneficial management of this species. Impacts could occur on Colley's meadowrue and golden sedge as well, but these plants have not been documented on Camp Lejeune, reducing the likelihood of such effects. This potential adverse effect from not updating the INRMP would be minor, however, as it would be minimized through compliance with Section 7, as applicable. The same is true of any impacts on the red knot.

With regard to the other federally listed species found at or near Camp Lejeune, the No Action Alternative would continue to have no effects on some (fish and marine mammals) and generally positive effects on others (piping plover, sea turtles, American alligator, seabeach amaranth) through the continuation of the management measures contained in the INRMP.

3.4.2.2 Species at Risk

In general, the potential impacts on species at risk would be similar to those on more common plants and wildlife addressed in Sections 3.2.4 and 3.3.1, respectively. Because these species are, by definition, more fragile than the more common ones, however, these impacts could be of greater import and they could be felt beyond the individual level, at the local population or even species level. In the long term, this could cause their being listed as threatened or endangered, leading to new restrictions on training capabilities. The management measures defined in the

INRMP are intended to avoid this outcome by minimizing these impacts, as much as possible, through avoidance, protection, and monitoring. The continued implementation of these measures would continue to minimize short-term and long-term adverse impacts.

3.4.2.3 Resources of Special Conservation Interest

Under the No Action Alternative, Camp Lejeune would continue to give consideration to sensitive habitat in its planning and in particular would continue managing Wallace Creek Cypress Swamp Natural Area and C.F. Russell Longleaf Pine Ridge Savanna Natural Area in accordance with the MOU for those areas. Continuation of current management practices would not result in adverse impacts on these areas and would continue to have beneficial impacts.

3.4.3 Effects on Protected and Sensitive Species & Habitats - Proposed Action Alternative

3.4.3.1 Threatened and Endangered Species

The potential effects of the Proposed Action Alternative on federally threatened or endangered species have been evaluated in a BA for the 2015 INRMP update. The BA addresses the following species:

- Red-cockaded woodpecker
- Piping Plover
- Loggerhead Sea Turtle
- Green Sea Turtle
- Red Knot
- American Alligator
- Seabeach Amaranth
- Rough-leaved Loosestrife
- Cooley's Meadowrue
- Pondberry
- Golden Sedge
- Hirst's Panic Grass

The following assessment is summarized from the BA. (As under the No Action Alternative, there is no potential for impacts on fish and marine mammal species from the implementation of the INRMP and no BA was prepared for those species.)

In general, potential impacts under the Proposed Action Alternative would be similar to those under the No Action Alternative. Habitat management and forest management and protection activities have the potential to affect the red-cockaded woodpecker and inland plant species, primarily the rough-leaved loosestrife and Hirst's panic grass, and possibly pondberry, Cooley's Meadowrue, and golden sedge, if they are present on base.

Red-cockaded woodpeckers could be affected through longleaf pine restoration activities, which require the harvesting of loblolly pine that currently provides woodpecker habitat, resulting in a short-term loss of suitable habitat. More generally, use of mechanical equipment could disturb birds and lead to nest abandonment. Such impacts would be minimized through restrictions on forestry activities in red-cockaded woodpecker habitat, including, for instance, not cutting any cavity trees unless required for safety of cluster health. Prescribed burns, although beneficial in the long term and necessary to maintain good woodpecker habitat, may have short-term adverse effects if fuel level are not well controlled, for instance by killing trees. These potential effects can generally be avoided by careful planning and management of the fires and the short-term risk is largely offset by long-term gains.

Habitat management and forest management and protection activities could damage rough-leaved loosestrife and Hirst's panic grass, either directly, through plant destruction, or indirectly, through modification of habitat from changes in hydrology from tire/track ruts or soil compaction. Potential impacts would be minimized by limiting activities in known habitat areas to those required for safety or habitat health. Any management activity within rough-leaved loosestrife would be done with minimal soil disturbance; skid trails, mechanical site preparation, and mechanical treatments to control competition would be prohibited within rough-leaved loosestrife sites and buffer zones. Impacts could also result from prescribed fire but the risk would be minimized through careful management of fuel levels and avoidance of known habitat area by plow lines, if these are necessary. Long-term beneficial impacts from removal of non-native competition would offset the short-term risks.

Similar impacts could also occur on pondberry, Cooley's meadowrue, or golden sedge if any are present, though this is unlikely. For these plants, conservation measures would be developed on a case-by-case basis, as needed.

Management of natural resources to better support training needs could also result in impacts from increased training activities. The 2014 red-cockaded woodpecker management plan would not allow for new recruitment clusters to be placed in highly used training areas until other areas are filled. Additionally, no new bud or pioneer clusters occurring in highly used training areas would be marked. This would minimize potential conflicts with training activities. However, the removal from established clusters of training restrictions as population milestones are met could lead to increased disturbance in highly used areas, especially during nesting season, which may lead to cavity tree or cluster abandonment. Potential impacts on habitat from prolonged troop and vehicle use, such as changes in understory vegetation and root damage to cavity trees may also occur. Where such impacts are unavoidable, artificial cavities would be used to replace lost cavities or to shift nesting activity away from highly used training areas. Continued monitoring and assessment of clusters would also contribute to minimizing the risk of long-term impacts.

Training activities could also affect listed plants either directly through destruction or indirectly through soil compaction or alteration of hydrology from tire/track ruts. Such impacts would be minimized through restrictions within rough-leaved loosestrife buffer areas, including prohibition of vehicular traffic (except in case of emergency or specifically authorized), excavation, bivouacking, and activities that may alter hydrology. Impacts on plants could also occur from the use of herbicides to clear vegetation from the impact areas. Such potential impacts would be addressed through project-specific Section 7 consultation.

In addition, dune stabilization actions as part of coastal resources management have the potential to impact the piping plover and seabeach amaranth. In order to encourage new dune formation on the portions of the dune-beach system that are designated training areas, actions such as seasonal driving restrictions, replanting dune grasses and installing sand fences would be completed annually. While they are not commonly located within the designated training area, both the piping plover and the seabeach amaranth have the potential to occur anywhere along Onslow Beach and, as such, have the potential to be affected by coastal management actions. Potential impacts from dune grass planting and sand fence installation include damage to plover nests or disturbance of nesting or wintering birds and damage to seabeach amaranth that may be present. Impacts on nesting sea turtles might also occur.

The potential for such impacts would be minimized by ensuring that dune stabilization actions do not occur in areas other than designated training areas. Piping plovers identified on Onslow Beach during the nesting season would be observed for breeding behavior. If breeding behavior is noticed, or a nest is located outside of the military training portion of the beach, appropriate protective measures would be implemented, including posting the areas to prohibit disturbance. In the unlikely event a nest is located within a designated training area, Camp Lejeune would pursue an incidental take statement. Any locations in which seabeach amaranth is identified are marked with signs restricting military or recreational beach driving and pedestrian traffic. Continued management of sea turtles according to the Camp Lejeune sea turtle protocol would minimize risks to these species.

The BA concluded that implementation of the 2015 INRMP would have no effect on the red knot, American alligator, Cooley's meadowrue, pondberry, and golden sedge because proposed management actions would either occur outside of the habitat typically occupied by these species or these species would not be located in the areas of the actions. The BA also found that the 2015 INRMP may affect, but is not likely to adversely affect piping plovers, loggerhead and green sea turtles, seabeach amaranth, rough-leaved loosestrife, and Hirst's panic grass. Sufficient conservation measures are in place to provide protection to those species from the proposed management actions, several of which would have beneficial effects. USFWS concurred with these findings by letter dated July 17, 2015 (a copy is included in Appendix 19 of the 2015 INRMP).

Implementation of the INRMP, however, may affect and is likely to adversely affect the red-cockaded woodpecker, as removal of training restrictions would allow training to occur within active clusters and near cavity trees, thus increasing the potential for damage and destruction of cavity trees and woodpecker habitat, as well as increasing the level of disturbance. Habitat and forest management has the potential to damage cavity trees and habitat and disturb birds. Prescribed fire used for wildland fire management also has the potential to damage or kill cavity trees.

To address this likely adverse effect, Camp Lejeune has conducted formal consultation with USFWS in accordance with Section 7 of the ESA. On July 17, 2015, USFWS issued a Biological Opinion (BO) (refer to Appendix 19 of the 2015 INRMP).

In the BO, USFWS found that Proposed Action would likely result in an incidental take of up to 19 red-cockaded woodpecker groups over the five-year period of the 2015 INRMP, with no loss of active clusters from fire management. USFWS determined that the estimated level of anticipated take is not likely to result in jeopardy to the species.

USFWS defined the following reasonable and prudent measures to minimize the anticipated impacts on the red-cockaded woodpecker:

- Avoid damaging, destroying, or felling pine trees in size and age classes that serve as foraging or potential nesting substrate within unmarked clusters and minimize tree loss in unmarked clusters, except as prescribed silviculturally to enhance red-cockaded woodpecker habitat.
- Inspect and monitor all unmarked (including de-marked) clusters and collect demographic information relative to red-cockaded woodpeckers and military training activities pursuant to the proposed monitoring program.
- Whenever prescribed burning will take place in the vicinity of active red-cockaded woodpecker clusters or recruitment clusters, Camp Lejeune personnel will take appropriate measures to protect cavity trees prior to general ignition of the burn unit. Motorized and heavy equipment use in red-cockaded woodpecker clusters will be minimized to the greatest extent possible during burning operations.
- Following prescribed burning activities, Camp Lejeune will inspect all active red-cockaded woodpecker clusters. If any cavity trees are found to be damaged to the point that they can no longer be used, Camp Lejeune will replace that tree by creating an artificial cavity in close proximity as soon as qualified personnel can be mobilized and on the site.
- Prior to construction within the cantonment areas and GSRA, conduct surveys of suitable habitat for the presence of red-cockaded woodpeckers.

Camp Lejeune must comply with the following terms and conditions implementing the above measures:

- Ensure, via all required environmental training programs at Camp Lejeune, that specific emphasis is placed on the importance of protecting all natural and artificial red-cockaded woodpecker cavity trees.
- Provide a report form containing the results of all monitoring and reporting requirements to USFWS by January 31 of each year.
- For all active RCW clusters and recruitment clusters, Camp Lejeune personnel will utilize raking or other means to remove all live and dead fuel for a distance of 10 feet from active cavity trees in order to protect them prior to prescribed burning. Other measures including back burning around cavity trees will be utilized as necessary in advance of the general ignition.
- Post-burn monitoring will take place in all active red-cockaded woodpecker clusters following prescribed burning activities. If any cavity trees are damaged to the point that they can no longer be used, Camp Lejeune will replace that tree by creating an artificial cavity in close proximity as soon as qualified personnel can be mobilized and on the site.
- The taking of any currently existing clusters, if discovered by surveys on GSRA, will require further Section 7 consultation prior to any activities which could affect them.

Compliance with the reasonable and prudent measures stated in the BO, and with the terms and conditions implementing these measures ensures that the Proposed Action would not result in significant adverse impacts on the red-cockaded woodpecker.

3.4.3.2 Species at Risk

In general, the potential impacts of the Proposed Action Alternative on species at risk would be similar to those on more common plants and wildlife addressed in Sections 3.2.5 and 3.3.2, respectively. Like under the No Action Alternative, the same impacts could be of greater import due to the at-risk status of these species and like under the No Action Alternative, Camp Lejeune would use monitoring and whenever possible, avoidance to prevent their further deterioration. Potential long-term and short-term impacts thus would be similar to what would occur under the No Action Alternative.

3.4.3.3 Resources of Special Conservation Interest

Under the Proposed Action Alternative, Camp Lejeune would continue to manage Wallace Creek Cypress Swamp Natural Area and C.F. Russell Longleaf Pine Ridge Savanna Natural Area in accordance with the MOU for those areas. Continuation of current management practices would not result in adverse impacts on these areas and would continue to have beneficial impacts.

3.5 Water Resources and Wetlands

3.5.1 Existing Conditions

3.5.1.1 Water Resources

Camp Lejeune has extensive water resources and aquatic habitat including onshore, nearshore, and surf areas in and adjacent to the New River and the Atlantic Ocean as shown in Figure 2-4 of the 2015 INRMP. The New River is the base's largest water feature, extending from the base's northern boundary south of Jacksonville to the Atlantic Ocean along a 17-mile, 16,650-acre reach. Just inside the base boundary, the New River is joined by Northeast Creek and Southwest Creek to form a wide, slow-moving tidal estuary that empties into the Atlantic Ocean at Onslow Bay. Numerous large second-order streams, including Wallace Creek, French Creek, Stone Creek, Lewis Creek, Stone Creek, Millstone Creek, and Muddy Creek, and many smaller second-order streams such as Cogdel Creek, Duck Creek, and Goose Creek, and unnamed tributaries drain into the New River. A small number of creeks in the eastern portion of Mainside drain to Bear Creek and Queen Creek to the east.

The AIWW and broad expanses of tidal marsh separate the barrier islands from the mainland on the southern side of the base. Several large second-order streams including Holover Creek, Gillets Creek, and Freeman Creek drain into the AIWW.

Although much of the natural hydrology of the GSRA has been altered by ditching and draining, several natural water features remain intact. Most of the GSRA drains westward into the Northeast Cape Fear River via Shakey Creek, Juniper Swamp, Shelter Swamp Creek, and Sandy Run, which is part of the Cape Fear watershed. A small portion of the eastern side of the GSRA drains into the New River.

The North Carolina Marine Fisheries Commission (NCMFC) adopted regulations in August 1977 to protect estuarine areas known as nursery areas. Nursery areas are "...Those areas in which for reasons such as food, cover, bottom type, salinity, temperature, and other factors, young finfish and crustaceans spend the major portion of their initial growing season" (15 NCAC 3I.0101(b)(20)(E)).

The NCDMF recognizes two types of nursery areas: Primary Nursery Areas and Secondary Nursery Areas. Primary Nursery Areas are areas in the estuarine system where initial post-larval development takes place. These areas are usually located in the uppermost sections of a system where populations are uniformly very early juveniles. Populations of economically important species in these areas are composed almost uniformly of early juveniles during the spring recruitment period from March to June. Secondary Nursery Areas are areas in the estuarine system where later juvenile development takes place. Populations are usually composed of developing sub-adults of similar size that have migrated from an upstream primary nursery area to the secondary nursery area located in the middle portion of the estuarine system. These areas

are located adjacent to PNAs, are generally deeper and contain mixed populations of large juveniles, sub-adults, and adults.

Several streams on Camp Lejeune include designated primary or secondary nursery areas.

3.5.1.2 Wetlands and Floodplains

Wetlands are defined as those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Jurisdictional and planning level delineations have identified over 55,000 acres of wetland at Camp Lejeune, excluding the New River, which comprises approximately 44 percent of the Base's land area. Approximately 28,678 acres, or 28 percent of the land area, of Mainside and 26,253, or 62 percent, of the GSRA are comprised of wetlands. Wetlands in the GSRA comprise part of the Great Sandy Run Pocosin, Shelter Swamp, Sandy Run Swamp, Juniper Swamp, and Big Shakey Swamp. Wetlands on the main base are more closely associated with broad creek basins and the coastal marshes. The inland areas of the base are typically characterized by large areas of wetlands classified as pocosins.

EO 11988, *Floodplain Management*, sets forth the responsibilities of federal agencies for reducing the risk of flood loss or damage to personal property, minimizing the impacts of flood loss, and restoring the natural and beneficial functions of floodplains. Floodplains and flood hazard zones are generally present throughout Camp Lejeune near the New River and its creeks and estuaries, and near the IAWW and Onslow Bay. Approximately 10,700 acres of the installation lie within floodplains.

3.5.2 Effects on Water Resources and Wetlands - No Action Alternative

Under the No Action Alternative, the management objectives and actions laid out in the 2007 INRMP would remain in effect. Their potential impacts were assessed in the 2007 EA prepared along with the INRMP. The EA found that implementation of the 2007 INRMP would have limited, minor impacts on riparian, wetland, open water, and other aquatic habitats. This would continue to be the case under the No Action Alternative evaluated in this EA.

Minor short-term impacts on surface waters and wetlands could occur during habitat maintenance and forest management activities, for instance through the construction and use of access trails for timber harvesting or vegetation clearing activities and in general any ground-disturbing activities that could result in increased soil erosion into nearby wetlands and streams. However, such potential impacts would be avoided or minimized through the implementation of forestry best management practices and, if one or more acres are disturbed, an erosion and sedimentation plan would be prepared, as required. This would ensure that there are no significant adverse effects on water quality in the short or long term, including on water quality within areas designated as primary or secondary nursery areas.

In the long term, soil management and shoreline stabilization activities would have positive impacts on water quality by reducing sedimentation. Compliance with Section 404 of the Clean Water Act and other wetland management measures would continue to help avoid or minimize adverse effects on wetlands. Vegetation control and habitat management measures could affect wetlands by causing changes in hydrography but at the most, the impact would be a change in the function of, not a net loss, of the affected wetlands.

There is no potential for adverse impacts on floodplains, as the INRMP includes no construction or landscape-altering actions that could affect floodways or increase the adverse effects of floods.

3.5.3 Effects on Water Resources and Wetlands - Proposed Action Alternative

Generally, the impacts of the Proposed Action Alternative on water resources would be similar to those of the No Action Alternative. The accommodation of intensified training activities across the base and in particular in the GSRA, which contains a large amount of wetlands, could result in increased impacts on wetlands but continued compliance with Section 404 of the Clean Water Act, development of protective standard operating procedures, and implementation of best management practices would ensure that these impacts are minimized or adequately mitigated without hindering training operations.

Vegetation control within the impact areas may require the use of herbicides. For use in wet areas, only approved products would be used. In the long term, changes in vegetation cover could alter the functionality of the wetlands within the clearing area, but this would represent a (potentially reversible) conversion rather than a net loss.

Relative to the 2007 INRMP, the 2015 INRMP contains measures specifically focused on the management of coastal resources, including the monitoring of splash points to evaluate the impacts of their use on surrounding wetlands and the evaluation of the feasibility of a “thin layer disposal project” to restore saltmarsh and promote barrier island stabilization. Such measures would have a positive long-term impact on water resources, as they would contribute to reducing adverse effects from usage of the splash points on surrounding waters. The coastal resources protection management measures called out in the 2015 INRMP together would also help minimize the potential adverse effects on water resources from the increase in amphibious operations which would occur in relation with the development of a CAAAC, especially in the New River. Shoreline stabilization measures would potentially have a long-term positive impact on floodplains.

3.6 Geology and Soils

3.6.1 Existing Conditions

Camp Lejeune lies mainly within the Outer Coastal Plain, characterized by a smooth, arcuate coastline, small estuaries, and offshore islands. The North Carolina Coastal Plain is underlain by a broad wedge of unconsolidated marine and fluvial sediments that is hundreds of feet thick in the southern coastal region near Camp Lejeune. Overlaying these materials is a 5- to 30-foot-thick layer of mostly clean sand and clayey sand, interlayered with deposits of clay and marine shells. The Yorktown Formation, a unit of bedrock consisting of clay, sand, and shell marl beds occur on the banks of large streams. The coastal sand ridge is another geologic feature of Camp Lejeune. This feature represents either an earlier shoreline or barrier island that lies along the Atlantic Intracoastal Waterway.

Three geomorphic surfaces of varying geologic age occur at Camp Lejeune:

- Pamlico: ranging from 0 to 25 feet above mean sea level (msl) and occurs in narrow strips along the New River and other streams.
- Talbot: ranging from 25 to 45 feet above msl underlying the majority of the base.
- Wicomico: ranging from 45 to 70 feet above msl located primarily on the western side of the New River, south of Jacksonville, with only a small portion occurring at Camp Lejeune. Elevations on this surface range from 45 to 70 feet above msl.

Camp Lejeune contains a variety of Coastal Plain soils as seen in Figure 2-3 of the 2015 INRMP. The soils at Camp Lejeune are typical of Onslow County and are generally acidic, strongly leached, and low in natural fertility; however, soils that developed in marl have a high calcium carbonate content and are less acidic. Most of the base is nearly level with minimal relief. Consequently, many of the soils are poorly drained and hydric.

The predominant soils are well-drained Baymeade fine sand (0 to 6 percent slopes) and poorly drained Leon fine sand. Other common soils include Croatan muck, Marvyn loamy fine sand (6 to 15 percent slopes), Muckalee loam, Murville fine sand, Torhunta fine sandy loam, and Woodington loamy fine sand.

3.6.2 Effects on Geology and Soils - No Action Alternative

Under the No Action Alternative, the 2007 INRMP would remain in effect. The impacts on soils from implementing the plan were assessed in the accompanying EA, which found that there would be a beneficial effect on soils through the rehabilitation of degraded areas, maintenance of groundcover that helps reduce surface erosion, and closely monitoring for future soil degradation. This would remain the case under the No Action Alternative.

As indicated in Section 3.5.3, habitat management and forest management measures could potentially result in increased erosion. For instance, timber harvesting and prescribed fires would

disturb soils, destroy ground cover leading to greater exposure to wind and water, and cause a temporary loss in organic material and soil nutrients. However, risks of erosion would be minimized through the implementation of forestry best management practices and would decrease as vegetation grows back. If one or more acres are disturbed, an erosion and sedimentation plan would be prepared, as required. Impacts would remain short-term and minor.

In the long term, soil management measures would have a positive impact by controlling and reducing the effects of training operations on base soils. The restoration of eroded sites and shoreline stabilization actions would minimize the long-term loss of soils. Dunes would be stabilized and enhanced, and protected during shorefront operations.

3.6.3 Effects on Geology and Soils - Proposed Action Alternative

In general, the impacts of the Proposed Action Alternative would be similar to those of the No Action Alternative: while there would be some potential short-term adverse impacts from habitat and forest management actions, these short-term impacts would be minimized and minor; long-term impacts would be beneficial.

While the 2015 INRMP would manage all natural resources, including soils, in a manner that supports new training requirements, such as the development of a CAAAC, specific soil management measures would ensure that this does not result in greater adverse impacts on soils. Such measures would include a review of actions for land-disturbing projects greater than one acre and monitoring of training effects in inland as well as coastal areas.

Coastal resources management measures also would have a beneficial long-term impact on soils: for instance, the monitoring of splash points would help identify and address any erosion from their use by amphibious vehicles.

3.7 Air Quality

3.7.1 Existing Conditions

Air quality in a given location is described by the ambient concentration of specific pollutants of concern in the atmosphere. A region's air quality is influenced by many factors including the type and amount of pollutants emitted into the atmosphere from various sources, the size and topography of the air basin, and the prevailing meteorological conditions.

The Clean Air Act authorized the United States Environmental Protection Agency (USEPA) to establish National Ambient Air Quality Standards (NAAQS) to protect public health and the environment.

Under the NAAQS, six criteria air pollutants were identified: nitrogen oxides, sulfur oxides, particulates, carbon monoxide, lead, and ozone. Criteria air pollutants are regulated based on

permissible levels related to health. Two standards were developed. The primary standards protect health while the secondary standards prevent damage to the environment or property.

A geographic area that meets or does better than the primary standards for criteria air pollutants is called an attainment area; areas that do not meet the primary standards for each pollutant are called nonattainment areas.

Camp Lejeune and 13 surrounding counties are located in an attainment area for all the criteria pollutants. Because the region is in attainment, the Clean Air Act General Conformity Rule (40 C.F.R. Parts 51 and 93) requirements do not apply.

In addition to the criteria pollutants, non-criteria toxic pollutants, called hazardous air pollutants, are also regulated under the Clean Air Act. USEPA has identified a total of 188 hazardous air pollutants that are known or suspected to cause health effects in small doses. Hazardous air pollutants are emitted by a wide range of man-made and naturally occurring sources including combustion mobile and stationary sources. Federal ambient air quality standards do not exist for non-criteria pollutants. Examples of listed air toxics include benzene, dioxin, asbestos, toluene, and metals such as cadmium, mercury, chromium, and lead compounds.

North Carolina regulates 105 toxic air pollutants under its toxic air pollutant control program. Toxic air pollutants are compounds that carry the potential for adverse health effects at certain ambient levels established by a Scientific Advisory Board created by the North Carolina Department of Environment and Natural Resources. The list of toxic air pollutants differs from the list of 188 hazardous air pollutants regulated under Section 112(b) of the 1990 Clean Air Act Amendments. Eighteen toxic air pollutants are not included on USEPA's list of hazardous air pollutants, and 129 hazardous air pollutants are not considered as toxic air pollutants in North Carolina.

Greenhouse gases are compounds that contribute to the greenhouse effect. The greenhouse effect is a natural phenomenon where gases trap heat within the surface-troposphere (lowest portion of the earth's atmosphere) system, causing heating at the surface of the earth. The primary long-lived greenhouse gases directly emitted by human activities are carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride.

The USEPA Administrator has recognized potential risks to public health or welfare and signed an endangerment finding regarding greenhouse gases under Section 202(a) of the Clean Air Act, which finds that the current and projected concentrations of the above primary greenhouse gases in the atmosphere threaten the public health and welfare of current and future generations. To estimate global warming potential, all greenhouse gases are expressed relative to a reference gas, carbon dioxide, which is assigned a global warming potential equal to 1.

3.7.2 Effects on Air Quality - No Action Alternative

Under the No Action Alternative, the 2007 INRMP would remain in effect and the impacts of the plan on air quality would continue. These impacts are primarily associated with prescribed burning. As forests and the underlying peat layer burn, they emit visible pollution in the form of smoke, soot, and ash. Fires also generate carbon monoxide, hydrocarbons, and nitrogen oxides that may increase ozone levels. Smoke is made up of primarily small particles, gases and water vapor, with trace amounts of hazardous air pollutants. Particulate matter is the principal pollutant of concern from wildfire smoke for the relatively short-term exposures typically experienced. Small particles (particulate matter with a diameter of 2.5 microns or less [PM_{2.5}]) can be inhaled deeply into the lungs, damaging lung tissue and causing respiratory and cardiovascular problems.

In general, however, the long-term risks from short-term smoke exposures are quite low. Short-term elevated exposures to wildfire carcinogens are also small relative to total lifetime exposures to carcinogens in diesel exhaust and other combustion sources. Prescribed fires are planned with consideration of weather, fuel loads, fuel conditions, and smoke sensitive areas (e.g., population centers, hospitals, schools, etc.) in a manner that minimize the risk of involuntary smoke exposure. The North Carolina Forest Service's Smoke Management Guidelines are followed. Any open burning would be conducted in accordance with 15 A NCAC 2D.1900, as applicable. Wildfires are allowed to burn when appropriate, but only if they are not likely to cause problem in smoke-sensitive areas. Therefore, the impacts of prescribed burnings on air quality would remain minor.

All management activities involving motorized equipment, for instance forest management actions, would generate air emissions but these emissions would be temporary and limited with no potential to affect air quality in the Camp Lejeune area or threaten the area's attainment status. While both prescribed fires and motorized equipment would release greenhouse gas, these emissions would not be on a scale as to result in a noticeable effect on climate change.

Both short-term and long-term impacts on air quality would be minor or negligible.

3.7.3 Effects on Air Quality - Proposed Action Alternative

The impacts on air quality of the Proposed Action Alternative would be the same as those of the No Action Alternative and would be negligible.

3.8 Cumulative Impacts

Cumulative impacts are "impacts on the environment which result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions."

The CEQ regulations (40 C.F.R. §§ 1500-1508) implementing the procedural provisions of NEPA define cumulative impact as:

Cumulative impact is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (40 C.F.R. § 1508.7).

As explained above, the implementation of either alternative would result in negligible to minor short-term adverse effects on the resources considered in this EA. Such effects are not likely to result in significant cumulative impacts when added to those of past, present, and foreseeable future actions because they would be temporary, with no adverse long-term consequences. In the long term, both alternatives generally would have either no impacts or positive long-term impacts and, as such, would mitigate, rather than aggravate, the impacts of past, present, and future projects and actions at and near Camp Lejeune on the environment.

Exceptions include long-term impacts from the suspension of longleaf pine restoration activities in the GSRA for up to five years under the Proposed Action Alternative and likely long-term adverse impacts on the red-cockaded woodpecker, a federally endangered species. The former would result in minor, non-significant adverse impacts on vegetation and habitat management; because of the small scale and temporary character of those impacts, they are not anticipated to cause significant cumulative impacts. With regard to the red-cockaded woodpecker, compliance with the reasonable and prudent measures contained in the July 2015 BO (INRMP Appendix 19) and their implementing terms and conditions would minimize any potential impacts. While some long-term adverse impacts may be unavoidable, continued minimization and mitigation through the consultation and permitting process will ensure that no significant species-wide adverse impacts occur.

3.9 Other NEPA Considerations

3.9.1 Unavoidable Adverse Impacts

Unavoidable adverse impacts of both the alternatives considered in this EA include short-term, limited, localized loss or disturbance of individual plants or animals; minor pollutant emissions; and minor loss or depletion of soils.

3.9.2 Relationship between Short-Term Uses of Man's Environment and the Enhancement of Long-Term Productivity

The management measures in the 2015 INRMP are intended to ensure a balance between Camp Lejeune's use of its land for military operational and training requirements and the protection and enhancement of its natural resources in accordance with applicable laws and regulations. This balance will allow Camp Lejeune to minimize the risk associated with additional constraints that could arise from inappropriate management of this environment. Therefore, in the long term,

the INRMP will ensure Camp Lejeune's continuing ability to productively fulfill its military mission.

3.9.3 Irreversible and Irretrievable Commitment of Resources

Irretrievably and irreversibly committed resources are those that are consumed during the construction and implementation of a project and that cannot be reused. Because their reuse is impossible, they are considered irretrievably and irreversibly committed to the development of the proposed project. These resources would include expendable materials necessary for maintenance, as well as fuels and other forms of energy that are utilized during management implementation. Since the reuse of these resources may not be possible, they could be considered irreversibly and irretrievably committed.

3.10 Conclusion

Based on the above, implementation of either the No Action Alternative or the Proposed Action Alternative would result in no significant impacts on the environment. While some localized, short-term, adverse impacts would occur, they would largely be offset by long-term positive impacts such as the management measures defined in each respective INRMP (2007, 2015) and would minimize and mitigate the impacts of Camp Lejeune's training mission on the environment. Preparation of an environmental impact statement is not required.

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4.0 REFERENCES AND PREPARERS

4.1 References

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4.2 Preparers

Laurent Cartayrade, Project Manager/Senior Environmental Planner: 14 years of experience in environmental planning. University of Paris IV-Sorbonne, BA; University of Maryland-College Park, MA, History; PhD, History.

Craig Carver, Environmental Planner: 4 years of experience in environmental planning and impact assessment. Virginia Commonwealth University, BA, Music; Virginia Commonwealth University, Master of Urban and Regional Planning.

Helen Chernoff, Senior Biologist: 28 years of experience performing environmental impact analyses under NEPA, biological assessments, ecological and human health risk assessments and hazardous waste investigations. State University of New York, Binghamton, BS, Biology; Florida State University, MS, Biology.

Brooke Perrigo, Environmental Planning and GIS: 4 year of experience with GIS mapping and environmental analysis under NEPA, State University of New York, Albany, BS, Environmental Science and Geography; Johns Hopkins University, MS, Environmental Planning and Management.

APPENDIX A
FEDERAL COASTAL ZONE CONSISTENCY DETERMINATION

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North Carolina Department of Environment and Natural Resources

Pat McCrory
Governor

Donald R. van der Vaart
Secretary

June 17, 2015

John R. Townson
Director, Environmental Management
PSC Box 20005
Camp Lejeune, NC 28542-0005

SUBJECT: CD15-016 – Integrated Natural Resource Management Plan, Camp Lejeune

Dear Mr. Townson:

North Carolina's coastal zone management program consists of, but is not limited to, the Coastal Area Management Act, the State's Dredge and Fill Law, Chapter 7 of Title 15A of North Carolina's Administrative Code, and the land use plan of the County and/or local municipality in which the proposed project is located. It is the objective of the Division of Coastal Management (DCM) to manage the State's coastal resources to ensure that proposed Federal activities would be compatible with safeguarding and perpetuating the biological, social, economic, and aesthetic values of the State's coastal waters.

DCM has reviewed the submitted information pursuant to the management objectives and enforceable policies of Subchapters 7H and 7M of Chapter 7 in Title 15A of the North Carolina Administrative Code which are part of the State's certified coastal management program. Based on this review, DCM concurs that the proposed project is consistent with North Carolina's coastal management program.

Should the proposed action be modified, a revised consistency determination could be necessary. This might take the form of either a supplemental consistency determination pursuant to 15 CFR 930.46, or a new consistency determination pursuant to 15 CFR 930.36. Likewise, if further project assessments reveal environmental effects not previously considered by the proposed development, a supplemental consistency certification may be required. If you have any questions, please contact Doug Huggett at 252-808-2808 x212. Thank you for your consideration of the North Carolina Coastal Management Program.

Sincerely,

Jonathan Howell
Asst. Major Permit Coordinator

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UNITED STATES MARINE CORPS
MARINE CORPS INSTALLATIONS EAST-MARINE CORPS BASE
PSC BOX 20005
CAMP LEJEUNE NC 28542-0005

5090.12
BEMD
MAR 03 2015

Jonathan Howell
North Carolina Division of Coastal Management
400 Commerce Avenue
Morehead City, NC 28557-3421

Dear Mr. Howell:

Marine Corps Installations East-Marine Corps Base Camp Lejeune (MCIEAST MCB CAMLEJ) proposes to implement a *2015-2020 Integrated Natural Resources Management plan* (2015 INRMP). The 2015 INRMP provides for the management of natural resources on Camp Lejeune in accordance with requirements of the Sikes Act Improvement Act (16 U.S.C. 670a et seq) as well as the implementing policies established in Department of Defense Instruction 4715.3, *Environmental Conservation Program* and Marine Corps Order P5090.2A w/CH 1-3 *Environmental Protection and Compliance Manual*.

Enclosed is our consistency determination for the 2015 INRMP. In accordance with Section 307(c)(1) of the Federal Coastal Zone Management Act of 1972 as amended, MCIEAST-MCB CAMLEJ has determined that these activities are consistent with North Carolina's Coastal Management Program. This determination is based on the review of the enforceable policies of the State's coastal program, found in Chapter 7 of Title 15A of the North Carolina Administrative Code. MCIEAST-MCB CAMLEJ requests that the Division of Coastal Management concur with this consistency determination.

The point of contact for this project is Ms. Stephanie McCary, Environmental Conservation Branch, G-F, at (910) 451-4542 or email stephanie.mccary@usmc.mil.

Sincerely,

JOHN R. TOWNSON
Director, Environmental Management
By direction of the
Commanding General

Enclosure: Coastal Consistency Determination for Proposed Marine Corps Base Camp Lejeune 2015-2020 Integrated Natural Resources Management Plan

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FEDERAL COASTAL CONSISTENCY DETERMINATION
MARINE CORPS INSTALLATIONS EAST - MARINE CORPS BASE CAMP LEJEUNE
2015-2020 INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN
ONSLOW COUNTY, NORTH CAROLINA
JANUARY 2015

This document provides the State of North Carolina with Marine Corps Installations East - Marine Corps Base Camp Lejeune's (Camp Lejeune) consistency determination under the Coastal Zone Management Act (16 United States Code [U.S.C.] § 1456(c) and 15 Code of Federal Regulations [C.F.R.] Part 930 Subpart C), for the implementation of the *2015-2020 Integrated Natural Resources Management Plan* (2015 INRMP) (Proposed Action). The information in this consistency determination is provided pursuant to 15 C.F.R. § 930.39.

The mandatory nature of the natural resources management actions established in the 2015 INRMP triggers compliance with the National Environmental Policy Act of 1969 (NEPA). Accordingly, Camp Lejeune has prepared an environmental assessment (EA) for the Proposed Action in accordance with NEPA; the Council on Environmental Quality's regulations for implementing the procedural provisions of NEPA (40 C.F.R. §§ 1500-1508); and Marine Corps Order (MCO) P5090.2A/CH 1-3, Chapter 12.

Camp Lejeune has also prepared a biological assessment (BA) to evaluate the potential effects from the Proposed Action on species protected under the Endangered Species Act (ESA).

The information provided in this consistency determination is based on the analyses in these documents.

1.0 FEDERAL AGENCY PURPOSE AND ACTION

The 2015 INRMP provides for the management of natural resources on Camp Lejeune in accordance with the requirements of the Sikes Act Improvement Act (16 U.S.C. 670a et seq.) as well as the implementing policies established in Department of Defense Instruction (DoDI) 4715.3, *Environmental Conservation Program* and Marine Corps Order P5090.2A/CH 1-3, *Environmental Protection and Compliance Manual*. The 2015 INRMP updates and replaces the previous INRMP prepared by Camp Lejeune in 2007. The components of the Proposed Action are summarized in Table 2 at the end of this document.

The purpose of the Proposed Action is to guide the management of Camp Lejeune's natural resources in a manner that supports the base's training mission with "no net loss" in mission capability while also providing for the conservation, rehabilitation, and sustainable multipurpose use of these natural resources. The Proposed Action is needed to ensure that the training needs of the installation are met and existing deficiencies in training capabilities are addressed in a manner that (1) conserves and enhances natural resources as well as promotes their sustainable use with no net loss in training capabilities and (2) supports Camp Lejeune's long-term and short-term training objectives.

The 2015 INRMP outlines the natural resources management goals and objectives that guide Camp Lejeune in the comprehensive conservation and sustainment of its natural resources while maintaining modern training ranges, training facilities and maneuver areas. The INRMP identifies actions needed to meet these goals and objectives at Camp Lejeune.

The location of Camp Lejeune is shown in Figure 1. Camp Lejeune consists of approximately 140,000 acres of land in Onslow County, North Carolina and is located 47 miles northeast of Wilmington. The main base is located east of the New River; west of the New River, Camp Lejeune comprises Verona Loop (about 22,000 acres), which is bounded by US Highway 17 to the west; to the west of US Highway 17, the Greater Sandy Run Area (GSRA), about 41,000 acres in size. Marine Corps Air Station (MCAS) New River also lies west of the New River, to the north and adjacent to Verona Loop.

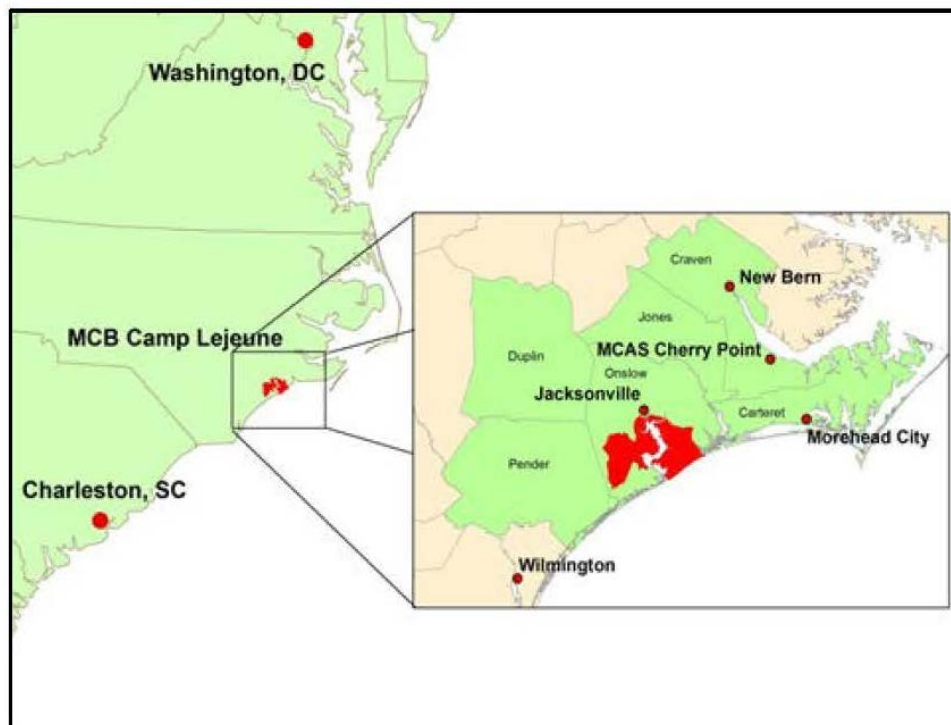


Figure 1: Location of Camp Lejeune

2.0 ENFORCEABLE POLICIES OF THE NORTH CAROLINA COASTAL ZONE MANAGEMENT PROGRAM

2.1 Enforceable Policies Not Applicable to the Proposed Action

Camp Lejeune has reviewed North Carolina's Coastal Management Program to identify the approved policies enforceable on the installation. Policies on Use of Coastal Airspace (15A NCAC 7M Section .0900) and Policies on Water and Wetland Based Target Areas for Military Training Activities (15A NCAC 7M Section .01000) were not considered because they are not approved enforceable policies under North Carolina's Coastal Management Program.

Table 1 lists the policies that were found not applicable to the Proposed Action or are not enforceable on the Marine Corps. Policies in Table 1 are not addressed further in this document.

Table 1: Policies non Applicable to the Proposed Action

Enforceable Policy	Explanation
The Estuarine and Ocean System (15A NCAC 07H. 0207) (Public Trust Areas)	Not applicable. This policy protects public rights for navigation and recreation, and conserves and manages public trust areas. The Proposed Action would not affect such public rights.
Ocean Hazard Areas (15A NCAC 7H Section .0300)	Not applicable. The Proposed Action would not take place in an ocean hazard area.
Public Water Supplies (15A NCAC 7H Section .0400)	Not applicable. The Proposed Action would not impact water supplies.
Natural and Cultural Resource Areas (15A NCAC 07H .0506) (Coastal Complex Natural Area)	Not applicable. The Proposed Action would not impact areas that have remained essentially unchanged by human activity.
Natural and Cultural Resource Areas (15A NCAC 07H .0507) (Unique Coastal Geologic Formations)	Not applicable. The Proposed Action would not impact unique coastal geologic formations as defined in the regulation.
Natural and Cultural Resource Areas (15A NCAC 07H .0508) (Use Standards)	Not enforceable on the Marine Corps. This policy instructs state regulators how to evaluate permit applications for development.
Natural and Cultural Resource Areas (15A NCAC 07H .0510) Significant Coastal Historic Architectural Resources	Not applicable. The Proposed Action does not include activities that could affect significant coastal architectural resources.
Development Standards Applicable to All Areas of Environmental Concern (15A NCAC 7H Section .0600)	Not applicable. The Proposed Action does not involve development.
Shorefront Access Policies (15A NCAC 7M Section .0300)	Not applicable. The Proposed Action would not affect the ability of the public to access shorelines.
Coastal Energy Policies (15A NCAC 7M Section .0400)	Not applicable. The Proposed Action does not include the construction of energy facilities.
Post-Disaster Policies (15A NCAC 7M Section .0500)	Not enforceable on the Marine Corps. These policies direct state agencies on how to undertake disaster planning and policymaking.
Floating Structure Policies (15A NCAC 7M Section .0600)	Not applicable. The Proposed Action does not involve the use of floating structures for commercial or residential purposes.
Mitigation Policy (15A NCAC 7M Section .0700)	Not applicable. The Proposed Action does not include development activities that require mitigation.
Policies on Beneficial Use and Availability of Materials Resulting From the Excavation or Maintenance of Navigational Channels (15A NCAC 7M Section .1100)	Not applicable. The Proposed Action does not include dredging or the disposal of dredged material.
Policies on Ocean Mining (15A NCAC 7M Section .1200)	Not applicable. The Proposed Action does not include ocean mining.
County Land Use Plans (15A NCAC 7B Section .0700)	Not applicable. The Proposed Action does not include development on land.

2.2 Enforceable Policies Applicable to the Proposed Action

The Estuarine and Ocean System (15A NCAC 07H. 0200)

North Carolina has designated four Areas of Environmental Concern to protect particular physiographic areas from uncontrolled development that may cause irreversible damage to

property, public health, or the environment. The Estuarine and Ocean System is one of these areas and has four main components, three of which are applicable to the Proposed Action (the Public Trust Areas component [15A NCAC 07H. 020] is not applicable, see Table 1):

- *Coastal Wetlands (15A NCAC 07H. 0205), which are defined as any salt marsh or other marsh subject to regular or occasional flooding by tides, including wind tides, whether or not the tide waters reach the marshland areas through natural or artificial watercourses. This policy prohibits the alteration of a wetland and its vegetation without a permit.*
- *Estuarine Waters (15A NCAC 07H. 0206), which are the state's oceans, sounds, tidal rivers and their tributaries that stretch across coastal North Carolina and link to the other parts of the estuarine system. This policy's objective is to conserve and manage the important features of estuarine waters to protect their biological, social, aesthetic, and economic values.*
- *Coastal Shorelines (15A NCAC 07H. 0209), which include all land within 75 feet (23 meters) of the normal high water level of estuarine waters as well as land within 30 feet (9 meters) of the normal high water level of public trust waters located inland of the dividing line between coastal fishing waters and inland fishing waters. This policy's objective is to ensure that shoreline development is compatible with the dynamic nature of coastal shorelines while conserving and managing the important natural features of the estuarine and ocean system.*

Coastal Wetlands: The Proposed Action includes objectives and actions designed to integrate wetland conservation into Camp Lejeune's facility and range development and to conserve wetlands so that training land remains available for military training. The Proposed Action also includes actions to manage, protect, and preserve coastal resources that together will avoid, minimize, or mitigate impacts on coastal wetlands from training and development activities at Camp Lejeune (e.g., Actions 4.8-06 and 4.8-07 in Table 2). Implementation of the Proposed Action will minimize impacts on coastal wetlands from training and development activities at Camp Lejeune to the maximum extent practicable consistent with mission requirements and in accordance with applicable laws and regulation, including Section 404 of the Clean Water Act. Some minor short-term adverse impacts may result from habitat and forest management activities and vegetation control actions. Vegetation control actions may result in a change in vegetation cover and corresponding alteration in hydrology within existing wetlands, potentially resulting in a change of ecological function. All such potential adverse effects would be addressed in accordance with applicable laws and regulations. Therefore, the Proposed Action is considered consistent to the maximum extent practicable with 15A NCAC 07H. 0205.

Estuarine Waters: Minor short-term impacts on surface waters could occur during habitat maintenance and forest management activities and, in general, any ground-disturbing activities that could cause increased soil erosion into nearby wetlands and streams. However, such potential impacts would be avoided or minimized through the implementation of forestry best management practices and erosion and sedimentation control measures and would not significantly adversely affect water quality in the short or long term, including water quality within areas designated as primary or secondary nursery areas. In the long term, soil management and shoreline stabilization activities included in the Proposed Action would have

positive impacts on water quality by reducing sedimentation. The Proposed Action also contains measures specifically focused on the management of coastal resources, including the monitoring of splash points to evaluate the impacts of their use on surrounding waters and the evaluation of the feasibility of a “thin layer disposal project” to restore saltmarsh and promote barrier island stabilization. Such measures would have a positive long-term impact on water quality. The coastal resources protection management measures called out in the 2015 INRMP would also help minimize the potential adverse effects on water resources from training activities at Camp Lejeune, especially along the New River. Therefore, the Proposed Action is consistent to the maximum extent practicable with 15A NCAC 07H.0206.

Coastal Shorelines: Implementation of the Proposed Action would not adversely affect coastal shorelines. To the contrary, the 2015 INRMP contains measures specifically designed to promote the stabilization and enhancement of coastal shoreline resources (see Table 2, Goal/Objective COA1 and associated actions). Therefore, the Proposed Action is fully consistent with 15A NCAC 07H.0209.

Natural and Cultural Resource Areas (15A NCAC 07H.0500)

- *Coastal Areas that Sustain Remnant Species (15A NCAC 07H.0505): Coastal areas that sustain remnant species are those areas that support native plants or animals determined to be rare or endangered (synonymous with threatened and endangered), within the coastal area. Such places provide habitats necessary for the survival of existing populations or communities of rare or endangered species within the coastal area. This policy's objective is to protect unique habitat conditions required for the survival of threatened and endangered native plants and animals and to minimize land use impacts that might jeopardize these conditions.*

Implementation of the Proposed Action would maintain and enhance areas that sustain remnant species as much as possible consistent with Camp Lejeune’s mission and in accordance with applicable laws and regulations, including the Endangered Species Act. The 2015 INRMP contains measures specifically designed to minimize conflicts between rare species management and training requirements, including measures pertaining to the red-cockaded woodpecker (*Picoides borealis*), federally endangered; sea turtles known to occur at Camp Lejeune (Leatherback sea turtle [*Dermochelys coriacea*], Kemp’s ridley sea turtle [*Lepidochelys kempii*], Hawksbill sea turtle [*Eretmochelys imbricate*]), all federally endangered; rough-leaved loosestrife (*Lysimachia asperulaefolia*), federally endangered; seabeach amaranth (*Amaranthus pumilus*), federally threatened; piping plover (*Charadrius melodus*), federally threatened; American alligator (*Alligator mississippiensis*), federally threatened for similarity of appearance with the American crocodile; Hirst’s panic grass (*Dichanthelium hirstii*), a federal Candidate species; and the red knot (*Calidris canutus*), a species proposed for listing.

The 2015 INRMP also defines measures addressing species at risk, which include 60 vascular plants, 23 birds, 9 reptiles, 4 mammals, 2 amphibians, and 1 invertebrate, including Venus flytrap (*Dionaea muscipula*); Coastal goldenrod (*Solidago villosicarpa*); Carolina gopher frog (*Rana capito capito*); and Eastern diamondback rattlesnake (*Crotalus adamanteus*).

Also considered in the 2015 INRMP are the pondberry (*Lindera melissifolia*), a federally-listed endangered plant, which was reportedly collected on Camp Lejeune from a single location in the Greater Sandy Run Area but has never been confirmed on Camp Lejeune despite repeated surveys; Cooley's Meadowrue (*Thalictrum cooleyi*), a federally endangered plant, documented within a half mile of Camp Lejeune but not on the installation, which, however, contains appropriate habitat; and golden sedge (*Carex lutea*), a federally endangered species that has not been documented on Camp Lejeune but with all known sites within a four-mile area in the Northeast Cape Fear River watershed in Pender and Onslow Counties.

The BA prepared to assess the effects of implementing the 2015 INRMP on federally protected species concluded that there would be no effect on the red knot, American alligator, Cooley's meadowrue, pondberry, and golden sedge because the proposed management actions would either occur outside of the habitat typically occupied by these species or these species would not be located in the areas of the actions. The BA also concluded that the Proposed Action may affect but is not likely to adversely affect piping plovers, loggerhead and green sea turtles, seabeach amaranth, rough-leaved loosestrife, and Hirst's panic grass, as sufficient conservation measures are in place to provide protection from the proposed management actions.

Implementation of the 2015 INRMP, however, may affect and is likely to adversely affect the red-cockaded woodpecker, as removal of training restrictions would allow training to occur within active clusters and near cavity trees, thus increasing the potential for damage and destruction of cavity trees and woodpecker habitat, as well as increasing the level of disturbance. Habitat and forest management has the potential to damage cavity trees and habitat and disturb birds. Prescribed fire used for wildland fire management also has the potential to damage or kill cavity trees. To address this likely adverse effect, Camp Lejeune is conducting formal consultation with the US Fish and Wildlife Service in accordance with Section 7 of the ESA. Camp Lejeune will comply with the terms of the consultation and of any permit that it may be required to obtain.

Two highly significant areas on Camp Lejeune are specifically designated as Natural Areas and are listed on the North Carolina Registry of Natural Heritage Areas:

- Wallace Creek Cypress Swamp Natural Area, in the northern part of Mainside, consisting of a 115-acre old-growth bald cypress stand.
- C.F. Russell Longleaf Pine Ridge Savanna Natural Area, a 26-acre longleaf pine stand that is one of the few old-growth, naturally regenerating longleaf pine forests remaining on the Coastal Plain.

A formal Memorandum of Understanding (MOU) between the Commanding General, Camp Lejeune and the North Carolina Department of Environment and Natural Resources (NCDENR) precludes the base from making or permitting changes that substantially and negatively affect the exceptional natural resources for which the natural areas are registered.

Based on the above, Implementation of the Proposed Action is considered consistent to the maximum extent practicable with 15A NCAC 07H.0505.

- *Significant Coastal Archaeological Resources (15A NCAC 07H.0509): Significant coastal archaeological resources are defined as areas that contain archaeological remains (objects, features, and/or sites) that have more than local significance to history or prehistory. The management objective is to conserve coastal archaeological resources of more than local significance to history or prehistory that constitute important scientific sites, or are valuable educational, associative, or aesthetic resources.*

Implementation of the 2015 INRMP is not anticipated to affect significant coastal archaeological resources. All management actions with the potential to cause ground disturbance of archaeological sites would be conducted in accordance with Section 106 of the National Historic Preservation Act and any impacts would be avoided, minimized, or mitigated in consultation with the State Historic Preservation Officer and other parties, as appropriate. Thus, the Proposed Action is consistent to the maximum extent practicable with 15A NCAC 07H.0509.

Shoreline Erosion Policies (15A NCAC 07M.0200)

North Carolina's general shoreline erosion policy states that the general welfare and public interest require that development along the ocean and estuarine shorelines be conducted in a manner that avoids loss of life, property and amenities. It also declares that protection of the recreational use of the shorelines of the state is in the public interest. In order to accomplish these public purposes, the planning of future land uses, reasonable rules and public expenditures should be created or accomplished in a coordinated manner so as to minimize the likelihood of damage to private and public resources resulting from recognized coastal hazards.

The Proposed Action includes several actions and measures designed to avoid, minimize, or correct shoreline erosion, including actions to stabilize, enhance, protect, and restore coastal dunes; the monitoring of and evaluation of splash points; and the evaluation of a "thin layer disposal project" to restore saltmarsh and promote barrier island stabilization. None of these measures would be conducted in a manner that could cause loss of life, property and amenities or increase the likelihood of damage to private and public resources resulting from recognized coastal hazards. Therefore, the Proposed Action is fully consistent with 15A NCAC 07M.0200.

Coastal Water Quality Policies (15A NCAC 07M.0800).

The waters of the coastal area are a valuable natural and economic resource of statewide significance. This policy states that no land or water use shall cause the degradation of water quality so as to impair traditional uses of the coastal waters, such as fishing, swimming, hunting, recreational boating, and commerce. The policy seeks to minimize pollutant discharges and control runoff.

For the reasons stated above under *Estuarine Waters*, the Proposed Action would not cause degradation of water quality at and near Camp Lejeune, nor would it impair traditional uses of the coastal waters. The Proposed Action is consistent to the maximum extent practicable with 15A NCAC 07M.0800.

3.0 SUMMARY OF FINDINGS

Pursuant to Section 307 of the Coastal Zone Management Act of 1972, as amended, and 15 C.F.R. Part 930(c), Camp Lejeune has determined that implementing the Proposed Action is consistent to the maximum extent practicable with the enforceable policies of North Carolina's approved Coastal Management Program.

Table 2: Summary of Proposed Action

Proposed Action (2015 INRMP)
Red-cockaded Woodpecker
<p>GOAL/OBJECTIVE TES1: Manage red-cockaded woodpecker habitat to increase “good quality” habitat for each partition</p> <p>Action 4.1-01: Camp Lejeune will manage for red-cockaded woodpecker habitat at the partition level, both within and outside of the normal silvicultural prescription cycle.</p> <p>Action 4.1-02: Restore longleaf pine within the guidelines of the 2003 Recovery Plan for the red-cockaded woodpecker on Mainside. Longleaf pine restoration in the GSRA will be reevaluated upon completion of the TVMC range planning and development process.</p> <p>Action 4.1-03: Make progress toward burning all existing and potential red-cockaded woodpecker habitat on a 3-year rotation, and increasing growing season burning to greater than 50 percent.</p>
<p>GOAL/OBJECTIVE TES2: Promote red-cockaded woodpecker population growth toward active clusters through cluster management and protection and through population manipulation</p> <p>Action 4.1-04: Implement monitoring and protection plan for red-cockaded woodpecker.</p> <p>Action 4.1-05: Maintain minimum growth rate of 5 percent per year (average over 10 years).</p>
<p>GOAL/OBJECTIVE TES3: Develop and maintain a complete and current data set to effectively manage red-cockaded woodpecker on Camp Lejeune.</p> <p>Action 4.1-06: Monitor 100 percent red-cockaded woodpecker population annually.</p> <p>Action 4.1-07: Survey annually for new cavities.</p>
<p>GOAL/OBJECTIVE TES4: Manage Camp Lejeune’s red-cockaded woodpecker population to increase mission flexibility for future training and range development needs</p> <p>Action 4.1-08: Apply red-cockaded woodpecker population model to forecast impacts on demographic stability from range and facility development.</p> <p>Action 4.1-09: Implement management strategy which allows for removal of training restriction as population milestones are met.</p> <p>Action 4.1-10: Maintain 200-foot cluster buffer.</p> <p>Action 4.1-11: Direct red-cockaded woodpecker management to allow for future mechanized maneuver corridors through red-cockaded woodpecker habitat.</p> <p>Action 4.1-12: Implement a study to monitor the effects of mechanized maneuver in the BCTMC corridors.</p>
Sea-Turtles
<p>GOAL/OBJECTIVE TES5: Continue current management and monitoring of sea turtles on Onslow Beach and Browns Island</p> <p>Action 4.1-13: Protect sensitive habitat at South Onslow Beach.</p> <p>Action 4.1-14: Enter sea turtle data into NCWRC database via seaturtle.org.</p> <p>Action 4.1-15: Continue to implement protective measures for sea turtles in-water.</p> <p>Action 4.1-16: Implement Camp Lejeune sea turtle protocol.</p> <p>Action 4.1-17: Continue to reduce sources of artificial lighting on Onslow Beach.</p>
Rough-leaved Loosestrife
<p>GOAL/OBJECTIVE TES6: Maintain a complete and current data set to effectively manage Rough-leaved Loosestrife on Camp Lejeune</p> <p>Action 4.1-18: Continue to implement reduced rough-leaved loosestrife monitoring protocol.</p> <p>Action 4.1-19: Update GIS layer for rough-leaved loosestrife on a yearly basis.</p> <p>Action 4.1-20: Survey high-probability rough-leaved loosestrife habitat in areas to be affected by management or development actions to include the entire GSRA.</p>
<p>GOAL/OBJECTIVE TES7: Carry out management activities that will promote conservation of Rough-leave Loosestrife</p> <p>Action 4.1-21: Prescribe-burn rough-leaved loosestrife habitat every 2 to 3 years.</p> <p>Action 4.1-22: Maintain and update buffer areas around rough-leaved loosestrife sites.</p> <p>Action 4.1-23: Protect rough-leaved loosestrife sites from soil disturbance and changes to hydrology.</p>
Seabeach Amaranth
<p>GOAL/OBJECTIVE TES8: Protection of seabeach amaranth and habitat on Onslow Beach</p> <p>Action 4.1-24: Protect sensitive habitat at South Onslow Beach.</p> <p>Action 4.1-25: Annually survey potential seabeach amaranth habitat on Onslow Beach.</p>

Proposed Action (2015 INRMP)
Action 4.1-26: Mark and protect seabeach amaranth sites.
Bald Eagle
GOAL/OBJECTIVE TES13: Protect bald eagles found on Camp Lejeune Action 4.1-35: Maintain protective measures required as a condition of the Bald and Golden Eagle Protection Act (BGEPA) take permit Action 4.1-36: Monitor each nest according to conditions of the BGEPA permit. Action 4.1-37: Conduct periodic surveys for potential nests along the New River corridor.
Piping Plover
GOAL/OBJECTIVE TES9: Conserve piping plover populations Action 4.1-27: Conduct bi-weekly surveys for piping plover and during the breeding season census window. Action 4.1-28: Protect piping plover nests and habitat from training and outdoor recreation impacts. Action 4.1-29: Report plover sightings to NCWRC.
American Alligator
GOAL/OBJECTIVE TES10: Maintain current data on American alligator population Action 4.1-30: Cooperate with any State surveys in the New River and tributaries.
Hirst's Panic Grass
GOAL/OBJECTIVE TES11: Promote recovery of Hirst's panic grass Action 4.1-31: Annually implement monitoring protocol for Hirst's panic grass. Action 4.1-32: Conduct habitat management actions to maintain and enhance Hirst's panic grass sites at Camp Lejeune when necessary.
Red Knot
GOAL/OBJECTIVE TES12: Promote recovery of red knot through continued protection of habitat and monitoring Action 4.1-33: Protect sensitive habitats on the south end of Onslow Beach. Action 4.1-34: Conduct biweekly shorebird surveys.
Species at Risk
OBJECTIVE SAR1: Identify, monitor, and manage Species at Risk (SAR) and the habitats in which they occur Action 4.1-38: Conduct SAR inventories prior to land-disturbing activities that may threaten their occurrence. When consistent with the military mission, avoid and minimize impacts on SAR through the NEPA process. Action 4.1-39: Monitor SAR populations on the Installation, in collaboration with the USFWS and NCWRC. Action 4.1-40: Implement ecosystem management practices that support the conservation and management of habitat for SAR.
Marine Mammals
GOAL/OBJECTIVE MAR1: Support coastal initiative efforts through impact and avoidance minimization Action 4.1-41: Minimize impacts on endangered species and marine mammals through involvement with the project planning and design process. Action 4.1-42: Evaluate the relative impacts of project alternatives on federally-listed species/marine mammals and identify potential impact mitigation measures. Action 4.1-43: Solicit NMFS/USFWS input during the planning and design phases through ESA/MMPA consultations.
Forest Management
GOAL/OBJECTIVE FOR1: Manage forests to support the military mission and promote a healthy and natural forest ecosystem Action 4.2-01: Develop and implement the ASPP. Action 4.2-02: Restore and manage longleaf pine to its historic range in accordance with the 2003 Red-Cockaded Woodpecker Recovery Plan and consistent with the military mission. Action 4.2-03: Align forest management practices with the military mission through coordination and planning, ensuring forest management practices are accomplished while eliminating or minimizing negative impacts on the military mission.
GOAL/OBJECTIVE FOR2: Promote responsible timber harvesting Action 4.2-04: Follow Best Management Practices (2006 NC Division Forest Resources) for all forestry-related activities. Action 4.2-05: Monitor timber harvest and restoration operations to ensure contract requirements are met.

Proposed Action (2015 INRMP)
<p>GOAL/OBJECTIVE FOR3: Manage for multiple uses of forest lands Action 4.2-06: Provide a forested environment that meets the needs of the military mission and provides accessibility for recreation opportunities, while ensuring compliance with applicable laws, regulations, and orders. Action 4.2-07: Provide an optimum yield of sustainable forest products.</p>
Forest Protection
<p>OBJECTIVE WLF1: Integrate prescribed fire with the military mission to support training and natural, healthy ecosystems Action 4.3-01: Implement annual prescribed burn plan. Action 4.3-02: Monitor long-term changes in landscape conditions.</p> <p>OBJECTIVE WLF2: Manage forests to reduce loss of training time and potential damage to Camp Lejeune and private property due to wildfire Action 4.3-03: Implement Wildland Fire Management Plan. Action 4.3-04: Support the annual table-top exercise to coordinate incident management strategies in response to wildland fires at Camp Lejeune.</p>
Fish and Wildlife Management
<p>OBJECTIVE FWL1: Manage fish and wildlife habitat to support game species Action 4.4-01: Manage food plots in support of the game management program. Action 4.4-02: Manage freshwater fishing ponds. Action 4.4-03: Conduct annual surveys for game species, including wild turkey, American woodcock, and northern bobwhite and contribute data to state resource managers. Action 4.4-04: Continue antler-restriction harvest strategy in Hunting Zone 2 to reduce the harvest of immature bucks, and increase hunter opportunity for taking mature deer. Action 4.4-05: Retain mast-producing trees when harvesting timber, where it does not conflict with other habitat management requirements.</p> <p>OBJECTIVE FWL 2: Conserve and promote non-game wildlife and their habitats Action 4.4-06: Continue programs that benefit non-game wildlife including nest box programs for species such as eastern blue birds and purple martins, cover board surveys for reptiles, and calling amphibian survey routes. Action 4.4-07: Perform annual surveys and monitor population trends for non-game wildlife.</p> <p>OBJECTIVE FWL 3: Manage nuisance wildlife to protect the health and safety of tenants on Camp Lejeune Action 4.4-08: Trap and remove nuisance wildlife. Action 4.4-09: Coordinate depredation actions required for nuisance wildlife management with the NCWRC and USFWS. Action 4.4-10: Provide guidance to installation personnel to assist them in solving problems associated with nuisance wildlife.</p> <p>OBJECTIVE BAS1: Implement BASH Plan per MCAS ASO 3710.40C Action 4.6-01: Continue wildlife management programs, including survey, harassment, relocation, and depredation of BASH species as well as maintenance of permits for Migratory Bird Depredation, Special Airport Depredation, and Bald Eagle Depredation, and other permits. Action 4.6-02: Manage habitat on and around air fields and landing zones in a manner that minimizes bird-animal strike hazards.</p> <p>GOAL/OBJECTIVE INV1: Continue implementation of the Invasive Species Management Plan to survey, control, and monitor invasive species at Camp Lejeune in order to conserve and enhance native flora and fauna and maintain quality habitat for the military training mission Action 4.10-1: Monitor non-native and exotic invasive plant and animal species on Camp Lejeune. Action 4.10-2: Implement necessary control actions on known populations of non-native and exotic infestations of invasive species.</p>
Migratory Birds
<p>OBJECTIVE MIG1: Continue land management activities in support of military training through conservation and management of migratory birds and their habitat Action 4.5-01: Conduct annual migratory bird surveys, including planning level surveys that support long range master planning efforts and migratory bird conservation initiatives. Action 4.5-02: Protect priority migratory bird habitats where such protections provide a benefit to species and can be integrated with training activities.</p>

Proposed Action (2015 INRMP)
Wetlands
<p>OBJECTIVE WET1: Integrate wetland conservation into Camp Lejeune’s facility and range development process</p> <p>Action 4.7-01: Delineate wetlands and update Camp Lejeune’s GIS wetland layer. Action 4.7-02: Comply with Section 404 Clean Water Act permits issued by the US Army Corps of Engineers for DOD action on Camp Lejeune. Action 4.7-03: Perform Annual Inspections of the GSRA Mitigation Bank.</p> <p>OBJECTIVE WET2: Conserve wetlands so that training lands remain available for military training</p> <p>Action 4.7-04: Implement standard operating procedures for off road vehicle movement to minimize impacts on wetlands. Monitor sensitive wetland areas to ensure impacts are minimized/mitigated. Action 4.7-05: Use Best Management Practices when maintaining vegetation on live-fire ranges, helicopter landing zones, parachute drop zones, runway clear zones, and other mission-support openings.</p>
Coastal Resources
<p>GOAL/OBJECTIVE COA1: Manage, protect and preserve coastal resources</p> <p>Action 4.8-01: Support oyster management in the New River Estuary (NRE) by providing North Carolina Division of Marine Fisheries access to store oyster shell (at Mile Hammock Bay) used for oyster cultch planting in sites at selected locations in the NRE and support public access to existing Division of Marine Fisheries Shellfish Management Areas for shellfishing and fishing consistent with the military mission. Action 4.8-2: Implement living shoreline stabilization projects along the New River where site conditions support shoreline protection and habitat restoration designs. Action 4.8-03: Stabilize, enhance, protect and restore coastal dunes using native vegetation and other approved methods within the training section of the beach. Action 4.8-04: Implement and monitor seasonal beach driving restrictions. Action 4.8-05: Participate in the planning process for range development projects in the coastal zone to help avoid and minimize impacts on coastal resources. Action 4.8-06: Develop a monitoring program for the purpose of evaluating the effect of “splash points” on the surrounding wetlands and to develop measures to counter those effects. Action 4.8-07: Evaluate the feasibility of a “Thin Layer Disposal Project” to restore saltmarsh and promote barrier island stabilization.</p>
Soils
<p>OBJECTIVE SOI1: Integrate training and other mission requirements for land use with sound natural resources management</p> <p>Action 4.9-01: Monitor training effects on inland soils and in coastal areas, and use results to provide recommendations for restoration of eroded sites/soil conservation. Action 4.9-02: Place selected eroded sites in a closed or limited use status during restoration/rehabilitation and maintenance repair projects. Action 4.9-03: Use an interdisciplinary approach to review proposed actions at Camp Lejeune for all land-disturbing projects that will impact one acre or more of land. Action 4.9-03: Improve the maneuver trails network including splash points and other hardened sites to facilitate mechanized training requirements.</p>
Outdoor Recreation
<p>OBJECTIVE REC1: Coordinate access of authorized personnel, their dependents, and sponsored guests to natural resources-based activities</p> <p>Action 4.11-01: Serve as the permitting agent for the sale/issuance of permits for hunting, fishing, trapping, off-road recreational vehicle use, and firewood collection on the Installation.</p> <p>OBJECTIVE REC2: Manage a safe and effective Conservation Law Enforcement program that integrates conservation management objectives with the military mission</p> <p>Action 4.11-02: Ensure conservation law enforcement officers maintain all certifications, licenses, and training necessary to meet Camp Lejeune conservation law enforcement program requirements.</p> <p>OBJECTIVE REC3: Provide opportunities for authorized personnel, their dependents, and sponsored guests to take part in natural resource-dependent outdoor recreation</p> <p>Action 4.11-03: Schedule and coordinate organized annual sporting events, including the Commanding Officer’s Invitational Deer Hunts and Youth Fishing Day.</p>

Proposed Action (2015 INRMP)**OBJECTIVE REC4: Provide natural resource-dependent outdoor recreation opportunities for persons with disabilities**

Action 4.11-04: Plan and host special hunts for disabled veterans and other persons with disabilities.

OBJECTIVE REC5: Promote natural resource conservation awareness and education

Action 4.11-05: Continue participation in conservation outreach initiatives through natural resource-based lectures and presentations at Camp Lejeune Dependent Schools, local community schools and colleges, conservation groups, and special events.

Action 4.11-06: Provide instruction to authorized personnel on hunter-based educational programs, including hunter safety courses and archery skills training.

Action 4.11-07: Continue to support the Camp Lejeune Conservation Volunteer Program by providing opportunities for volunteers to participate in projects that are consistent with the Installation's INRMP and mission objectives.

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APPENDIX B
COMMENTS ON THE PREFINAL EA

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North Carolina
Department of Administration

Pat McCrory, Governor

Bill Daughtridge, Jr., Secretary

May 4, 2015

Ms. Stephanie McCary
United States Marine Corps
Marine Corps Installations East
PSC Box 20005
Camp LeJeune, North Carolina 28542-0005

Re: SCH File # 15-E-0000-0533; EA; Proposed project is for the 2015 - 2020 Integrated Natural Resources Management Plan at the Marine Corps Base Camp Lejeune.

Dear Ms. McCary:

The above referenced environmental impact information has been submitted to the State Clearinghouse under the provisions of the National Environmental Policy Act. According to G.S. 113A-10, when a state agency is required to prepare an environmental document under the provisions of federal law, the environmental document meets the provisions of the State Environmental Policy Act. Attached to this letter for your consideration are the comments made by agencies in the course of this review.

If any further environmental review documents are prepared for this project, they should be forwarded to this office for intergovernmental review.

Should you have any questions, please do not hesitate to call.

Sincerely,

A handwritten signature in cursive script that reads "Crystal Best".

Crystal Best

State Environmental Review Clearinghouse

Attachments

cc: Region P

Mailing Address:
1301 Mail Service Center
Raleigh, NC 27699-1301

Telephone: (919)807-2425
Fax (919)733-9571
State Courier #51-01-00
e-mail state.clearinghouse@doa.nc.gov

Location Address:
116 West Jones Street
Raleigh, North Carolina



North Carolina Department of Environment and Natural Resources

Pat McCrory
Governor

Donald R. van der Vaart
Secretary

MEMORANDUM

TO: Crystal Best
State Clearinghouse

FROM: Lyn Hardison *Lyn*
Division of Environmental Assistance and Customer Service
Permit Assistance & Project Review Coordinator

RE: 15-0533
Environmental Assessment
Proposed project is for the 2015-2020 Integrated Natural Resources Management Plan
at the marine Base Camp Lejeune
Onslow County

Date: May 1, 2015

The Department of Environment and Natural Resources has reviewed the proposal for the referenced project. Based on the information provided, several of our agencies have identified permits that may be required and offered some valuable guidance. The comments are attached for the applicant review.

The Department appreciates the cooperative efforts and open communication the applicant has with our agencies and we encourage these efforts to continue as they move forward with the project.

Thank you for the opportunity to respond.

Attachment



North Carolina Department of Environment and Natural Resources

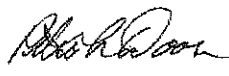
Pat McCrory
Governor

Donald R. van der Vaart
Secretary

Date: April 22, 2015

To: Linda Culpepper, Director
Division of Waste Management

Through: Jim Bateson, Superfund Section Chief

From: Pete Doorn, Special Remediation Branch Head 

Subject: NEPA Project #15-0533, 2015-2020 Integrated Natural Resource Management Plan, Marine Corps Installations East – Marine Corps Base Camp Lejeune, Onslow County, North Carolina

The Superfund Section has reviewed the Camp Lejeune's 2015-2020 Integrated Natural Resource Management Plan (2015 INRMP). Camp Lejeune consists of more than 143,000 acres of land in Onslow County. The 2015 INRMP outlines the natural resources management goals and objectives that guide Camp Lejeune in the comprehensive conservation and sustainment of its natural resources while maintaining modern training ranges, training facilities, and maneuver areas.

The Camp Lejeune Marine Corps Base is listed on the National Priorities List (NPL) as Camp Lejeune Military Reservation. Through its Installation Restoration (IR) Program, the Marine Corps identifies, assesses, and remediates environmental sites at the base, with review from EPA and NC DENR. The 2015 INRMP acknowledges that accomplishing the Camp Lejeune's training objectives over the next five years will require close coordination with the base's Environmental Management Division. It is suggested that the 2015 INRMP also note that if environmental contamination is known in the planning stages, or encountered during implementation of the base training objectives, that the base's Environmental Management Division will provide direction to safely manage any risks posed by the contamination.

Please contact me at 919.707.8369 if you have any questions.



North Carolina Department of Environment and Natural Resources

Pat McCrory
Governor

Donald R. van der Vaart
Secretary

MEMORANDUM

TO: Linda Culpepper, Division Director through Kathleen Lance

FROM: Dennis Shackelford, Eastern District Supervisor
Solid Waste Section

DATE: April 15, 2015

SUBJECT: NEPA Review: Project #15-0533 - Onslow County
Resources Management Plan - Camp Lejeune, NC

Dennis Shackelford

Digitally signed by Dennis Shackelford
DN: cn=Dennis Shackelford, o=Division
of Waste Management - Solid Waste
Section, ou=DENR,
email=dennis.shackelford@ncdenr.gov,
c=US
Date: 2015.04.15 13:31:02 -0400

The Division of Waste Management, Solid Waste Section (Division) has reviewed the proposed project for the 2015 - 2020 Integrated Natural Resources Management Plan at the Marine Corps Base at Camp Lejeune. The Division has seen no adverse impact on the surrounding community and likewise knows of no situations in the community, which would affect this project.

During construction the United State Marine Corp (Corp) should make every feasible effort to minimize the generation of waste, to recycle materials for which viable markets exist, and to use recycled products and materials in the development of this project where suitable. Any waste generated by this project that cannot be beneficially reused or recycled must be disposed of at a solid waste management facility permitted by the Division. The Division strongly recommends that the Corp require all Contractors to provide proof of proper disposal for all waste generated. The nearest permitted facility to the project is the MCB Camp Lejeune MSW Landfill, Piney Greene Road, Camp Lejeune, North Carolina, 28452, Permit Number 67-08 and the Onslow County Landfill, 415 Meadowview Road, Jacksonville, North Carolina 28540, Permit Number 67-09. Additional permitted facilities are listed on the Division of Waste Management, Solid Waste Section portal site at: <http://portal.ncdenr.org/web/wm/sw/facilitylist>.

Questions regarding solid waste management should be directed to Mr. Ray Williams, Environmental Senior Specialist, Solid Waste Section, at (252-948-3955).

cc: Jason Watkins, Field Operations Branch Head
Ray Williams, Environmental Senior Specialist
Jessica Montie, Compliance Officer

State of North Carolina
 Department of Environment and Natural Resources
 INTERGOVERNMENTAL REVIEW - PROJECT COMMENTS

Reviewing Office: WIRO

Project Number 15-0533 Due Date: 4/24/2015
 County ONSLOW

After review of this project it has been determined that the ENR permit(s) and/or approvals indicated may need to be obtained in order for this project to comply with North Carolina Law. Questions regarding these permits should be addressed to the Regional Office indicated on the reverse of the form. All applications, information and guidelines relative to these plans and permits are available from the same Regional Office.

	PERMITS	SPECIAL APPLICATION PROCEDURES or REQUIREMENTS	Normal Process Time (statutory time limit)
<input type="checkbox"/>	Permit to construct & operate wastewater treatment facilities, sewer system extensions & sewer systems not discharging into state surface waters.	Application 90 days before begin construction or award of construction contracts. On-site inspection. Post-application technical conference usual.	30 days (90 days)
<input type="checkbox"/>	NPDES - permit to discharge into surface water and/or permit to operate and construct wastewater facilities discharging into state surface waters.	Application 180 days before begin activity. On-site inspection. Pre-application conference usual. Additionally, obtain permit to construct wastewater treatment facility-granted after NPDES. Reply time, 30 days after receipt of plans or issue of NPDES permit-whichever is later.	90-120 days (N/A)
<input type="checkbox"/>	Water Use Permit	Pre-application technical conference usually necessary	30 days (N/A)
<input type="checkbox"/>	Well Construction Permit	Complete application must be received and permit issued prior to the installation of a well.	7 days (15 days)
<input type="checkbox"/>	Dredge and Fill Permit	Application copy must be served on each adjacent riparian property owner. On-site inspection. Pre-application conference usual. Filling may require Easement to Fill from N.C. Department of Administration and Federal Dredge and Fill Permit.	55 days (90 days)
<input type="checkbox"/>	Permit to construct & operate Air Pollution Abatement facilities and/or Emission Sources as per 15 A NCAC (2Q.0100 thru 2Q.0300)	Application must be submitted and permit received prior to construction and operation of the source. If a permit is required in an area without local zoning, then there are additional requirements and timelines (2Q.0113).	90 days
<input type="checkbox"/>	Permit to construct & operate Transportation Facility as per 15 A NCAC (2D.0800, 2Q.0601)	Application must be submitted at least 90 days prior to construction or modification of the source.	90 days
<input checked="" type="checkbox"/>	Any open burning associated with subject proposal must be in compliance with 15 A NCAC 2D.1900	N/A	60 days (90 days)
<input type="checkbox"/>	Demolition or renovations of structures containing asbestos material must be in compliance with 15 A NCAC 20.1110 (a) (1) which requires notification and removal prior to demolition. Contact Asbestos Control Group 919-707-5950.		
<input type="checkbox"/>	Complex Source Permit required under 15 A NCAC 2D.0800		
<input checked="" type="checkbox"/>	The Sedimentation Pollution Control Act of 1973 must be properly addressed for any land disturbing activity. An erosion & sedimentation control plan will be required if one or more acres to be disturbed. Plan filed with proper Regional Office (Land Quality Section) At least 30 days before beginning activity. A fee of \$65 for the first acre or any part of an acre. An express review option is available with additional fees.		20 days (30 days)
<input type="checkbox"/>	Sedimentation and erosion control must be addressed in accordance with NCDOT's approved program. Particular attention should be given to design and installation of appropriate perimeter sediment trapping devices as well as stable stormwater conveyances and outlets.		(30 days)
<input type="checkbox"/>	Mining Permit	On-site inspection usual. Surety bond filed with ENR Bond amount varies with type mine and number of acres of affected land. Any acre mined greater than one acre must be permitted. The appropriate bond must be received before the permit can be issued.	30 days (60 days)
<input type="checkbox"/>	North Carolina Burning permit	On-site inspection by N.C. Division Forest Resources if permit exceeds 4 days	1 day (N/A)
<input type="checkbox"/>	Special Ground Clearance Burning Permit - 22 counties in coastal N.C. with organic soils	On-site inspection by N.C. Division Forest Resources required "if more than five acres of ground clearing activities are involved. Inspections should be requested at least ten days before actual burn is planned."	1 day (N/A)
<input type="checkbox"/>	Oil Refining Facilities	N/A	90-120 days (N/A)
<input type="checkbox"/>	Dam Safety Permit	If permit required, application 60 days before begin construction. Applicant must hire N.C. qualified engineer to: prepare plans, inspect construction, certify construction is according to ENR approved plans. May also require permit under mosquito control program. And a 404 permit from Corps of Engineers. An inspection of site is necessary to verify Hazard Classification. A minimum fee of \$200.00 must accompany the application. An additional processing fee based on a percentage of the total project cost will be required upon completion.	30 days (60 days)

Project Number: <u>15-0533</u> Due Date: <u>4/24/2015</u>			Normal Process Time (statutory time limit)
PERMITS	SPECIAL APPLICATION PROCEDURES or REQUIREMENTS		
<input type="checkbox"/>	Permit to drill exploratory oil or gas well	File surety bond of \$5,000 with ENR running to State of NC conditional that any well opened by drill operator shall, upon abandonment, be plugged according to ENR rules and regulations.	10 days N/A
<input type="checkbox"/>	Geophysical Exploration Permit	Application filed with ENR at least 10 days prior to issue of permit. Application by letter. No standard application form.	10 days N/A
<input type="checkbox"/>	State Lakes Construction Permit	Application fee based on structure size is charged. Must include descriptions & drawings of structure & proof of ownership of riparian property.	15-20 days N/A
<input checked="" type="checkbox"/>	401 Water Quality Certification	N/A	60 days (130 days)
<input type="checkbox"/>	CAMA Permit for MAJOR development	\$250.00 fee must accompany application	55 days (150 days)
<input type="checkbox"/>	CAMA Permit for MINOR development	\$50.00 fee must accompany application	22 days (25 days)
<input type="checkbox"/>	Several geodetic monuments are located in or near the project area. If any monument needs to be moved or destroyed, please notify: N.C. Geodetic Survey, Box 27687 Raleigh, NC 27611		
<input type="checkbox"/>	Abandonment of any wells, if required must be in accordance with Title 15A, Subchapter 2C.0100.		
<input type="checkbox"/>	Notification of the proper regional office is requested if "orphan" underground storage tanks (USTS) are discovered during any excavation operation.		
<input checked="" type="checkbox"/>	Compliance with 15A NCAC 2H 1000 (Coastal Stormwater Rules) is required.		45 days (N/A)
<input type="checkbox"/>	Tar Pamlico or Neuse Riparian Buffer Rules required.		
<input checked="" type="checkbox"/>	Plans and specifications for the construction, expansion, or alteration of a public water system must be approved by the Division of Water Resources/Public Water Supply Section prior to the award of a contract or the initiation of construction as per 15A NCAC 18C .0300 et. seq. Plans and specifications should be submitted to 1634 Mail Service Center, Raleigh, North Carolina 27699-1634. All public water supply systems must comply with state and federal drinking water monitoring requirements. For more information, contact the Public Water Supply Section, (919) 707-9100.		30 days
<input checked="" type="checkbox"/>	If existing water lines will be relocated during the construction, plans for the water line relocation must be submitted to the Division of Water Resources/Public Water Supply Section at 1634 Mail Service Center, Raleigh, North Carolina 27699-1634. For more information, contact the Public Water Supply Section, (919) 707-9100.		30 days

Other comments (attach additional pages as necessary, being certain to cite comment authority)

Division	Initials	No comment	Comments	Date Review
DAQ	DAC	<input type="checkbox"/>	this site has an air quality prm. most issues here deal with prescribed burn.	4/7/15
DWR-WQROS (Aquifer & Surface)	jhs	<input type="checkbox"/>	any impacts to wetlands may require a 401 certification	4/15/15
DWR-PWS	DJW	<input type="checkbox"/>	See comments marked above	4/24/15
DEMLR (LQ & SW)	des	<input type="checkbox"/>	Erosion & sediment control and stormwater regulations must be addressed as plans go forward with environmental improvements.	4/7/15
DWM - UST	WER	<input checked="" type="checkbox"/>		4/8/15

REGIONAL OFFICES

Questions regarding these permits should be addressed to the Regional Office marked below.

Asheville Regional Office
2090 US Highway 70
Swannanoa, NC 28778
(828) 296-4500

Mooresville Regional Office
610 East Center Avenue, Suite 301
Mooresville, NC 28115
(704) 663-1699

Wilmington Regional Office
127 Cardinal Drive Extension
Wilmington, NC 28405
(910) 796-7215

Fayetteville Regional Office
225 North Green Street, Suite 714
Fayetteville, NC 28301-5043
(910) 433-3300

Raleigh Regional Office
3800 Barrett Drive, Suite 101
Raleigh, NC 27609
(919) 791-4200

Winston-Salem Regional Office
585 Woughtown Street
Winston-Salem, NC 27107
(336) 771-5000

Washington Regional Office
943 Washington Square Mall
Washington, NC 27889
(252) 946-6481

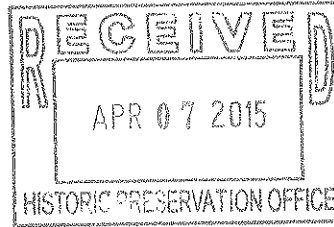
NORTH CAROLINA STATE CLEARINGHOUSE
DEPARTMENT OF ADMINISTRATION
INTERGOVERNMENTAL REVIEW

COUNTY: ONSLOW

G07: MILITARY ACTIVITIES
(TRAINING, FLIGHT ROUTES,
BASE EXPANSIONS

STATE NUMBER: 15-E-0000-0533
DATE RECEIVED: 03/30/2015
AGENCY RESPONSE: 04/24/2015
REVIEW CLOSED: 04/29/2015

MS RENEE GLEDHILL-EARLEY
CLEARINGHOUSE COORDINATOR
DEPT OF CULTURAL RESOURCES
STATE HISTORIC PRESERVATION OFFICE
MSC 4617 - ARCHIVES BUILDING
RALEIGH NC



ER 15-0811

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DENR - COASTAL MGT
DENR LEGISLATIVE AFFAIRS
DEPT OF CULTURAL RESOURCES
DEPT OF TRANSPORTATION
EASTERN CAROLINA COUNCIL

A- (NC) 4-20-15
GA

PROJECT INFORMATION

APPLICANT: United States Marine Corps
TYPE: National Environmental Policy Act
Environmental Assessment

Due 4/22/15

DESC: Proposed project is for the 2015 - 2020 Integrated Natural Resources Management Plan at the Marine Corps Base Camp Lejeune.

The attached project has been submitted to the N. C. State Clearinghouse for intergovernmental review. Please review and submit your response by the above indicated date to 1301 Mail Service Center, Raleigh NC 27699-1301.

If additional review time is needed, please contact this office at (919)807-2425.

AS A RESULT OF THIS REVIEW THE FOLLOWING IS SUBMITTED: NO COMMENT COMMENTS ATTACHED

SIGNED BY:

Renee Gledhill-Earley

DATE:

4/27/15



APR 08 2015

NORTH CAROLINA STATE CLEARINGHOUSE
DEPARTMENT OF ADMINISTRATION
INTERGOVERNMENTAL REVIEW

Nazia Sarder

COUNTY: ONSLOW

G07: MILITARY ACTIVITIES
(TRAINING, FLIGHT ROUTES,
BASE EXPANSIONS

STATE NUMBER: 15-E-0000-0533
DATE RECEIVED: 03/30/2015
AGENCY RESPONSE: 04/24/2015
REVIEW CLOSED: 04/29/2015

MS CARRIE ATKINSON
CLEARINGHOUSE COORDINATOR
DEPT OF TRANSPORTATION
STATEWIDE PLANNING - MSC #1554
RALEIGH NC

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DENR - COASTAL MGT
DENR LEGISLATIVE AFFAIRS
DEPT OF CULTURAL RESOURCES
DEPT OF TRANSPORTATION
EASTERN CAROLINA COUNCIL

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If additional review time is needed, please contact this office at (919)807-2425.



AS A RESULT OF THIS REVIEW THE FOLLOWING IS SUBMITTED: NO COMMENT COMMENTS ATTACHED

SIGNED BY: _____

[Handwritten Signature]

DATE: 4/8/15



NORTH CAROLINA STATE CLEARINGHOUSE
DEPARTMENT OF ADMINISTRATION
INTERGOVERNMENTAL REVIEW

COUNTY: ONSLOW

G07: MILITARY ACTIVITIES
(TRAINING, FLIGHT ROUTES,
BASE EXPANSIONS

STATE NUMBER: 15-E-0000-0533
DATE RECEIVED: 03/30/2015
AGENCY RESPONSE: 04/24/2015
REVIEW CLOSED: 04/29/2015

MS CAROLYN PENNY
CLEARINGHOUSE COORDINATOR
CC&PS - DIV OF EMERGENCY MANAGEMENT
FLOODPLAIN MANAGEMENT PROGRAM
MSC # 4719
RALEIGH NC

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DENR - COASTAL MGT
DENR LEGISLATIVE AFFAIRS
DEPT OF CULTURAL RESOURCES
DEPT OF TRANSPORTATION
EASTERN CAROLINA COUNCIL

PROJECT INFORMATION

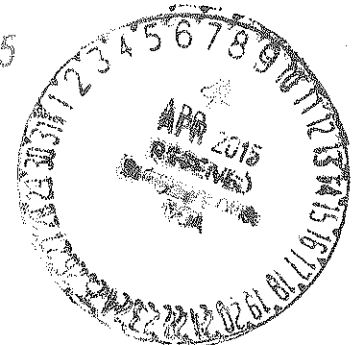
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If additional review time is needed, please contact this office at (919)807-2425.

APR - 1 2015



AS A RESULT OF THIS REVIEW THE FOLLOWING IS SUBMITTED: NO COMMENT COMMENTS ATTACHED

SIGNED BY: Daniel Healy

DATE: 4/6/15

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Appendix 21:

Finding of No Significant Impact

MCB Camp Lejeune

2015-2020 INRMP

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FINDING OF NO SIGNIFICANT IMPACT
for the
2015-2020 INTEGRATED NATURAL RESOURCES MANAGEMENT
PLAN
Marine Corps Installations East - Marine Corps Base Camp Lejeune
Onslow County, North Carolina

Responsible Officer:

R. F. CASTELLVI
Brigadier General, U.S. Marine Corps
Commanding General
MCI EAST, MCB Camp Lejeune

Point of Contact:

STEPHANIE MCCARY
Environmental Management Division
MCI EAST, MCB Camp Lejeune

July 2015

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FINDING OF NO SIGNIFICANT IMPACT

2015-2020 INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN

Pursuant to the Council on Environmental Quality's (CEQ) Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act (NEPA) (40 C.F.R. 1500-1508), Marine Corps Installations East - Marine Corps Base Camp Lejeune (Camp Lejeune) gives notice that it has prepared an environmental assessment (EA) to evaluate the potential impacts on the environment of implementing its *2015-2020 Integrated Natural Resources Management Plan* (2015 INRMP).

The purpose of the 2015 INRMP is to guide the management of Camp Lejeune's natural resources in a manner that supports the base's training mission with "no net loss" in mission capability while also providing for the conservation, rehabilitation, and sustainable multipurpose use of these natural resources. The INRMP was prepared in accordance with the requirements of the Sikes Act Improvement Act (SAIA) (16 U.S.C. 670a *et seq.*) as well as the implementing policies established in Department of Defense Instruction (DoDI) 4715.3, *Environmental Conservation Program* and Marine Corps Order (MCO) P5090.2A/CH 1-3, *Environmental Protection and Compliance Manual*. The 2015 INRMP updates and replaces the previous INRMP, prepared in 2007.

The proposed action evaluated in the EA consists of natural resources management actions that will guide Camp Lejeune in the comprehensive conservation and sustainment of its natural resources while maintaining modern training ranges, training facilities and maneuver areas. The proposed management actions pertain to the following resources or activities: protected species (red-cockaded woodpecker [*Picoides borealis*]; green sea turtle (*Chelonia mydas*); loggerhead sea turtle (*Caretta caretta*); rough-leaved loosestrife [*Lysimachia asperulaefolia*]; seabeach amaranth [*Amaranthus pumilus*]; Hirst's panic grass [*Dichanthelium hirstii*]; piping plover [*Charadrius melodus*]; red knot [*Calidris canutus*]; American alligator [*Alligator mississippiensis*]; bald eagle [*Haliaeetus leucocephalus*]; marine mammals; and multiple species at risk); forest management; wildland fire management; fish and wildlife management; migratory birds; Bird/Animal Aircraft Strike Hazard (BASH) management; wetlands; coastal resources; soils; and outdoor recreation and conservation outreach.

The EA considered two alternatives: the No Action Alternative, under which the 2007 INRMP would not be updated and would remain in effect for the foreseeable future; and the Proposed Action Alternative, under which the 2015 INRMP would be implemented and replace the 2007 INRMP.

The EA assessed the potential impacts of the alternatives on the following resources: land use, vegetation, fish and wildlife communities, protected and sensitive species and habitats, water

resources and wetlands, geology and soils, and air quality. Impacts on the following resources were not considered in detail because implementation of the 2015 INRMP has no potential to measurably affect them: noise, socioeconomics (including Executive Order [EO] 12898, *Environmental Justice* and EO 13045, *Protection of Children*), infrastructure, cultural resources, and hazardous materials and waste.

Under the No Action Alternative, the natural resources management measures defined in the 2007 INRMP would remain in effect. This would have no significant adverse impacts on the environment. However, the now outdated management approach defined in the 2007 INRMP would not appropriately support Camp Lejeune's current and future training needs; it would impede the provision of needed training infrastructure or the performance of certain training operations, and thus undermine the base's ability to optimally perform its mission.

The Proposed Action Alternative would have minor short-term adverse impacts on vegetation, fish and wildlife communities, wetlands and water resources, soils, and air quality due to habitat and forest management activities; vegetation control actions, including prescribed burns; and some of the new or increased training activities the 2015 INRMP would support. None of these impacts would be significant. They would be minimized through the implementation of best management practices (BMPs) (including North Carolina forestry BMPs) and compliance with applicable regulatory requirements and guidelines (including the North Carolina Forest Service's Smoke Management Guidelines.)

In the long term, the suspension of longleaf pine restoration activities in the Greater Sandy Run Area (GSRA) for up to five years under the Proposed Action Alternative would result in minor, non-significant adverse impacts on vegetation and habitat management. These impacts would be localized and reversible.

The Proposed Action Alternative would not affect, or may affect but is not likely to adversely affect, federally-listed species, with the exception of the red-cockaded woodpecker, which the proposed action may affect and is likely to adversely affect. Potential adverse impacts to the red-cockaded woodpecker could occur due to the removal of training restrictions and other activities increasing the risk of disturbance. Camp Lejeune conducted formal Section 7 consultation with the US Fish and Wildlife Service to address this likely adverse effect. Camp Lejeune will comply with the reasonable and prudent measures stated in the Biological Opinion (BO) issued by the US Fish and Wildlife Service on July 17, 2015 and with their implementing terms and conditions. Compliance with the BO will ensure that the adverse impact on the red-cockaded woodpecker is not significant.

Based on the analyses in the EA, Camp Lejeune finds that implementing the 2015 INRMP will not have a significant impact on the quality of the human environment. This Finding of No Significant Impact (FONSI) is the appropriate outcome of the NEPA process for this proposed action and preparation of an environmental impact statement (EIS) is not required. The 2015 INRMP and EA are available from: Commanding General, Base Public Affairs Office, MCB Camp Lejeune, North Carolina, 28542, telephone: (910) 451-7440.

22 Jul 2015

Date



R. F. CASTELLVI
Brigadier General, U.S. Marine Corps
Commanding General
MCI EAST, MCB Camp Lejeune

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