UNITED STATES AIR FORCE

DARE COUNTY RANGE

PRELIMINARY DRAFT

INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN

July 2015

Integrated Natural Resources Management Plan
Dare County Range

Seymour Johnson Air Force Base, North Carolina
4th Civil Engineer Squadron
Environmental Management Flight

4 CES/CEIE
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In accordance with the Sikes Act Improvement Act of 1997 and subsequent amendments, this plan was prepared in cooperation with the US Fish and Wildlife Service and the North Carolina Wildlife Resources Commission

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1 EXECUTIVE SUMMARY

1.1 PURPOSE OF THE INRMP

The purpose of this Integrated Natural Resources Management Plan (INRMP) is to ensure that natural resource management at Air Force Dare County Range (DCR) is implemented in a manner that supports military mission readiness by ensuring lands are available for sustained use. The INRMP provides for: the conservation and rehabilitation of natural resources at DCR; the sustainable multipurpose use of those resources; and, subject to safety requirements and military security, public access for recreational use. To ensure frequent and continued use of land for military training, now and into the future, natural resource utilization must be (1) sustainable, (2) in accordance with federal and state laws and regulations, and (3) optimally integrated with existing plans and mission requirements

1.2 SCOPE

This INRMP guides implementation of the natural resources management program by the 4th Fighter Wing (4 FW) Civil Engineer Squadron, Environmental Element (4 CES/CEIE). This INRMP reflects the US Air Forces' (USAF) approach to natural resources management and stewardship and summarizes baseline information and agreements through which compliance with regulatory and planning processes, such as those required by the Sikes Act Improvement Act (SAIA) of 1997, National Environmental Policy Act (NEPA), Endangered Species Act (ESA) and the Clean Water Act (CWA) are accomplished. Further, this INRMP helps maintain the quality of training lands to accomplish DCR's critica l military mission on a sustained basis and to ensure that natural resources conservation measures and Air Force activities on mission land are integrated and consistent with federal stewardship requirements. The INRMP also responds to the USFWS guidelines for managing the federally-listed endangered species red-cockaded woodpecker (RCW) and red wolf.

This INRMP also fulfills responsibilities under Air Force Instruction (AFI) 32-7064, 18 November 2014 – Integrated Natural Resources Management, Air Force Policy Directive (AFPD) 32-70 – Environmental Quality, Department of Defense Instruction (DODI) 4715.03 – Natural Resources Conservation Program, and Air Force policies for natural resources planning, conservation, management, and rehabilitation in support of the DCR military training and testing mission.

1.3 BENEFITS OF INRMP IMPLEMENTATION

Implementation of the INRMP will ensure future mission capacity through good stewardship of natural resources, ecosystem management, and addressing mission priorities for Dare County Range. The primary goals of the INRMP are as follows:

Provide quality natural resources as a critical training asset upon which to accomplish the military mission at DCR.

Comply with federal, state, and county laws and regulations that pertain to management of natural resources.

Manage natural resources at DCR to ensure good stewardship of public lands entrusted to the care of the US Air Force.

The INRMP will direct the management of threatened and endangered species; describe natural resources management actions and activities in compliance with applicable laws, regulations, policy, and directives; reduce invasive species; manage and sustain healthy wildlife populations, to include hunting and fishing;

provide recreation opportunities for the public; restore ecosystem functions through the use of prescribed fire; provide erosion control through appropriate floodplain, wetlands, and watershed management; and conserve species and habitats in concert with the military mission. This INRMP will provide benefits to species, the public, and the military mission by outlining proper management, prioritizing management activities, and ensuring activities are integrated and compatible with military readiness activity.

2 GENERAL INFORMATION

2.1 PURPOSE

The Dare County Range (DCR) INRMP has been prepared to direct the management of natural resources at DCR, and is based on an interdisciplinary approach to ecosystem management. Under The Endangered Species Act (ESA) of 1973 the INRMP outlines a plan to protect and conserve federally listed threatened and endangered (T&E) plants and animals and their habitats on DCR.

This INRMP incorporates the provisions of AFI 32-7064, *Integrated Natural Resources Management*, and guides the activities of the natural resources management program and its interaction with the military mission. Key installation decision makers will be informed of the condition of DCR's natural resources, the objectives of natural resources management, and potential or actual conflicts between mission activities and this management plan.

The purpose of this INRMP is to serve as a planning tool for future activities at DCR as a road map for the stewardship of all natural resources found on DCR. This stewardship is based on an *ecosystem management approach* as defined in AFI 32-7064, *Integrated Natural Resources Management* and in Department of Defense Instruction (DODI) 4715.03. This approach to resource management protects and enhances vital ecosystem services within the context of mission support. The preservation and enhancement of biodiversity on DCR is implemented by objectives outlined in the INRMP that are consistent with Air Force objectives and DCR's mission.

The INRMP is prepared in cooperation with the US Fish and Wildlife Service (USFWS), North Carolina Wildlife Resources Commission (NCWRC), Air Force Civil Engineer Center (AFCEC) and DCR natural resources office. Natural resources managers at DCR also communicate with these groups and agencies regularly throughout the year. The goal of these communications is to promote conservation initiatives throughout the installation and encourage input from state and federal partners.

2.2 AUTHORITY

This INRMP is prepared in accordance with the Sikes Act (16 United States Code [USC] 670) as amended by the Sikes Act Improvement Act (SAIA). The Sikes Act mandates not only that each military base with significant natural resources prepare an INRMP but also that they implement the management activities contained in the plan. The SAIA requires that, where appropriate with the military mission, INRMPs 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 and wildlife;
- Integration of, and consistency among, the various activities conducted under the INRMP;
- Establishment of specific natural resources management objectives and time frames for proposed action;
- Sustained use by the public of natural resources to the extent such use is not inconsistent with the needs of fish and wildlife resources management;

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

Department of Defense Manual (DODM) 4715.03, Integrated Natural Resources Management Plan Implementation Manual 2013; Air Force Policy Directive (AFPD) 32-70, Environmental Quality; and AFI 32-7064, Integrated Natural Resources Management provide guidance and serve as key components in the process.

Other federal and state laws and regulations that impact the management of natural resources at DCR and that were considered during the preparation of this INRMP include:

- Federal Water Pollution Control Act of 1977 (the Clean Water Act)
- Endangered Species Act of 1973
- Bald and Golden Eagle Protection Act of 1940, as amended
- Federal Noxious Weed Act of 1974
- Federal Water Pollution Control Act Amendments of 1972 (Clean Water Act)
- National Environmental Policy Act of 1969
- Noxious Plant Control Act
- Soil Conservation Act of 1935
- Archaeological Resources Protection Act of 1979
- Multiple-use and Sustained Yield Act of 1960
- Federal Land Policy and Management Act of 1976
- Fish and Wildlife Coordination Act
- Migratory Bird Treaty Act
- Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990
- Title 10 USC 2665 Forest Management
- Title 10 USC 2667 Agricultural Outleasing
- Executive Order (EO) 11990 Protection of Wetlands
- EO 12608 Protection of Wetlands (amends EO11990)
- EO 11987 Exotic Organisms
- EO 11989 Off-road Vehicles on Public Land
- EO 11988 Floodplain Management
- EO 13045 Protection of Children from Environmental Health and Safety Risks
- EO 13112 Invasive Species

- EO 13186 Responsibilities of Federal Agencies to Protect Migratory Birds

DODI 4715.03, Natural Resources Conservation Program, is the overarching instruction for Department of Defense (DoD) natural and cultural resource management, and is the primary agent for implementing policy (including the Sikes Act), assigning responsibilities, and prescribing procedures for the integrated management of natural and cultural resources on DoD property. This Instruction also establishes the DoD Conservation Committee that reports to the Environmental Safety and Occupational Health (ESOH) Council Policy Board, and designates "DoD Executive Agents" to lead DoD implementation of primary conservation issues.

AFPD 32-70, Environmental Quality, establishes policies to: responsibly manage natural and cultural resources on U.S. Air Force properties, clean up past environmental damage, meet current environmental standards, plan future activities to minimize impacts, and eliminate pollution from U.S. Air Force activities whenever possible. Under this directive, an Air Force Environmental Quality Program was developed, which includes activities such as cleanup, compliance, conservation, and pollution prevention. Additionally, this directive states that the Air Force will pursue adequate funding to meet environmental legal obligations.

AFI 32-7064, Integrated Natural Resources Management, implements AFPD 32-70 and DODI 4715.3. This Instruction provides details on how to manage natural resources on U.S. Air Force installations so that they comply with applicable federal, state, and local laws and regulations. The INRMP facilitates compliance with federal, state, and local environmental requirements. Potential impacts to water and air quality, wetlands, endangered species, marine mammals, migratory birds, and other wildlife, forest, and fire management, and public access are all analyzed under these requirements. The relevant statutes and executive orders listed in this document show the applicability of various natural resources program components to significant laws and regulations.

2.3 RESPONSIBILITY

Multiple installation organizations play a role in managing, protecting, and supporting DCR's natural resources. To ensure that the two missions—military training and environmental conservation—are compatible and mutually supportive, it is essential that these organizations work together to promote the overall U.S. Air Force mission. Various organizations and committees are involved in the stewardship of DCR's natural resources. These groups meet on a quarterly or semi-annual basis to discuss any issues that may impact natural resources on and adjacent to the installation. Table 1 describes the internal stakeholders and their role in INRMP development and implementation.

Table 1. Air Force Natural Resource Management Responsibilities

Group	Unit	Flight/Staff	Responsibilities
Wing Staff	Commander	Vice Wing Commander	Chairman, ESOHC
		Judge Advocate	Regulatory Interpretation and Legal Representation
		Wing Safety	BASH Monitoring and Minimization
Operations Support	Airfield	Airfield	BASH Monitoring and Minimization

Squadron	Operations	Management	
Mission Support Group	4 CES/CEN	Engineering	Storm Water/Erosion Control and Landscaping Specifications for New Construction
	4 CES/CEO	Operations	Oil/Water Separator Maintenance General Grounds Maintenance Environmental Controls Airfields Grounds Maintenance
	4 CES/CEIE	Environmental	Natural/Cultural Resources BASH Monitoring and Minimalization Hazmat/Hazwaste Management Installation Restoration Program Air Quality Monitoring/Compliance Environmental Impact Assessment Storm Water Management Pollution Prevention Clear Zone Tree Removal

On behalf of the Secretary of the Air Force, the Air Force Civil Engineer Center (AFCEC) maintains centralized control of budgeting, planning, plan development and assists the base with expertise and guidance as it relates to all aspects of civil engineering, environmental compliance and specifically the execution of the installation INRMP.

2.3.1 Wing Commander

The 4 FW Commander is directly responsible for accomplishing the mission. In addition, the Commander is responsible for ensuring that base-assigned and tenant units comply with the laws and requirements associated with the management of natural resources and that funding and staffing are sufficient to accomplish the projects and objectives outlined in this INRMP. The 4 FW Commander or his/her designee is responsible for the following aspects of the DCR INRMP:

- Approves the INRMP
- Certifies the annual review of the INRMP as valid and current; OR delegates the certification of the annual INRMP review to the appropriate designee
- Controls access to and use of installation natural resources
- Provides appropriate funding and staffing to ensure implementation of the INRMP

The 4 FW Commander will ensure implementation of this INRMP upon review and approval. The USFWS and NCWRC will endorse the INRMP after review.

2.3.2 ESOH Council

Installation leadership is connected to base level environmental management through the Environmental, Safety, and Occupational Health (ESOH) Council. Assigned squadrons and tenant units are represented

on this Council and are responsible for unit-specific oversight of operations that may impact environmental resources. The ESOH Council reviews the overall environmental management system at scheduled intervals to ensure its continuing suitability, adequacy and effectiveness. In addition, the ESOHC ensures that 4 FW organizations comply with the plan.

2.3.3 Environmental Management Element

The 4 CES/CEIE Compliance and Analysis Element Leader has primary responsibility for natural resources management and is the principal point-of-contact for determining consistency of proposed actions and projects within the INRMP. 4 CES/CEIE, which includes Natural Resources, Compliance and NEPA staff at DCR and Seymour-Johnson AFB, is responsible for the revision, update and monitoring of the DCR INRMP as follows:

- Review Air Force (AF) Form 813, *Request for Environmental Impact Analysis*, to determine natural resource impacts which would result from a proposed action.
- Act in accordance with 32 Code of Federal Regulations Part 989, Environmental Impact Analysis Process. Documented on AF Form 813, Request for Environmental Impact Analysis.
- Attend the Work Request Review Board to ensure an AF Form 813, Request for Environmental Impact Analysis has been or will be submitted for proposed projects that have the potential to impact the environment.
- Collaborate with Natural Resources Manager to address any proposed activity that has the potential to negatively impact natural resources.
- Participate on BASH Team and review BASH Plan annually
- Provide a status of the natural resources management program to the ESOH Council upon request.
- Coordinate with the U.S. Fish and Wildlife Service (USFWS) and the North Carolina Wildlife Resources Commission (NCWRC) on an annual basis.
- Prepare an update to the DCR INRMP as needed in coordination with AFCEC, the USFWS and the NCWRC.
- Project 5 years of goals for the implementation of the DCR INRMP
- Identify objectives which will support each goal.
- Identify requirements to AFCEC that require funding to achieve each objective.
- Manage funding for projects.
- Manage available manpower to implement the DCR INRMP. 33

2.3.4 External Stakeholders

In accordance with Executive Order 13352 (Aug 26, 2004), Facilitation of Cooperative Conservation, DCR natural resources staff will promote cooperative conservation with an emphasis on collaborative activities among Federal, State, local, and tribal governments, private for-profit and nonprofit institutions, other nongovernmental entities and private citizens.

The SAIA requirement that INRMPs be prepared in cooperation with, and reflect mutual agreement of, the USFWS and NCWRC, and affords them signatory authority of DCR's INRMP. Dare County Range is surrounded by Alligator River National Wildlife Refuge and the USFWS is an important partner in ecosystem management strategies. DCR is also a member of NCWRC's Gamelands Program. Cooperation and coordination with the USFWS and NCWRC is an integral part of the USAF's natural resources management program.

This INRMP meets consistency requirements of the Coastal Area Management Act of 1974 for the preservation of natural land and water resources. The DCM will be contacted for any action requiring a Consistency Determination. The US Army Corps of Engineers (USACE) has jurisdiction over waters of the US and requires permits for projects in wetlands.

The SAIA mandates that the public be provided a meaningful opportunity to comment on DCR's INRMP. The public was afforded a 30-day comment period on the INRMP. Copies of the INRMP were placed in libraries throughout Dare County. Notification of the availability of the INRMP and the public review and comment period was made via publication in local newspapers and by letters mailed to state, federal, and local agencies, as well as individuals and organizations who expressed an interest in natural resources management on DCR. Copies of all comments received during the 30-day comment period were documented and addressed. The final INRMP will be posted on the Seymour Johnson AFB website.

2.4 MANAGEMENT PHILOSOPHY

2.4.1 Interdisciplinary Approach

The primary objective of the U.S. Air Force natural resources program is to ensure continued access to land and airspace required to accomplish the military mission while maintaining these resources in a healthy condition. Natural resource management and other mission activities are integrated and in agreement with federal mandates. DCR's INRMP is designed to guide mission activities in an attempt to minimize and avoid impacts and to maintain a balance between resources conservation and mission objectives. Procedures to evaluate whether a proposed AF mission-critical project will negatively impact the environment and to identify associated necessary mitigation measures have been established within the INRMP. The plan ensures long-range resources are available for the mission. Guided by AFI 32-7064, DoD directives, and current scientific literature, the INRMP balances the military mission with restoration of ecological functions by emphasizing the conservation and enhancement of biological diversity.

2.4.2 AF Principles for Ecosystem Management

Ecosystem management is a land management system that seeks to protect viable populations of native species, perpetuate natural disturbance regimes on a regional scale, adopt long-term planning timelines, and allow human use at levels that do not result in long-term ecological degradation. As outlined by the DoD Under Secretary of Defense–Installations and Environment, DoD natural resources management will uphold the principles as outlined in DODI 4715.03, *Natural Resources Conservation Program* as follows:

- Maintain or restore native ecosystem types across their natural range where practical and consistent with the military mission.
- Maintain or restore ecological processes such as fire and other disturbance regimes where practical and consistent with the military mission.
- Maintain or restore the hydrological processes in streams, floodplains and wetlands when feasible.

- Use regional approaches to implement ecosystem management on an installation by collaboration with other DoD components as well as other federal, state and local agencies and adjoining property owners.
- Provide for outdoor recreation, agricultural production, harvesting of forest products, and other practical utilization of the land and its resources, provided that such use does not inflict long-term ecosystem damage or negatively impact the AF mission.

An ecosystem is defined as a dynamic and natural complex of living organisms interacting with each other and with their associated non-living environment. The USAF's overall approach to managing natural resources on DCR reflects the principles of ecosystem management, consistent with DoD and Air Force policy. This approach seeks to balance the two goals of maximizing land use for military readiness and maintaining native habitats. Such an approach is intended to facilitate maximum support of the Range's military training mission and infrastructure, while simultaneously promoting both the sustainability of native species and habitat diversity and compliance with applicable laws and regulations.

The DoD Biodiversity Management Strategy (The Keystone Center, 1996) report notes that the challenge is "to manage for biodiversity in a way that supports the military mission." This strategy identifies the INRMP as the primary vehicle to implement biodiversity protection on military installations and includes the following principles of ecosystem management:

- Support the military mission
- Use joint planning between natural resources managers and military personnel
- Integrate biodiversity conservation into INRMP and other planning protocols
- Involve internal and external stakeholders up front
- Emphasize the regional (ecosystem) context
- Use adaptive management
- Involve scientists and the use the best science available
- Concentrate on results

The Department of Defense (DoD Instruction 4715.3, Environmental Conservation Program) states that all DoD conservation programs shall work to guarantee continued access to our land, air, and water resources for realistic military training and testing while ensuring that the natural and cultural resources entrusted to DoD care are sustained in a healthy condition for scientific research, education, and other compatible uses by future generations.

The Instruction recommends that ecosystem management and biodiversity principles are used to conserve DoD lands. Key elements of the relationship of these two closely related concepts as outlined in the Instruction are:

- Maintain and improve sustainability and native biological diversity of ecosystems
- Administer with consideration of ecological units and timeframes
- Support sustainable human activities
- Develop a vision of ecosystem health
- Develop priorities and reconcile conflicts
- Develop coordinated approaches to work towards ecosystem health

- Rely on the best science and data
- Use benchmarks to monitor and evaluate outcomes
- Use adaptive management
- Implement through installation plans and programs

The USAF goal with regard to ecosystem management 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, that approach shall maintain and improve the sustainability and biological diversity of terrestrial and aquatic ecosystems while supporting sustainable economies, human use, and the environment required for realistic military training operations.

4 CES/CEIE will use ecosystem management principles to guide its natural resources program. Adaptive integrated management is an important component of ecosystem management and will result in the best option being implemented, evaluated, and modified according to best options.

4 CES/CEIE practices responsible stewardship of its lands and natural resources, while maintaining an interest in regional conservation and management planning. The USAF wants to ensure that its training lands are viewed primarily in terms of their intended land use, that of military training and that natural resource management efforts are designed to be in support of that military mission. To that end, DCR is working to ensure that its land use planning efforts, and those of the region, are complementary, and together meet the region's species and habitat needs so that DCR's land can continue to be used in support of the Air Force's mission.

2.4.3 Integration with Other Management Plans

The INRMP is a key component plan of the Base Comprehensive Plan as detailed in the AFI 32-7062, Air Force Comprehensive Planning. The INRMP identifies natural resource features that need to be considered and incorporated into the Base Comprehensive Plan, General Plan, Installation Development Plan, Air Installation Compatible Use Zone, BASH Plan, Installation Pest Management Plan, and Range Management Plan.

The purpose of this INRMP is to document and assist, as required, the development, integration, and coordination of natural resource management programs with other plans and programs. Moreover, this INRMP is intended to facilitate the integration of existing natural resource management actions (plans and programs) with DCR's primary military mission of training and support.

This INRMP is complementary to the Integrated Cultural Resources Management Plan (ICRMP), which address the National Historic Preservation Act and other cultural resources law and policies. Cultural resources (archaeological and historical) were surveyed and a finding of no cultural resources was reported in Cultural Resources Survey of the Dare County Ordnance Range, Seymour Johnson Air Force Base, North Carolina, 1996.

2.5 CONDITIONS FOR IMPLEMENTATION AND REVISION

2.5.1 Implementation

The 4th Civil Engineer Squadron/Installation Management Environmental Element (4 CES/CEIE) is primarily responsible for developing and implementing the INRMP, but the INRMP is a management plan that pertains to all actions and all personnel as they intersect with natural resources. All installation personnel are required to address natural resources conservation in their daily activities, special projects, and training missions IAW with INRMP.

2.5.2 Revisions

Natural resource management is a fluid process that requires frequent reviews and updates to management plans. Mandatory annual reviews and updates will be conducted to account for changes in the military mission, condition of natural resources, the ecosystem and regulatory requirements once the INRMP has been completed. DCR's natural resources manager and the AFCEC Installation Support Teams will coordinate and support the installation review process. In order to comply with regulations and ensure the continued usefulness of this INRMP, reviews will be conducted as follows:

Annual Review - Annually, the INRMP continuous updates will be formally coordinated with the cooperating partners through notification of updates and acknowledgement of guidance. 5-year funding projections will be key to the annual updates. Unmet and new requirements cannot be added in the current or planning year budgets requiring a significant look forward to successfully and accurately project funding needs.

Five-Year Review - Formal submission for review and comment by the Major Command, the USFWS, and the FWC will be accomplished. As of 2014 AFCEC will be utilizing continuous updates on e-Plans website with the goal of reducing the five year review to a much less burdensome process for all signatory parties. If annual updates are approved and signed, the five-year review becomes obsolete.

Management of natural resources is a dynamic process and this INRMP will be developed so that frequent evaluation and revision is easily accomplished. Section 101(b) (2) of SAIA requires that each plan be reviewed "on a regular basis, but not less often than every five years." Consistent with Air Force and DoD guidance, CEV will review the INRMP annually in cooperation with the USFWS and NCWRC and revise the INRMP when necessary.

The continuous involvement of the USFWS and NCWRC, as well as other state agencies, such as the NC Department of Natural Resources (DENR), Division of Forest Resources (DFR), Division of Coastal Management (DCM), Non-governmental Organizations (NGOs), and the public (through ongoing availability of this INRMP on the website), is expected to assist in future reviews and revisions. During these reviews, natural resources management objectives, planned actions, and proposed actions will be reviewed with the appropriate managers to document progress, identify additional actions required or desired, and revise implementation schedules and priorities. As part of these reviews, the USFWS and NCWRC will be involved in the evaluation of processes, results, and implementation of established milestones and timelines for specific projects and programs, and a review of species, habitat, and ecosystem goals established in conservation management plans. New projects, data, understanding of natural processes and species, and lessons learned from completed and ongoing projects and practices will be incorporated as appropriate following these reviews.

3 INSTALLATION OVERVIEW

3.1 LOCATION AND AREA

Dare County Range (DCR), established in 1965, is located in northeastern North Carolina. DCR consists of 46,619 acres, of which 4,388 acres is maintained as two separate impact areas. The Dare County mainland is an 186,000 acre peninsula (Figure 2.1) bounded on the north by the Albemarle Sound, on the west by the Alligator River, on the east by the Croatan Sound, and on the southeast by the Pamlico Sound. Dare County is connected to the larger Albemarle-Pamlico peninsula by Hyde County, which borders Dare County to the southwest. DCR is surrounded by the 152,000 acre US Department of Interior Fish and Wildlife Service Alligator River National Wildlife Refuge (ARNWR). DCR is not adjacent to any major body of water although the western boundary lies within a mile of Alligator River and the eastern boundary lies within a mile of Stumpy Point Bay, which connects to Pamlico Sound.

3.2 INSTALLATION HISTORY

Abbreviated History and Pre-Military Land Use

Dare County is the site of the first English colony in the New World, established on the island of Manteo in 1587, less than twelve miles to the northeast of DCR. Though the colony failed, it marked the beginning of extensive human settlement and use of the region's natural resources. In 1607, a successful permanent colony was established at Jamestown, Virginia, and by the mid 17th century exploration and permanent settlement of the region began in earnest as settlers moved into the area from Virginia.

The low-lying Dare Peninsula, with its shallow sounds and dense forest, was settled more slowly than other coastal locations. In the early eighteenth century, colonial land grants indicate that settlement began at the site of present-day villages Mashoes, Manns Harbor, East Lake, and Stumpy Point. These settlements are located on the highest ground in the county, adjacent to coastal waters. In the latter half of the century, nearly all the remaining land, including what is now DCR, was purchased by land speculators who believed that the land could be drained and farmed. Many of these speculators had never visited the property before purchasing it, and found farming difficult on the wet, nutrient-poor land.

Figure 1. The Price-Strother map of 1808 shows the former connection of marshes between Roanoke Island and the Dare County peninsula (formerly part of Tyrrell County).

Though much of Dare County proved unsuitable for farming, timber became a very valuable and sought after resource. The primary commercial timber species on the Dare mainland is Atlantic white cedar (AWC), which grows naturally in dense stands on very deep organic soils. Cedar typically becomes established after major disturbances, such as wildfire, which was common on the peninsula. Individual trees can live up to 300 years, reaching heights of 120 feet and diameters up to 30 inches. When harvested and milled, AWC produces strong, lightweight, rot resistant lumber which was used throughout the colonies in boat construction, buildings, and even shingles and buckets. During early settlement, cedar was harvested along waterways where easy access and transportation were available. Harvest increased dramatically in the mid-1800s with the advent of steam-powered railroad logging, and large sections of the peninsula's interior were intensively harvested using clear-cut techniques. Nearly all of the AWC on the Dare peninsula was harvested by the turn of the twentieth century. The lumber mill at Buffalo City continued to mill pine and cypress until the supply was exhausted around 1932. Little planning or thought was given to regeneration, and as a result, many prior AWC forests regenerated as hardwood-dominated swamp forests, or as mixed pine-cedar-hardwood forests. Following World War I, cedar logging ceased until harvesting of second-and third- growth cedar timber began in the 1980s.

In the 1950s and 1960s, the West Virginia Pulp and Paper Company (Westvaco) began forest management on mainland Dare County. During this period, extensive systems of roads, canals, and lateral ditches were dug to drain the lands and provide road access. The first attempts at artificial regeneration, including loblolly pine plantations and experimental plantations of native trees, occurred during Westvaco ownership. Westvaco sold the property to First Colony Farms in the 1970s.

DCR was established by lease in 1965, and the property title was obtained in 1979. After range establishment, First Colony Farms retained mineral rights until 1990 and Atlantic Forest Products retained timber rights until 1996. Harvesting of AWC timber began in 1984 and continued until 1989. Over 2,000 acres of AWC were harvested during those five years. Remaining stands were either too young to be valuable for lumber, or too far from existing roads to facilitate access. Through collaboration with the Prudential Life Insurance Company, First Colony Farms, and The Nature Conservancy, the lands surrounding DCR were donated to the USFWS in 1984. The USFWS obtained the mineral rights to DCR in 1990.

3.3 CURRENT MILITARY MISSION

DCR is managed by the Range and Airspace Flight of the 4th Operations Support Squadron at SJAFB in coordination with the Environmental Flight of 4 CES. There are four USAF employees permanently based at DCR. DCR is a composite day and night use facility located approximately 140 air miles east of Seymour Johnson AFB.

DCR is 46,619 acres of USAF property, of which 4,388 acres are classified as "impact areas". The two separate deforested impact areas are maintained by the Air Force (2,279) and the Navy (2,109). The Navy operates their impact area through a lease agreement with the Air Force. The impact areas are used for basic weapons delivery training. The remaining acreage is used as a safety buffer and consists of roads and forested wetland managed by 4 CES/CEIE.

The AF impact area is an air-to-ground range used for simulated special and conventional weapons delivery. Only training ordnance is authorized at DCR, specifically training bombs and inert general purpose bombs up to 2,000 pounds (BDU-33, BDU-48, inert MK-82/83/84, MK-76, MK-106), 2.75 inch inert rockets and training practice ammunition (20mm, 30mm, 50/7.62/5.56 cal). The use of self-protection flares and chaff is permitted on DCR. Tracers, white phosphorous, and live ordnance are prohibited. The impact area contains a variety of standard Class A practice targets to include a centrally located nuclear target (Nuke Bull), one conventional target, six improved targets on gravel pads, three heated targets for Infrared training, two strafe pits and two Military Operations in Urbanized Terrain (MOUT) target arrays.

DCR is used for day and night tactical ground attack training. The strafe targets are scored with the IRSSS, Improved Remote Strafe Scoring System. The impact area also permits laser tracking and accuracy scoring of a variety of targets via the LSVRS, Laser Spot Video Recording System. DCR is capable of WISS scoring both day and night.

Ordnance authorized by the Navy on their impact area consists of any size practice bomb or training shape provided it is inert and utilizes only marking charges for spotting purposes, subcaliber practice rockets through 2.75 inch with inert heads, 5 inch rockets, and solid ball strafing ammunition. The Navy target facilities consists of a rocket-glide bombing target, the Navy-East conventional target, Navy Loft and Short Bull targets, Navy Bomb Dummy Unit Target, the Minimum Altitude Lay-Down Target, two strafing targets, a laser target, Navy Military Operations in Urbanized Terrain (MOUT) target area, and an artificial runway. Live ordinance, flare tracer ammunition, and pyrotechnics are prohibited on the Navy impact area.

Figure 2. The Air Force Military Operations in Urban Terrain target area.

DCR's principal users are F-15E Strike Eagles from SJAFB and F-18 Hornets/Super Hornets from NAS Oceana and Marine Corps Air Station, Cherry Point. Additional users include F-16 Fighting Falcons from various units of the Washington, D.C., Virginia, and New Jersey Air National Guards.

3.4 SURROUNDING COMMUNITIES

Roanoke Island lies to the east of mainland Dare County and includes the communities of Manteo and Wanchese. Manteo serves as the county seat and has a year-round population. East of Roanoke Island are the low, windswept beaches and dunes of the Outer Banks. The community of East Lake is located along US Highway 64 to the north, Mann's Harbor and Mashoes are located on the Croatan sound to the east, and Stumpy Point is located on the Pamlico Sound to the south.

Figure 3. Dare County peninsula and surrounding water bodies.

3.4.1 Regional Land Use

The Outer Banks have a tremendous influx of population from tourism in the summer months, often swelling the Dare County population by a factor of ten (220,000+). This tourism has fueled a building boom over the last twenty-five years that has brought thousands of vacation homes, several multi-lane bridges and highways, and scores of restaurants and businesses to Dare County, many of which operate seasonally. The permanent population of Dare County is 35,145 (July 2005). Median age is 41.8. Projected annual growth rate is 2.2% with a projected 2010 population of 39,370.

Table 2. Dare County Populations

Town	*Population*
Duck	517
Southern Shores	2,551
Kitty Hawk	3,399
Kill Devil Hills	6,613
Nags Head	3,094
Manteo	1,123

The coastal location of Dare County attracts tourists interested in outdoor recreation, and provides a source of employment and business development in the region. Manns Harbor, Wanchese, and Stumpy Point are traditional fishing towns where commercial fishing is extremely important to the economy. The Outer Banks communities of Nags Head, Buxton, and Hatteras, as well as the town of Manteo, have large fleets of private charter fishing vessels that travel the local sounds and venture out Oregon Inlet to the ocean in search of abundant recreational fishing opportunities. Private land use is typified by rural residential development, small-scale agriculture, and forest products production.

3.4.2 Local and Regional Natural Areas

The Alligator River National Wildlife Refuge, surrounding DCR, was created in 1984 to preserve a diversity of habitat types including high and low pocosin, bogs, freshwater and brackish marshes, hardwood swamps, and Atlantic white cedar swamps (http://www.fws.gov/alligatorriver). Nearly all of these habitats are found on DCR as well. Characteristics that these ecosystems share include deep, organic "peat" soils, saturated hydrology, and fire-dependent vegetation. These natural community types support a diverse population of native wildlife, including the American black bear, red-cockaded woodpecker, red wolf, and many species of migratory waterfowl. Many of these communities provide the most representative example of a "natural" ecosystem in a regional landscape heavily influenced by over four centuries of human occupancy and modification. In addition to forest and shrubland habitats, ARNWR contains more than 3,000 acres of agricultural fields used to grow grain crops for migratory waterfowl.

DCR and ARNWR together make up more than 90% of the ownership of the Dare County mainland. There are private land inholdings in ARNWR, as well as several small communities that border the refuge.

Figure 4. Communities at Risk

4 PHYSICAL ENVIRONMENT

4.1 CLIMATE

Dare County covers an area of 800 square miles, of which 391 square miles is land. Located in the northeast section of the state, it is bounded by the Atlantic Ocean; Pamlico, Croatan, and Albemarle Sounds; and Hyde and Tyrrell Counties. The climate of Dare County is tempered by the Gulf Stream, with warm summers and cool winters. Average annual rainfall is 52 inches.

Table 3. Average Temperature and Rainfall in Manteo, Dare County, North Carolina

Month	Average Low Temp (º F)	Average High Temp (º F)	Average 24-hr Temp (º F)	Average Rainfall
January	34.0	52.0	43.0	4.3
February	35.6	54.1	45.0	3.8
March	41.9	61.3	51.6	4.2
April	49.6	70.0	59.9	3.4
May	58.8	76.6	67.8	4.4
June	67.3	83.5	75.4	4.6
July	70.9	87.1	79.0	5.5
August	71.1	86.5	78.8	5.8
September	66.0	81.7	73.8	5.0
October	56.3	72.3	64.4	3.9
November	47.3	64.4	55.8	3.6
December	38.7	55.9	47.3	3.6
Average/Total	53.1	70.5	61.9	52.1

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

4.1.1 Tropical Storms

Coastal North Carolina is one of the most hurricane-vulnerable locations along the coastline of the United States. Since 1852, the paths of 45 tropical weather events have passed directly over mainland Dare County (Figure 4.2), including 11 hurricanes and 23 tropical storms. Countless other tropical storms and hurricanes have passed nearby enough to cause flooding and wind damage. With hurricane activity predicted to increase in the coming decades, further impacts on forest resources can be expected.

4.1.2 Climate Change

Adaptive management strategies will be adopted, when developed, to address projected impacts of climate change as addressed in the most current National Climate Assessment (NCA3) for the Southeastern United State. At this time NCA3 lists only sea level rise as an impact of climate change in the southeast and adaptive strategies have not been fully developed.

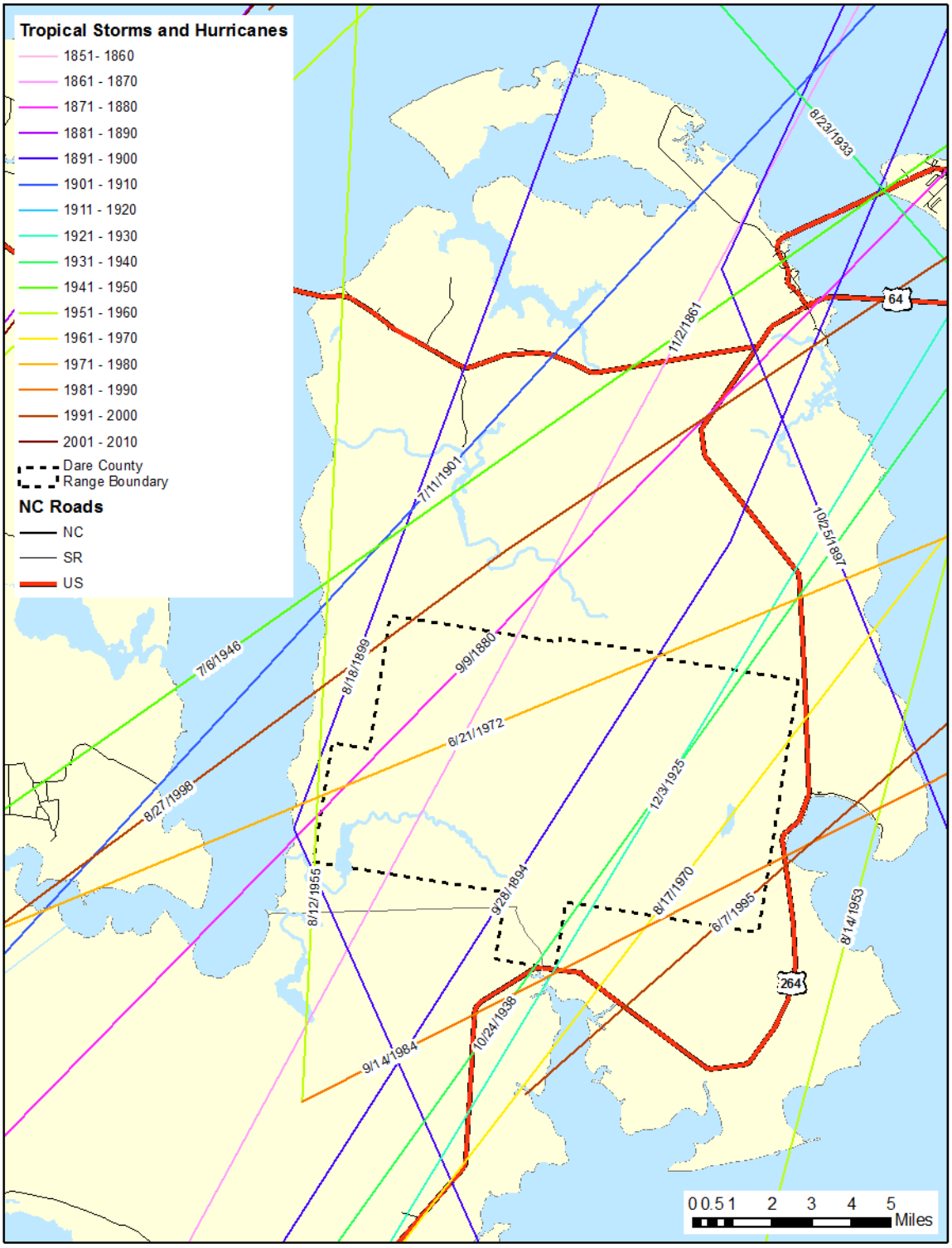

Figure 5. Tropical weather events that have passed directly over Dare County.

4.2 LANDFORMS

Dare County, located in the Coastal Plain region of the state, is located in the Pasquotank River Basin, which is surrounded by the Albemarle-Pamlico estuarine system. The topography is flat with elevations zero to four feet above sea level (Figure 2.10).

The US Fish and Wildlife Service is the principal Federal agency that provides information on the extent and status of the Nation's wetlands. The National Wetlands Inventory (NWI), in cooperation with the US Geological Survey (USGS), produced a series of topical maps to show wetlands and deepwater habitats. These maps were developed using high altitude imagery to identify wetland habitats based on vegetation, visible hydrology and geography and are appropriate to make resource management decisions at the regional level.

According to NWI data, DCR contains 356 acres of open water and 180 acres of non-wetland (ie, upland) habitat. The remaining 46,083 acres (99%) of DCR, are considered wetlands, or in the case of roads and office compound areas, converted wetlands. The majority of this wetland area is forested. DCR supports unique wetland habitats called pocosins, which are pockets of poorly drained soils with high organic matter. 16

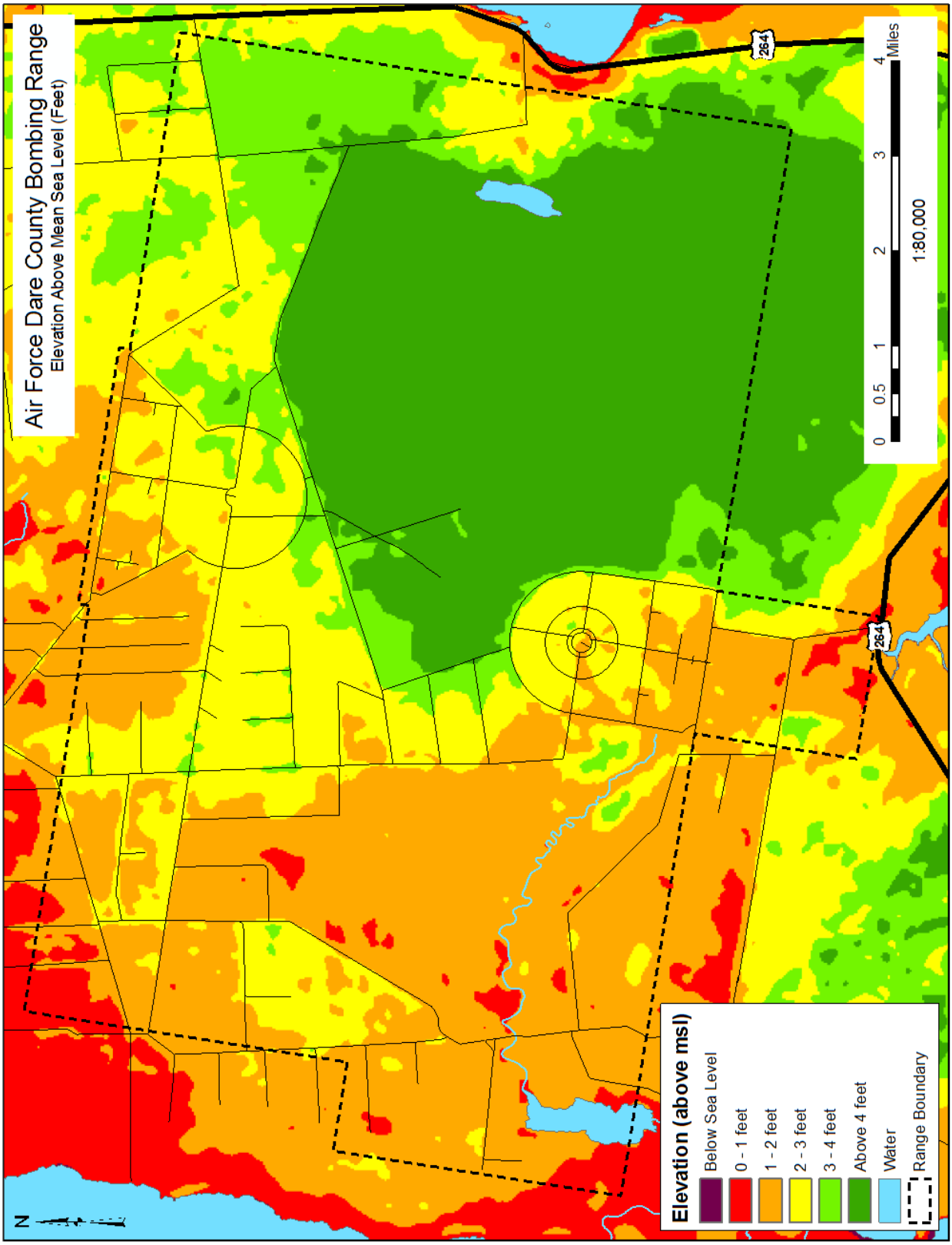

Figure 6. DCR Elevation

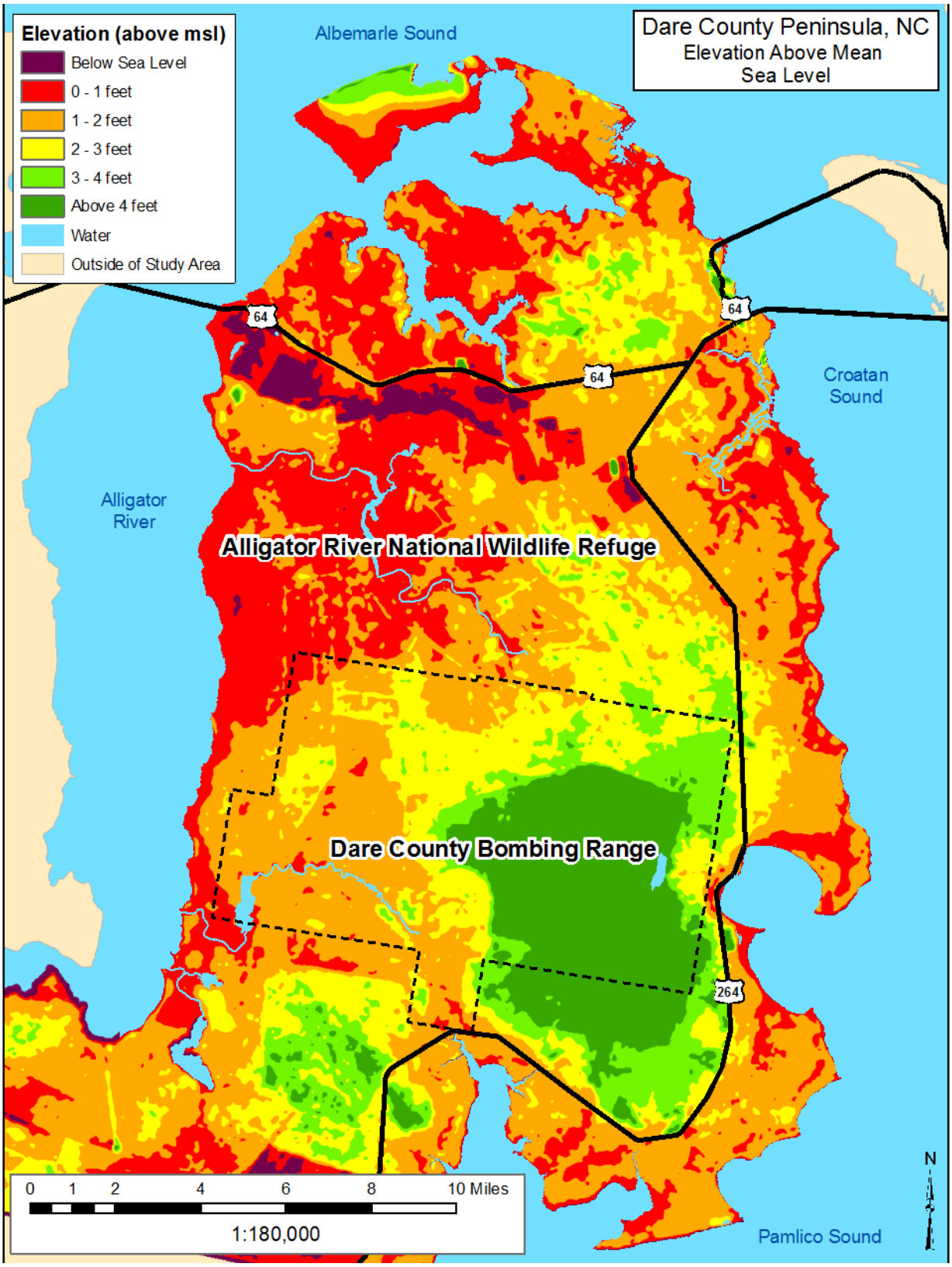

Figure 7. Dare County Peninsula Elevation

4.3 GEOLOGY AND SOILS

Deep organic soils provide a number of challenges to military operations and natural resources management on DCR. According to the Dare County Soil Survey, produced by the US Department of Agriculture (USDA) Soil Conservation Service, 40,504 acres on DCR are saturated or flooded organic muck soils, and 5,765 acres are wet mineral soils. While the topography of Dare County is extremely flat, the high organic content of the soil gives it a mucky texture that does not support weight adequately. Construction of any kind, including the establishment of targets on the impact areas, requires the addition of fill material or floating platforms to support the weight. Wheeled vehicles are unable to leave the road because they will sink immediately into the soil. Low ground-pressure tracked equipment is used with some success when operating off of the road system. Table 2.2 describes the limitations on building and road construction (without the use of engineering controls) for each soil series found on DCR. A soil series map may be found in Figure 2.5.

Table 4. Building and development limitations for each soil series that occurs on DCR.

Building and Development Limitations						
Soil Series	**Symbol**	**Acres**	**Organic Horizon Depth**	**Shallow Excavation**	**Small Commercial Buildings**	**Local Roads and Streets**
Cape Fear Loam	CaA	1,580.6	None	Severe: wetness	Severe: flooding, wetness	Severe: low strength, wetness
Hyde Loam	HyA	4,184.8	None	Severe: wetness	Severe: flooding, wetness	Severe: low strength, wetness
Roper Muck	RpA	2,658.9	13”	Severe: wetness	Severe: flooding, wetness	Severe: low strength, wetness
Ponzer Muck	PoA	4,646.7	24”	Severe: excess humus, wetness	Severe: subsides, flooding, wetness	Severe: subsides, low strength, wetness
Bellhaven Muck	BvA	9,043.9	38”	Severe: excess humus, wetness	Severe: flooding, wetness, low strength	Severe: wetness
Pungo Muck	PuA	24,021.2	65”	Severe: excess humus, wetness	Severe: subsides, flooding, wetness	Severe: subsides, wetness, low strength
Hobonny Muck	HoA	56.6	72+”	Severe: excess humus, wetness	Severe: flooding, wetness, low strength	Severe: wetness, flooding
Longshoal Mucky Peat	LfA	76.4	80”	Severe: excess humus, wetness	Severe: flooding, wetness, low strength	Severe: wetness, flooding
Water	W	350.1				

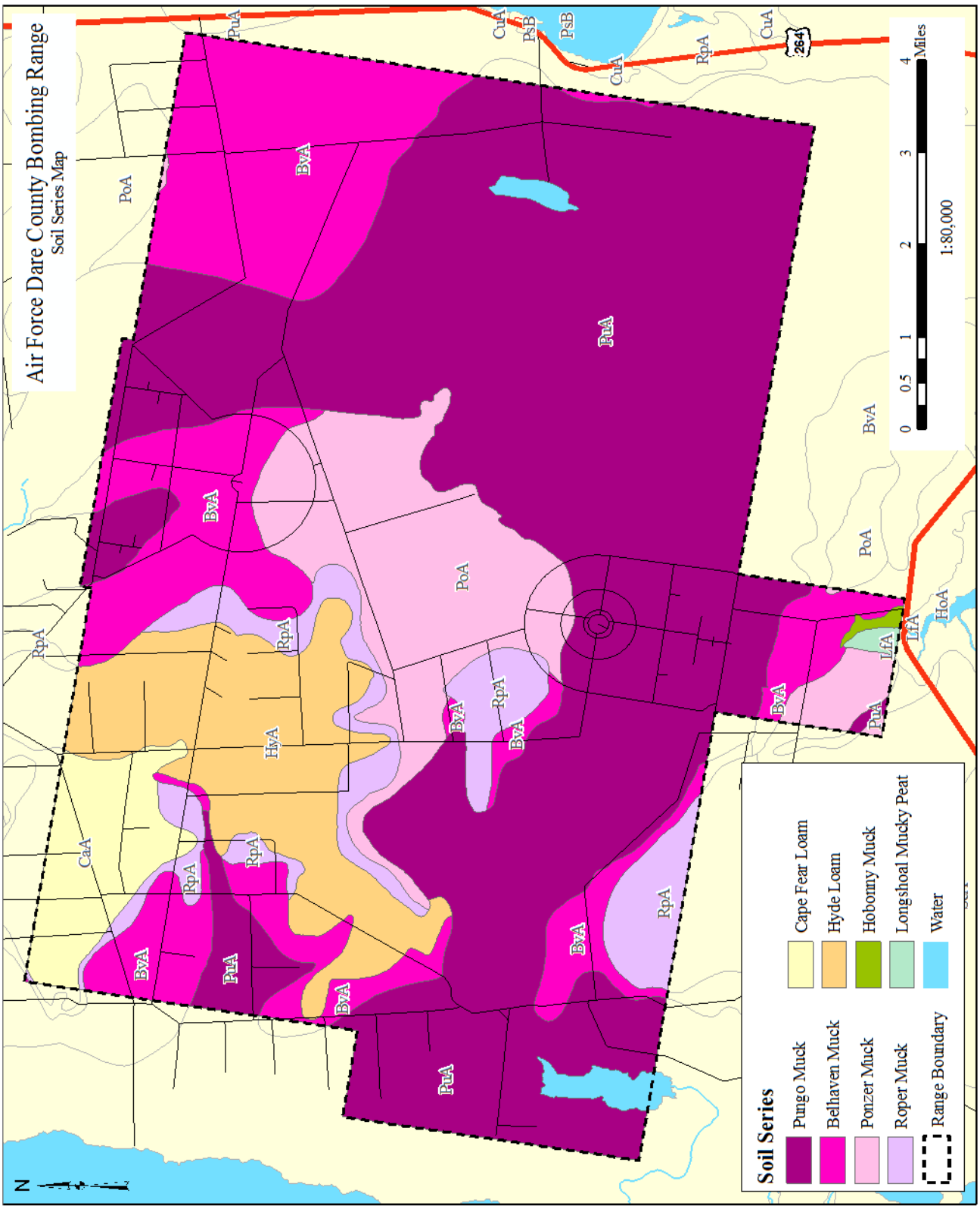

Figure 8. Soil survey of DCR

4.4 HYDROLOGY

Prior to USAF ownership of the property, logging roads were built by filling in roadbeds and dredging adjacent canals. These canals drain a network of lateral ditches, referred to as "v-ditches", which were established to enhance drainage of forested tracts for conversion to agriculture. The roadside canal system is tied to several large canals which drain into the water bodies surrounding the peninsula. After USAF took ownership, administrative areas with buildings and parking areas were constructed on filled wetlands. These activities took place prior to CWA legislation. Target areas have also been filled to allow for ease of maintenance and prevent them from sinking into the soft organic muck.

DCR contains 180 acres of non-wetland (i.e., upland) habitat. Lake Worth and Whipping Creek Lake make up 356 acres of lacustrine (lake) habitat. The remaining 46,083 acres (99%) of DCR are wetlands. The majority of this wetland area is forested or shrub-dominated "pocosin" wetland.

Section 404 of the Clean Water Act prohibits dredging or filling activities on wetlands or deepwater habitats adjacent to waters of the United States without a permit from the US Army Corps of Engineers. Ninety-nine percent of the land area of DCR is considered to be wetland habitat. In the past, wetland-altering projects have been mitigated on-site by restoring previously filled areas to wetland habitat. Dredge or fill actions to these areas would also require a Section 404 permit. Methods for mitigation must be considered before wetland-altering activities occur. Floodplains Designations are shown in Figure 9. Wetland Inventory Classifications are shown in Figure 13.

Floodplains are defined as low and relatively flat areas adjoining inland and coastal waters and include flood-prone areas of offshore islands. Due to Dare County's low elevation and low relief, the entire county is prone to flooding from wind tides, prolonged rainstorms, and tropical storms. Flood zones are delineated by the NC Floodplain Mapping Program based on detailed engineering studies in selected areas and limited detail studies in remaining flood hazard areas. The detailed studies include cross sections of stream beds, elevation based on LIDAR data, and hydraulic factors and other engineering data to determine which areas would be inundated by water under 100-year (1 percent annual probability) and 500-year flood conditions (0.2% annual probability). (figure 4.9)

On the eastern half of the bombing range, trees can be killed by saltwater overwash from coastal flooding. On saturated organic and mineral soils, flooding can reduce soil stability and lead to wind throw of shallow rooted species during windstorms.

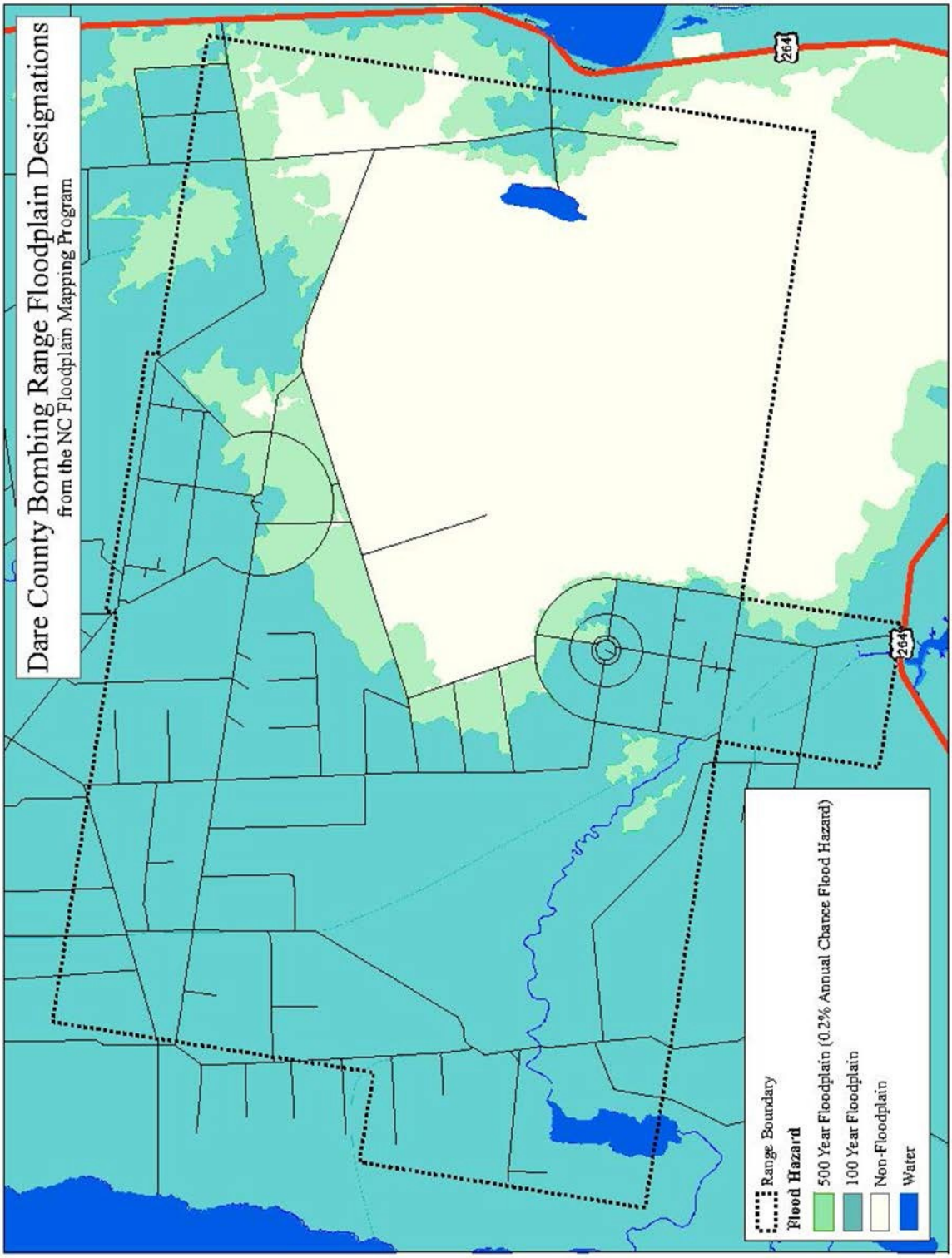

Figure 9. Floodplain Designations

5 ECOSYSTEMS AND THE BIOTIC ENVIRONMENT

5.1 ECOSYSTEM CLASSIFICATION

DCR resides in Bailey's ecosystem classification of Humid Temperate Domain, Outer Coastal Plain Mixed Forest Province (232). This province comprises the flat and irregular Atlantic and Gulf Coastal Plains down to the sea. Well over 50 percent of the area is gently sloping. Local relief is less than 300 ft (90 m), although some areas are gently rolling. Most of the region's numerous streams are sluggish; marshes, swamps, and lakes are numerous.
(http://www.fs.fed.us/land/ecosysmgmt/colorimagemap/ecoreg1_provinces.html)

The Environmental Protection Agency (EPA) classifies DCR Level III as Middle Atlantic Coastal Plain, and Level IV Swamps and Peatland (63c) after Omernik.
(http://www.epa.gov/wed/pages/ecoregions/level_iii_iv.htm)

Nonriverine swamps and peatlands are flat, poorly drained areas containing organic soils of peat and muck. The dark reddish-brown to black soils, acidic and nutrient-poor, often contain logs, stumps, and other woody matter from bald cypress and Atlantic white cedar trees. Pocosin lakes occur in some areas. The vegetation of the high and low pocosins contains a dense shrub layer, along with stunted pond pine, swamp red bay, and sweet bay. Swamp forests are dominated by swamp tupelo, bald cypress, and Atlantic white cedar. Fire during drought periods, logging, and construction of drainage ditches have affected natural vegetation patterns. Several areas of mineral and shallow organic soils have been drained and cultivated for crops of corn, soybeans, and wheat. (Griffith, G.E., Omernik, J.M., Comstock, J.A., Schafale, M.P., McNab, W.H., Lenat, D.R., MacPherson, T.F., Glover, J.B., and Shelburne, V.B., 2002, Ecoregions of North Carolina and South Carolina, (color poster with map, descriptive text, summary tables, and photographs): Reston, Virginia, U.S.).

Four coastal plain terrestrial ecosystems are found on DCR: pocosin, floodplain forest, nonalluvial mineral wetland, and tidal swamp forest and wetlands. The following sections (5.1.1 through 5.1.4) are excerpts from the 2005 N.C. Wildlife Action Plan describing the four terrestrial ecosystems found on the DCR.

5.1.1 Pocosin

Peatland communities on DCR include low pocosin, high pocosin, pond pine woodlands, peatland Atlantic white cedar forest, and bay forest. These communities occur on peatlands of poorly drained interstream flats, and peat-filled Carolina bay depressions and swales of the eastern coastal plain (Schafale and Weakley 1990).

Both high and low pocosins are extremely nutrient poor and acidic, with little normal nutrient input other than rainfall. Fires were historically associated with droughts, and fire frequency and intensity strongly influence vegetative structure dominance, composition, stature and diversity. Low pocosins are centrally located on peatlands and are the least productive and most stunted of all the pocosin habitats. True low pocosins are much rarer than high pocosins or pond pine woodlands and differ from the others by having a persistent low stature (<1.5m tall) of shrubby vegetation and sparse, stunted trees. High pocosins are intermediate between low pocosins and pond pine woodlands in terms of location, depth of peat, shrub height and density, and stature of trees. The shrub layer is typically 1.5-3 meters in height and trees still tend to be scattered and small in stature.

Pond pine woodlands occur on parts of domed peatlands on poorly drained soils and are found throughout the Coastal Plain (Schafale and Weakley 1990). These communities are wet and nutrient poor, and fire played a role in shaping them historically. In areas where frequent fires have occurred over long periods of time, the understory is dominated by switch cane (Arundinaria) and in general the less frequent the fire regime the greater the dominance by pond pine (Schafale and Weakley 1990). Red-cockaded woodpeckers exist in some of these pond pine-dominated sites.

Atlantic white cedar-dominated forests are found throughout the Dare County peninsula and usually exist as a mosaic with pond pine woodlands, bay forests, nonriverine swamp forests and other communities (Schafale and Weakley 1990). Their occurrence is determined by fire history as they become established after a catastrophic fire removes all competing vegetation. They usually occur as even-aged stands. AWC dominates in some remaining pocosins where fire is infrequent, but its overall abundance and distribution has been greatly reduced by lack of fire, logging and drainage (Schafale and Weakley 1990).

Bay forests occur throughout the outer and middle Coastal Plain and typically exist on DCR as a mosaic with pond pine woodlands, Atlantic white cedar forests, and nonriverine swamp forests (Schafale and Weakley 1990). Bay forests occur on shallow organic soils and the canopy is dominated by loblolly bay, sweet bay, and red bay. Bay forests are believed to be a late-successional community that replaces pond pine woodlands and Atlantic white cedar after a long absence of fire. Bay forests may be solely a product of fire suppression, or there may be sites which naturally supported them (Schafale and Weakley 1990).

Pocosins are particularly important for wintering birds because of the high amount of soft mast available. Greenbrier (Smilax spp.), red bay, sweet bay, and many ericaceous shrubs produce large quantities of berries that are persistent through much of the winter.

5.1.2 Floodplain Forest

The Coastal Plain floodplain forest habitat includes levee forest, cypressgum swamps, bottomland hardwoods, and alluvial floodplains with small poorly defined fluvial features (such as small stream swamps). Floodplain forest may be associated with blackwater rivers (originating in the Coastal Plain) or brownwater rivers (originating the Piedmont or Mountains but flowing into the Coastal Plain). The floodplain forest systems of the Coastal Plain in the southeast are now only small fragments and sections of the original millions of acres present before European settlement and have been lost or altered by development, drainage, agriculture and logging (Weller and Stegman 1977).

Bottomland hardwoods in blackwater systems occur on high parts of the floodplain away from the channel and are dominated by laurel oak, water oak, willow oak, overcup oak, red maple, sweetgum, loblolly pine, and occasionally Atlantic white cedar (Schafale and Weakley 1990). Shrub layers can be very dense and switch cane can be common. Vines can be dense, but usually not as dense as on levees, and the herb layer is usually sparse. Flooding occurs in these sites occasionally but they are seldom disturbed by flowing water like levees. These areas may carry fires (due to dense lower layers of vegetation) when dry and the occurrence of fire would affect the plant community composition and structure.

Cypress-gum swamps contain just a few tree species, tolerant of nearly permanent flooding: bald cypress, pond cypress, and swamp black gum. These communities get little input of nutrients and the infertile acidic soils and wetness produce slow growth in the trees (Schafale and Weakley 1990). The difference between cypress and gum dominance is probably related to logging history, but environmental factors such as flooding frequency and depth, water chemistry, soil type and latitude also contribute (Schafale

and Weakley 1990). Since cypress-gum swamps flood for long periods of time their vegetational diversity is usually low.

5.1.3 Nonalluvial Mineral Wetlands

These wetlands occur on poorly drained areas of the eastern Coastal Plain. Saturation is due to poor drainage and sheet flow from adjoining peatlands. Nonalluvial mineral wetlands are more nutrient-rich than pocosins, but not as rich as floodplain wetlands. In the wettest areas, bald cypress, swamp black gum, and red maple dominate. Where these areas transition to peatland, loblolly pine, pond pine, and Atlantic white cedar may also be present. In less saturated nonalluvial wetlands, trees characteristic of bottomland hardwood systems dominate: cherrybark oak, laurel oak, swamp chestnut oak, tulip poplar, sweetgum, American elm, and red maple.

Both nonriverine wet hardwood forest and nonriverine swamp forest communities exist in the outer Coastal Plain and both are seasonally saturated or flooded by high water tables (Schafale and Weakley 1990). Fire was unlikely an important part of these systems naturally, although some nonriverine wet hardwood forests did support canebrakes historically (Schafale and Weakley 1990). Nonriverine wet hardwood forests are typically drier than nonriverine swamp forests and have more bottomland hardwood species present in their canopy (Schafale and Weakley 1990).

The shrubby nature of some of these sites is thought to be related to logging and since they are easy to drain and make excellent farmland, most of these areas have been lost (Schafale and Weakley 1990).

5.1.4 Tidal Swamp Forest and Wetlands

These habitats occur along rivers or sounds in areas where flooding is influenced by lunar or wind tides. Fresh water input may heavily influence the salt content. Vegetation ranges from cypress-gum swamps, characterized by swamp black gum, water tupelo, and bald cypress, to freshwater marshes containing giant cordgrass, sawgrass, cattails, American threesquare, black needle rush, spike-sedges, southern wildrice, arrowhead, and marsh fern. Regularly flooded herbaceous sites are reported to have high productivity, equivalent to salt marshes (Schafale and Weakley 1990).

Invasive Phragmites forms dense patches to reduce plant and animal diversity in some places. Fire was likely a natural component of some of these communities and likely reduced dominance of large plant species and increased overall plant diversity (Schafale and Weakley 1990).

Areas that are forested have a canopy dominated by bald cypress, swamp black gum, water tupelo, a dense to open shrub layer and are influenced by lunar or wind tides with little or no salinity in the water (Schafale and Weakley 1990). Salt-water intrusion during major storm events can cause major disturbance to this community.

5.2 VEGETATION

5.2.1 Historic Vegetation

The region including the Dare County Range has a settlement history dating to over 400 years ago, and much of the landscape has been affected by human occupation during that time. Logging, draining of wetland soils and conversion to agriculture, and suppression of natural fire cycles have favored the establishment of some vegetation communities, and excluded others. In an effort to establish context for the management of natural resources at the bombing range, a Legacy Resource Management Program Project (05-252) developed maps of presettlement vegetation and fire frequency using the principles of

plant community ecology and landscape fire ecology. This represents the best knowledge available about the natural state of vegetation on the Range.

Prior to settlement, the eastern side of the Dare County peninsula experienced frequent wildfires in a highly flammable band of salt marshes which extended the length of the peninsula from north-south. These fires burned onto what is now the bombing range via a band of flammable canebrake vegetation immediately to the west. The boundary between brackish marsh and salt-intolerant canebrake likely occurs at the western limit of storm overwash. In contrast, on the west side, a fire-resistant cypress-gum swamp fringes the fresh waters of the Alligator River in a narrow band. The short fire interval marsh and cane communities of the eastern side and the long fire interval river swamp on the west comprise the extremes of a cross-peninsula fire frequency gradient. Between these extremes, a kilometer wide swath of canebrake graded into pocosin vegetation where fire frequency was low enough to allow the development of a dense shrub understory. To the west of the pocosin vegetation, a large-scale patch mosaic of wooded wetland ecotypes occurred at decreasing fire intervals. This mosaic was made up of pond pine (Pinus serotina) woodland, black gum (Nyssa biflora)/red maple (Acer rubrum) forest, pond cypress (Taxodium ascendens)/water tupelo (Nyssa aquatica) forest, loblolly bay (Gordonia lasianthus) forest, and Atlantic white cedar (Chamaecyparis thyoides) (AWC) forest. Fire-exposed pine-gum and fire-sheltered oak-pine forests occurred on mineral soil lenses in the peninsula's interior.

Beginning in colonial times, AWC has been the most valuable tree species in Dare County (Frost 1987). Cedar is prized for its strong, lightweight, rot-resistant wood, and was used for home construction, boat-building, buckets, and shingles. Colonial logging involved the harvesting of trees located near waterways, where barges could be used to transport the trees to saw mills. Large-scale harvesting became possible when steam locomotive power was introduced in the mid-1800s. Using a network of narrow-gauge railroads, loggers were able to harvest and transport previously inaccessible timber. Following the American Civil War, Buffalo Timber Company of New York purchased more than 100,000 acres on the Dare mainland (Degregory 1994) and established a logging town at Buffalo City (Cumming 1966). By 1919, near the end of World War I, about 3,000 residents lived and worked in Buffalo City. Cedar trees as small as eight inches in diameter (dbh) were harvested, with little regard to regeneration. The Buffalo Timber Company closed in 1907, having exhausted all accessible virgin cedar. The Dare County Lumber Co. bought the land in the same year and re-invigorated the town, by harvesting loblolly and pond pine, which had been ignored by Buffalo Timber. Pine logging began to wind down by 1928 and a third company, Duvall Brothers, operated a mill for shingles and other products from second growth white cedar from the 1930s (Tate 2000) until World War II. By 1950, there were fewer than 100 residents left, and the town was abandoned when the sawmill closed for good. With exception of a few of the most inaccessible pockets of unmerchantable timber, the entire Dare peninsula appears to have been logged of merchantable timber during the 50 year period between 1870 and 1928. The declining operations up until 1950 likely were fueled by stands that regenerated from the late 19th century clearcuts and small stands previously considered not worth cutting.

The intensive harvest of AWC between 1870 and 1930 had an impact on the present-day vegetation composition of Dare County, but because of the use of railroad logging, ditching and drainage structures were not used, and the hydrology of the area was not substantially impacted. Beginning in the 1970s, Atlantic Forest Products began lumbering operations to harvest all accessible AWC stands. Direct access to the timber resource was accomplished by constructing a road network with associated canals and drainage. The effect of this hydrologic alteration is still somewhat unknown, though it appears that roads are interrupting sheet flow on portions of the range. By 1989, logging operations had ceased and timber rights reverted to the USAF. Remaining stands of cedar were either immature or too far from roads to be

harvested economically. The USAF is the first entity to plan for regeneration following timber harvests on the Dare County peninsula.

Using the National Vegetation Mapping and National Vegetation Classification System, (http://biology.usgs.gov/npsveg/nvcs.html), a 2004 vegetation mapping project identified and mapped twelve plant communities, or alliances, on DCR. A map of the vegetation alliances that occurred on DCR prior to the 2011 catastrophic wildfire can be found in Figure 10, and the extent of each alliance is described in Table 5. A vegetation alliance map of the entire Dare County peninsula is shown in Figure 12.

The extent of vegetation alliances defined by the National Vegetation Classification identified on DCR in 2004:

Table 5. DCR Vegetation Alliances.

Alliance	Acres	Percent
Atlantic White-cedar Saturated Forest Alliance	3,062.9	7.4%
Bald-cypress - Swamp Blackgum - (Water Tupelo) Saturated Forest Alliance	919.8	2.2%
Laurel Oak - Swamp Blackgum Saturated Forest Alliance	123.6	0.3%
Honeycups - Shining Fetterbush - (Big Gallberry, Little Gallberry) Saturated Shrubland Alliance	4,211.7	10.2%
Loblolly Pine - Atlantic White-cedar - Red Maple - Swamp Blackgum Saturated Forest Alliance	3,440.0	8.4%
Loblolly Pine - Sweetgum - Red Maple Saturated Forest Alliance	839.0	2.0%
Loblolly Pine Saturated Forest Alliance	1,695.8	4.1%
Pond Pine Saturated Woodland Alliance	15,589.5	37.9%
Saltmeadow Cordgrass - (Saltgrass) Tidal Herbaceous Alliance	108.9	0.3%
Shining Fetterbush - Little Gallberry Saturated Wooded Shrubland Alliance	4,584.0	11.1%
Swamp Blackgum - Red Maple - (Yellow-poplar) Saturated Forest Alliance	6,490.5	15.8%
Sweetbay - Swampbay Saturated Forest Alliance	54.1	0.1%
Administrative	4,747.2	11.5%
Surface Hydrology	751.8	1.8%
Total	46,619.0	

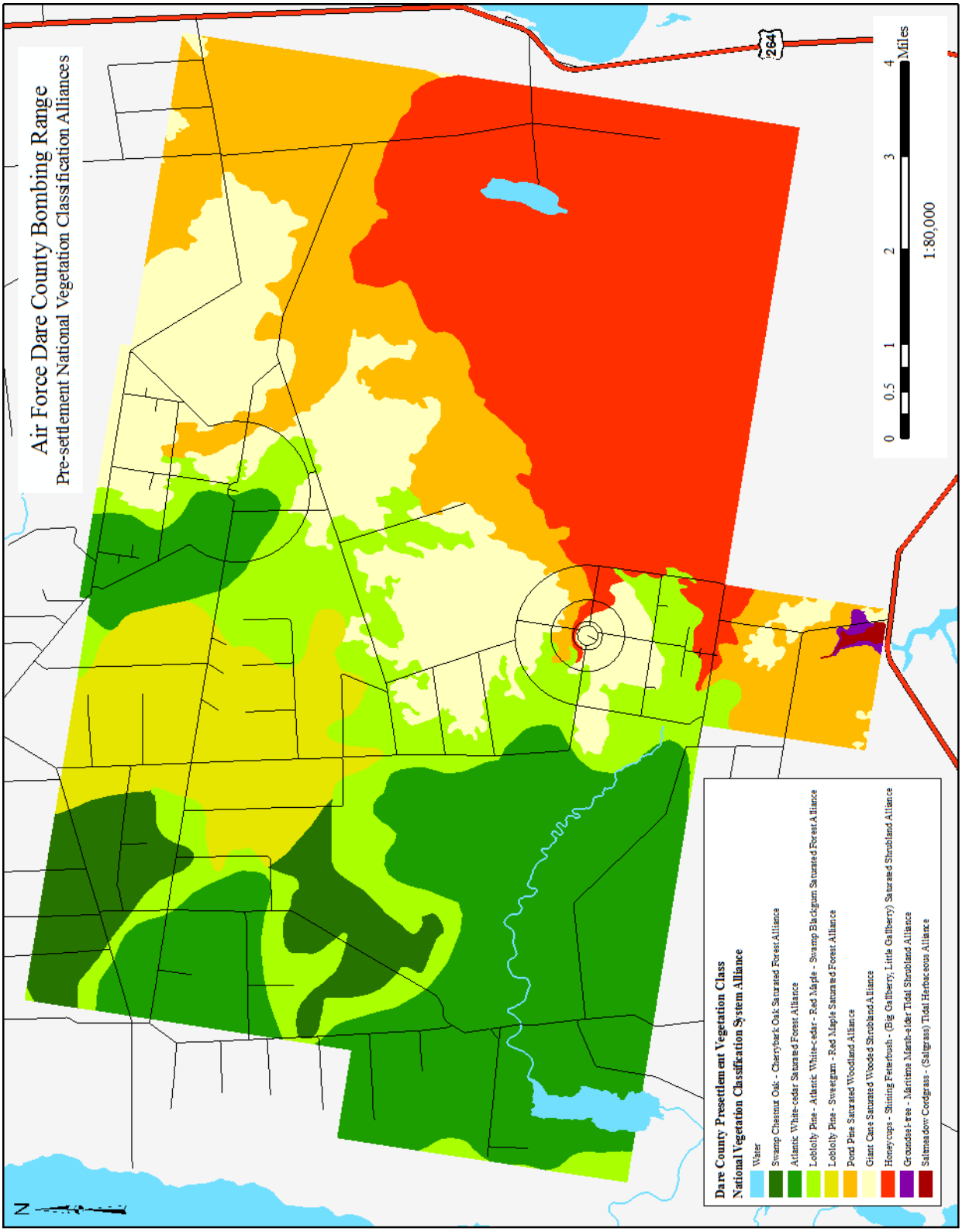

Figure 10. DCR Vegetation Alliances

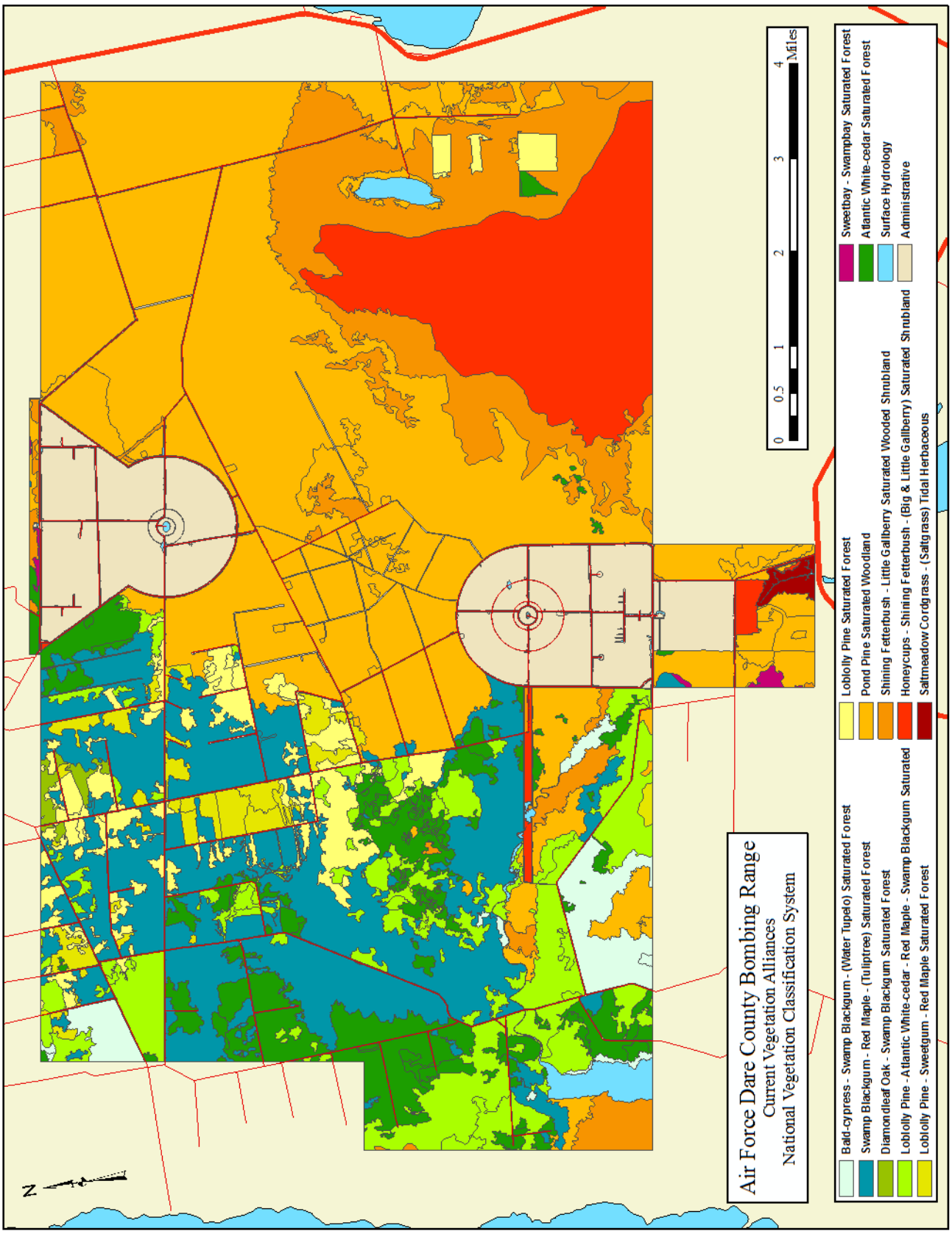

Figure 11. DCR Vegetation Classification

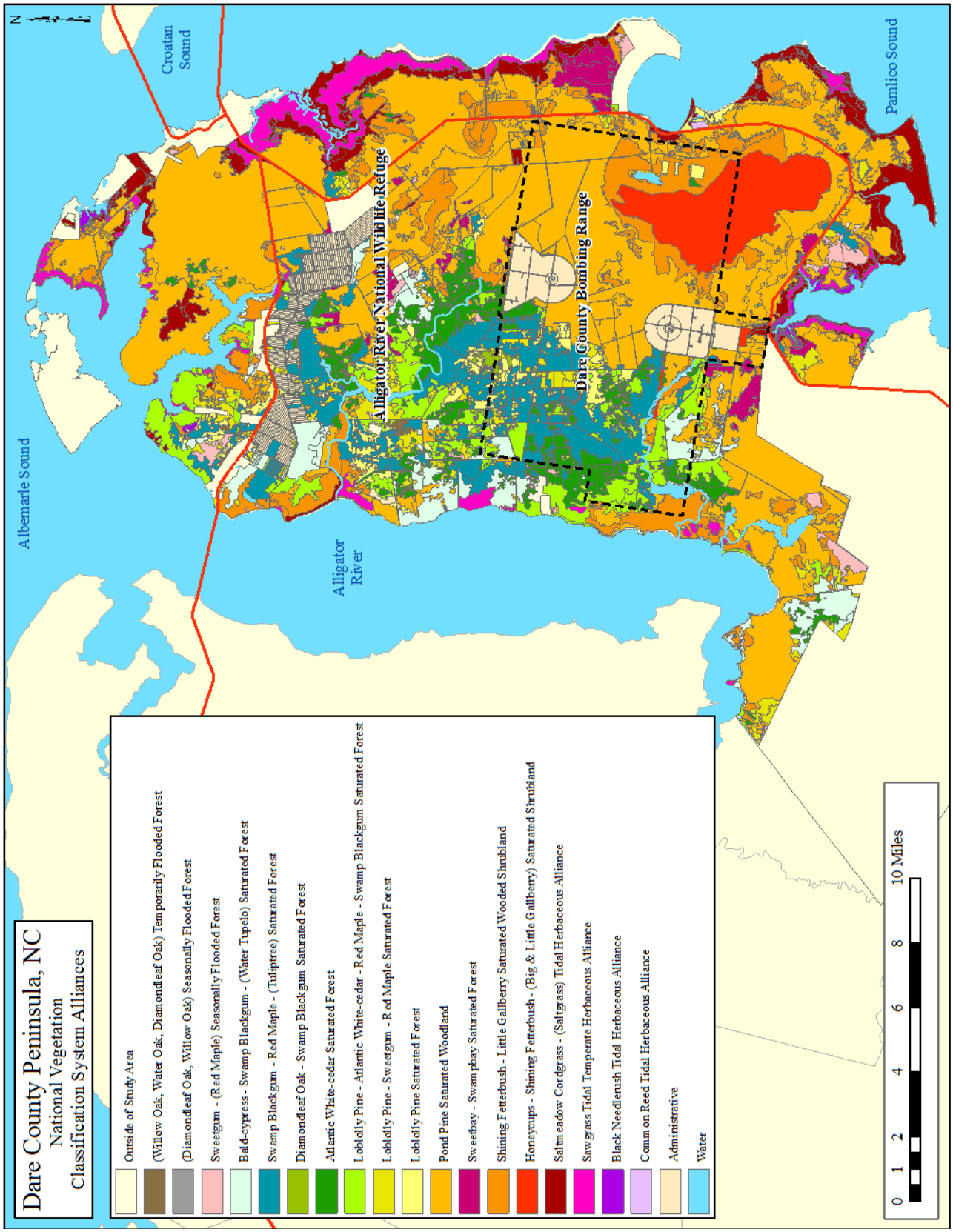

Figure 12. Dare County Peninsula Vegetation Classification

5.2.2 Rare Plants

The Air Force conducted an ecosystem survey in 1994. The final report, Ecosystem Survey of Dare County Air Force Range, North Carolina, contains a survey of vascular plants, and includes Federally listed endangered, threatened, or candidate species; State listed endangered, threatened, special concern, and candidate species; and species designated as significantly rare by the North Carolina Natural Heritage Program. The Natural Heritage Program also includes watch list species, which are species that are rare or otherwise threatened with serious decline, but which lack current information to justify placement on Federal or State lists.

Peltandra sagittifolia (Spoonflower)

Spoonflower is a southern bog species and is at its northern range limit in Dare County. Plants were found at three locations on DCR: (1) two target sites within the Air Force impact area; (2) two former Atlantic white cedar harvest areas adjacent to the Navy impact area; and (3) in two areas of high pocosin adjacent to Jackson Road and east of the Air Force impact area. The primary threat to the species is shade intolerance from regenerating forest and shrub species in former harvest areas and the Air Force impact area.

Rhynchospora alba (Northern White Beaksedge)

Northern white beaksedge is a northern bog species which is found at its southeastern range limit on Dare County Range. Plants were found at four locations: (1) throughout the low pocosin between the Air Force impact area and US 264; (2) a former forest harvest site northwest of the Navy impact area; (3) several sites within the Air Force impact area; and (4) in high pocosin/pond pine woodland east of the Air Force impact area. Plants found in former forest harvest areas are likely threatened by forest regeneration and subsequent shade intolerance. Plants found in disturbed sites on the impact areas are threatened if disturbance becomes widespread and at a greater frequency.

Vaccinium macrocarpon (Cranberry)

Cranberry is a northern evergreen shrub bog plant that, within North Carolina, is largely restricted to Dare County on the Coastal Plain. The population on DCR is likely the largest occurrence this far southeast. The survey found plants at three locations: (1) several sites in the Air Force impact area; (2) in pond pine woodland adjacent to Jackson Road and west of Long Curve Road; and (3) throughout the low pocosin between the Air Force impact area and US 264. Threats to the populations include shade intolerance from forest regeneration and increases in disturbance in the impact areas and ditch network.

Eleocharis equisetoides (Horsetail Spikerush)

Horsetail spike-rush is an aquatic, perennial plant in the sedge family. Horsetail spike-rush is primarily a species of the southern Atlantic and Gulf coastal plains. Horsetail spike-rush begins flowering in late spring and fruits from July to October. Plants were located on the Air Force impact area.

Eleocharis parvula (Little-spike Spikerush)

These green, grass-like perennial herbs can be recognized by the oval-shaped, brownish-flowering spikes at the tips of smooth, round stems. These spike-rush species grow individually or in clumps along shorelines or in shallow water, sometimes forming ankle-high turf-like mats. Spikerush is adapted to fluctuating water levels and prolonged soil saturation, and is drought and shade intolerant. Plants were found in the tidal freshwater marsh near Stomper Road.

Eriophorum virginicum (Tawny Cottongrass)

Tawny Cottongrass is a member of the sedge family, and not a grass species. In order to make the best of the nutrient poor bog environment, scientists report this and many other species of cotton-grass recycle their own nutrients. The population on DCR is one of the largest in North Carolina. Plants were found on the Air Force impact area and in frequently burned high pocosin areas east of the impact area.

Habenaria repens (Water-spider Orchid)

This plant is remarkable in sometimes being truly aquatic. Often forming floating mats, the plants are commonly decumbent, and new shoots and slender roots arise abundantly from much of the length of the stem. The species reaches its northern limit in Dare County. Plants were found in strafing pools on the Air Force impact area.

5.2.3 Invasive Plant Species

The common reed (Phragmites australis) is a warm-season perennial member of the grass family that becomes established in open areas, especially after a disturbance. Phragmites is native to many parts of the United States, but considered invasive in North Carolina. In Dare County, it has become increasingly common along ditch banks and in cleared areas, forming dense single species stands. By aggressively colonizing wet areas on DCR, it reduces the amount of light, water, and nutrients available to native species. This displaces native plant and animal communities, disrupting ecological processes. The North Carolina Native Plant Society lists Phragmites as a "Severe" threat on the Invasive Exotic Plant List due to its fast-spreading nature and lack of value to native species. Glyphosate-based herbicides may be applied in late summer/early fall after the plant has flowered to control established populations. Prescribed burning late in the growing season also may be effective. Mowing and biological control have not proven to be effective controls.

5.3 FISH AND WILDLIFE

Dare County is diverse with animal species. DCR and ARNWR combined offer a large expanse of open land for animals to thrive with relatively little pressure from humans. Large mammals include the American black bear (Ursus americanus), white-tailed deer (Odocoileus virginianus), and red wolf (Canis rufus). Abundant small mammals include eastern gray squirrel (Sciurus carolinensis), eastern cottontail (Sylvilagus floridanus), American woodcock (Philohela minor), raccoon (Procyon lotor), opossum (Didelphis marsupialis), and bobcat (Lynx rufus). Game bird species include eastern bobwhite quail (Colinus squamata), and mourning dove (Zenaida macroura).

5.3.1 Game Species

5.3.1.1 Black Bear

The American black bear (*Ursus americanus*) inhabits wooded and mountainous areas throughout most of North America, from Alaska to Florida, Canada to Mexico. Black bear populations in Virginia and North Carolina are found in the western mountainous regions and along the coastal plain of these two states. Until the 1970's, bear populations were declining in North Carolina and Virginia due to harvesting and habitat loss. NCWRC established bear sanctuaries, the majority of which were on the coastal plain, to stop this trend. In the 1990's increased bear sightings, human interactions, and death of bears due to vehicular collisions, caused politicians to request the reopening of bear hunting in Dare County (Allen, 1999).

A two-year black bear study conducted by Virginia Tech and funded by the Air Force was initiated in 2002. The objective of this project was to determine population density and distribution, sex ratio, and

genetic relatedness using hair trap samples and genetic analysis (DNA). Results estimated that population densities at ARNWR and DCR are 0.65 to 1.12 bears per square kilometer.

Based on eleven years of research (see Appendix 4 for more information), discussions, and observations, the USAF proposed a limited black bear hunt be initiated on the range. The NCWRC reviewed the proposal and agreed to administer a limited, highly restricted hunt in the fall of 2005. Deemed a success, limited black bear hunting continues at DCR. Data collected from all harvested bears will be used for future population management decisions.

Current habitat conditions at DCR are very favorable for black bears. The reintroduction of prescribed fire as a habitat management tool will positively impact black bears habitat.

5.3.1.2 White tail deer

The white-tailed deer (*Odocoileus virginianus*) is a medium-sized deer found throughout most of the continental United States, southern Canada, and Mexico. The deer can be recognized by the characteristic white underside to its tail, which it shows as a signal of alarm by raising the tail during escape.

White-tailed deer is the primary game species hunted on DCR. Hunters utilized the buffer lands surrounding the Air Force and Navy impact areas long before the Air Force purchased the property. Historically, deer management on the Range has been passive with baseline surveys being the only documented deer management activity.

Based on vegetative studies, deer habitat at DCR is categorized as minimal to moderate. Prescribed burning is being reintroduced to the range, but in a limited capacity. In the absence of fire, the underbrush and midstory is extremely difficult to control. Increased midstory density leads to a reduction of browse and therefore a reduction of deer health and numbers. Since the summer of 2000, supplemental food plots have been planted on several roads and firebreaks in an attempt to improve herd health and quality. Food plots will not be used as a means to support game populations above the normal carrying capacity of the natural habitats.

5.3.2 Small Game

Numerous species of small game animals inhabit DCR, most notably eastern bobwhite quail (*Colinus squamata*), mourning dove (*Zenaida macroura*), American woodcock (*Philohela minor*), eastern gray squirrel (*Sciurus carolinensis*), eastern cottontail (*Sylvilagus floridanus*), raccoon (*Procyon lotor*), opossum (*Didelphis marsupialis*), and bobcat (*Lynx rufus*). Population estimates have not been determined for these species. It is believed that these species receive very little hunting pressure on DCR.

The supplemental food plots established along roadsides and firebreaks for white-tailed deer also provide benefits for small game species. Multiple hurricanes have resulted in excellent roadside cover and concealment and this improved habitat has allowed small game populations to flourish. Small game populations benefit from other management projects and there is not a need for active management of small game at this time.

5.3.3 Non Game Species

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% of the faunal diversity. Among southeastern states, North Carolina contains some of the highest species diversity rates— the state ranks fourth in the number of total vertebrate species, with more amphibians

than any other state in the nation and more mammal species than any other state east of Texas (North Carolina Wildlife Action Plan).

DCR supports many non-game species. There are no plans to actively manage non-game species as population numbers are not at critical levels for any species.

5.3.4 Invertebrates

An invertebrate survey conducted by TNC in 1994 recorded nine genera with 218 species and 6,207 individuals. The insect inventory concentrated primarily on Lepidoptera, one of the 28 currently recognized orders of insects. Grasshoppers, katydids, dragonflies, and tiger beetles were surveyed at a lesser sampling frequency. Within the Lepidoptera, only the so-called "macro-lepidoptera" was surveyed in detail. This group is composed of the butterflies and twelve closely allied families of higher moths. It includes roughly half of all the Lepidoptera that have been identified in North America and almost all the larger, more familiar species (e.g., those included within field guides to insects).

5.3.5 Reptiles and Amphibians

An ecosystem survey conducted by TNC, 1994, did not observe any rare amphibians and recorded only the possibility of three rare reptiles (not including the American alligator which is known to be present). The only likely place for rare amphibians to occur is Long Shoal River at the southern boundary. At this site, the Carolina water snake (*Nerodia sipedon williamengelsi*) (State: Special Concern) and northern diamondback terrapin (*Malaclemys terrapin terrapin*) (State: Special Concern) may be occasional visitors. Though there are no published records of the pygmy rattlesnake (*Sistrurus miliarius*) in Dare County (NCNHP files), it does occur in neighboring Hyde County, and may occur within the southwestern corner of DCR.

The report “Monitoring and Management of a Sensitive Resource: A Landscape-level Approach with Amphibians”, 2001, was contracted under the Legacy Program. Amphibian populations were sampled at the range in 1999 and 2000. The surveys located a total of 14 species of frogs and toads, four species of salamanders, 7 species of turtles, 5 lizard species, and 17 species of snakes. Only amphibian species were addressed in the report. No threatened, endangered or rare amphibian species were encountered during the 2 year survey. 28

5.3.6 Fish

There are three main bodies of water on DCR; Whipping Creek Lake, approximately 328 acres; Whipping Creek, approximately 10 acres; and Lake Worth, approximately 135 acres. There are also canals associated with the majority of the roads on the Range.

In 1985, the NCWRC conducted two 0.1-acre rotenone samples of Whipping Creek Lake. The species composition from the 1985 sample was nearly identical to a much more extensive rotenone survey done in 1964. A 1990 trap net survey appeared to be selective as fliers (*Centrarchus macropterus*) made up 89 percent of the catch. Assuming that no major changes occurred in the lake’s fish population since 1985, the 1990 survey, using trap nets, clearly underestimated the lake’s total species diversity.

The trap net sampling did provide insight into the flier population of Whipping Creek Lake. Fliers appear to be very abundant in the lake, with over 100 specimens caught. Given the low productivity of such low pH backwater lakes (Whipping Creek Lake pH was 4.8), the length/frequency analyses and length/weight plots indicate very reasonable growth rates. The lack of small fliers in the samples could imply poor recruitment. However, the absence of small fish was probably a function of gear selectivity.

5.3.7 Waterfowl

Waterfowl at DCR utilize Whipping Creek Lake, Whipping Creek, the impact areas, and roadside canals. The wood duck (*Aix sponsa*) is the most numerous species, particularly at Whipping Creek and the canals. Other species, such as mallards (*Anas platyrhynchos*) and Canada geese (*Branta canadensis*), migrate through the area, and Tundra Swans (*Olor columbianus*) are observed on occasion, especially in the flooded areas of the Navy impact area.

The installation of artificial nesting boxes is routinely done to benefit wood ducks; however studies at adjacent ARNWR determined that the use of artificial nesting boxes by wood ducks was minimal due to the numerous natural cavities found in the area. Waterfowl utilizing DCR appear to be healthy and there is no need for active management at this time.

5.3.8 Resident Birds

A list of birds likely to use the habitats on and around DCR was generated based on recent surveys and historical documents. This data was compiled by the North Carolina NHP, and included in the 1995 report "Ecosystem Survey of Dare County Air Force Range, North Carolina."

DCR's mission is to provide a bombing range for aircraft. Due to the hazards associated with birds and flying aircraft, the Air Force policy precludes any projects designed to increase use of the range by birds. While recruitment of bald eagles and peregrine falcons is not desirable by the Air Force, a comprehensive BASH (Bird Airstrike Safety Hazard) program is in place and pilots are trained to avoid situations that increase bird strike possibilities. Management of the buffer lands as a natural area provides numerous benefits to bird species.

5.3.9 Migratory Birds Management

DCR offers excellent habitat and open space for a variety of migratory birds and their presence is an important indicator of ecosystem health. Migratory bird management at DCR is predicated on compliance with the Migratory Bird Treaty Act of 1918 (MBTA), and implementation of migratory bird management actions in accordance with Executive Order 13186, Responsibilities of Federal Agencies to Protect Migratory Birds; and support the goals and efforts of numerous regional migratory and game bird conservation programs.

The MBTA was originally drafted to protect birds that migrated across international borders; however it now protects most non-migratory species as well. The MBTA prohibits many actions that may have negative effects on migratory birds, most notably the killing, collection or transport of birds.

Executive Order 13186 outlines responsibilities of federal agencies to protect migratory birds. The Order states that any federal agency "taking actions that have, or are likely to have, a measurable negative effect on migratory bird populations is directed to develop and implement a Memorandum of Understanding (MOU) with the Fish and Wildlife Service (Service) that shall promote the conservation of migratory bird populations."

The EO requires agencies through the MOU to support the conservation intent of previous migratory bird treaties, restore and enhance habitat, and prevent and abate pollution that impacts bird habitat when practicable. The EO also supports establishing partnerships with non-Federal entities.

5.4 THREATENED AND ENDANGERED SPECIES

The primary purpose of the Endangered Species Act is the protection and conservation of endangered and threatened species and the ecosystems upon which they depend (http://www.fws.gov/Endangered).

The Endangered Species Act has five primary requirements: to conserve listed species, to "consult" and "confer", to conduct a biological assessment, to not "jeopardize" listed species, and to not "take" listed fish and wildlife species or to remove or destroy listed plant species without a permit.

The classification system for the ESA is:

- Endangered (E): a species in danger of extinction within the foreseeable future throughout all or a significant portion of its range;
- Threatened (T): a species likely to become endangered within the foreseeable future throughout all or a significant portion of its range;
- Proposed (P): any species of fish, wildlife, or plant that is proposed in the Federal Register to be listed under Section 4 of the Endangered Species Act;
- Similar in Appearance (SAE/SAT): a species that is included on the list due to it's similarity in appearance to a threatened or endangered species;
- Essential experimental population (XE): experimental population whose loss would appreciably reduce the prospect of survival of the species in the wild. All other experimental populations are Nonessential (XN). (Experimental Population is a population of a listed species that is wholly separate geographically from other populations of the same species and may be subject to less stringent prohibitions than are applied to the remainder of the species to which it belongs).

Three Federally listed animal species found on DCR are the red cockaded woodpecker (RCW), red wolf, and American alligator. The American alligator is technically recovered, but remains listed due to its similarity in appearance to the American crocodile. Impacts to the alligator are not expected and USAF does not foresee any consultation requirements during implementation of this INRMP. Red wolves that were released on ARNWR and have since dispersed onto DCR are considered an experimental release population. Due to the experimental population determination, some ESA requirements are relaxed for the red wolf. USAF does address red wolf concerns in management activities, but formal consultation is not expected to be needed.

The RCW is the only species for which 4 CES/CEIE has active management projects planned and regularly consults with USFWS. In 2007, an ESMP was coordinated with USFWS and was reviewed and signed by the RCW Recovery Coordinator and Raleigh Field Office Supervisor. Because of dramatic changes to the landscape (subsequent loss of RCW habitat) due to the 2011 Pains Bay Wildfire, and modified management strategies – this INRMP will serve as an update to the ESMP. The Air Force has not engaged in formal consultation for any activities at DCR for the RCW and does not foresee the need to do so during the implementation of this INRMP.

5.4.1 Federally Listed species

Table 6. Federally Listed Species

Group	Scientific Name	Common Name	Federal Status (State Status)
Amphibian/Reptile	*Alligator mississippiensis*	American Alligator	T (T)
Birds	*Picoides borealis*	Red-cockaded Woodpecker	E (E)
Mammals	*Canis rufus*	Red Wolf	E (E)

E – Endangered, T – Threatened;

5.4.1.1 *Alligator mississippiensis* (American Alligator)

The American alligator (Alligator mississippiensis) was once threatened with extinction but the population has recovered and is considered stable throughout its range. In 1987, it was reclassified as

SAT due to its similarity in appearance to the endangered American crocodile (Crocodylus acutus). The American crocodile is limited to southern Florida in the US, and will not be mistaken with the American alligator in Dare County, but federal protection for the alligator applies throughout the US. Because the alligator is considered recovered, actions that may affect the species do not require consultation.

The American alligator is a large distinctive freshwater reptile species that occurs from the Gulf coast states north along the Mississippi river to Arkansas, and north along the Atlantic coast to the Albemarle Sound in North Carolina. The Dare County mainland represents the northernmost distribution of the species. Alligator habitat includes wetlands, bottomland swamp, ponds, sloughs, marshes and slow moving streams. Prime habitats are areas with high water quality and low water turbidity. On DCR, the primary habitat for this species is found in and around Whipping Creek Lake, though it can also be found in the creek itself and canals surrounding the impact areas. Due to the remote nature of this species' habitat, interactions with humans are rare and generally uneventful.

Alligator surveys conducted on the Dare County peninsula indicate that alligators generally occur in very low densities on the range and the Refuge. Survey methods included road counts, helicopter surveys, nest surveys, and hatchling counts. Not all survey methods were conducted every year (Alligator Surveys of DCR and ARNWR, 1993 and 1994, p. 4).

Population estimates on DCR in 1993 were twenty-five to thirty-five alligators and in 1994 were forty-six to sixty animals (Alligator Surveys, Tables 2). Data gaps currently exist due to the limited scope and variance in types of surveys performed in different years (Alligator Surveys, 1994, p. 13). According to the ESDCAFR, there is little interaction between alligators and humans on DCR and consequently there are few threats to alligators at the Range.

5.4.1.2 *Picoides borealis* (Red-cockaded Woodpecker)

The red-cockaded woodpecker (Picoides borealis) (RCW) is a federally listed endangered species endemic to open, mature and old growth pine ecosystems in the southeastern United States. RCWs were listed as endangered (E) in 1970 and given federal protection with the passage of the Endangered Species Act in 1973 (USFWS Recovery Plan, 2003). The species is federally listed as endangered due to the widespread disappearance of its primary habitat type, longleaf pine forests, through extensive harvest and exclusion of fire. Fire is an important process in nesting habitats because it reduces understory and hardwood species that the birds find undesirable. Foraging habitat is similar, though a wider range of understory densities are acceptable.

Historically, this woodpecker's range extended from Florida to New Jersey, as far west as Texas and Oklahoma, and inland to Missouri, Kentucky, and Tennessee. Today the RCW is found from Florida to Virginia and west to southeast Oklahoma and eastern Texas, representing about one percent of the woodpecker's original range.

RCWs are a cooperative breeding species, living in family groups that typically consist of a breeding pair with or without one or two male helpers. RCWs are non-migratory with individual families or groups maintaining year round territories. A group usually consists of two to four individuals before nesting and four to six birds after the young have fledged. Clutch size averages three to five eggs with a 10-day incubation period which typically occurs late April to early May.

RCWs are one of the few species that construct cavities in living pine trees. They use live trees because the resin that is exuded creates a barrier to prevent climbing snakes from depredating the nest. RCWs at DCR nest in pond pines and loblolly pines.

On DCR, RCWs historically nested in mature pond pine trees in mature stands of pond pine woodland, where past fire history created the open conditions necessary for habitat. Effective fire suppression had allowed the encroachment of hardwood and shrub vegetation, and the habitat quality declined as a result. Active management activities to improve woodpecker habitat included mechanical chopping of underbrush, thinning, and prescribed fire. Recent research and discoveries of RCW utilization in pond pine habitat, coupled with habitat loss at DCR due to the Pains Bay Wildfire (2011) have resulted in changes in management strategies.

Three natural community types, pond pine woodland, high pocosin and nonriverine swamp forest are considered, either wholly or in part, as current or potentially suitable nesting and foraging habitat. Pine plantation is also classified as RCW habitat though it is a human artifact community. All stands 30 years old or older in pond pine woodland and pine plantation (former pond pine woodland), are considered current habitat. Clearcuts, standing dead timber, stands less than 30 years old and stands with less than 50 percent pine in the overstory constitute potentially suitable habitat in these three community types.

5.4.1.3 *Canis rufus* (Red Wolf)

The red wolf (Canis rufus) was listed as an endangered species in March 1967 under the Endangered Species Protection Act, and protection was continued under the Endangered Species Act of 1973. The red wolf was historically found throughout the southeastern states where its habitat was the vast bottomland forests (ESDCAFR, 1995, p. 7-30).

The red wolf is a medium sized canine smaller than the more common gray wolf (*Canis lupus*), which does not occur in North Carolina. Adults have coats that vary from brown and gray to cinnamon and yellow. They may be confused with the smaller coyote (*Canis latrans*), with which they sometimes hybridize. Red wolves are social animals that live in packs consisting of a breeding adult pair and their offspring of different years, typically five to eight animals. Red wolves prey on a variety of wild mammals such as raccoon, rabbit, white-tailed deer, nutria, and other rodents. Most active at dusk and dawn, red wolves are elusive and generally avoid humans and human activity (http://www.fws.gov/alligatorriver/).

The red wolves in Dare County are considered an experimental endangered population that is recovering from the brink of extinction. By the mid-1980s, red wolves were considered extinct outside of captivity. A captive breeding and reintroduction program established a population in Dare County and the nearby USFWS Pocosin Lakes National Wildlife Refuge in 1987. Beginning in 1987, captive bred red wolves were released on ARNWR and have since expanded onto neighboring wildlife refuges, private land and DCR. Current population estimates by ARNWR estimates 100-125 animals in Dare County (pers. comm. Michael Morse, USFWS, 10 Sep 07).

No management recommendations have been made for this species, which is receiving intensive study from the Fish and Wildlife Service. There are no major threats to the red wolf on DCR although some wolves have been struck by automobiles on adjoining highways and there is the possibility of a wolf being mistakenly shot or trapped (ESDCR, 1995, p. 7-30). The shooting/hunting of coyotes is prohibited on DCR due to this possibility.

Red wolves have successfully inhabited and reproduced on DCR and do not impact military operations, nor appear to be negatively impacted by military activities. Due to their stable population on DCR and intense management on adjacent ARNWR, 4 CES/CEV has not programmed any projects to actively manage red wolf populations during the implementation of this INRMP, however, the 4 CES/CEV staff is

available to assist ARNWR wolf recovery biologists when needed. Through annual reviews with USFWS and NCWRC, red wolf management will be discussed and any emergent needs addressed.

5.4.1.4 Other Species of Concern

The Ecosystem Survey of Dare County Air Force Range, North Carolina, 1995, reported that three additional species were noteworthy for additional monitoring on DCR. The northern diamondback terrapin, the Carolina salt marsh snake, and the black rail were found on ARNWR in the Long Shoal River marshes, south of US 264. Their habitat, the Saltmeadow Cordgrass - (Saltgrass) Tidal Herbaceous Alliance, extends north of US 264 onto 109 acres south of the Air Force impact area, and therefore it is possible these three species could be on DCR. It was noted however, that wildland fire suppression and no prescribed burning of this area has likely rendered the area unsuitable as habitat for these three species.

Table 7. Species of concern found on adjacent lands on ARNWR

Group	Scientific Name	Common Name	State Status (Federal Status)
Amphibian/ Reptile	*Malaclemys terrapin* *Nerodia sipedon williamengelsi*	Northern Diamondback Terrapin Carolina Water Snake	SC (FSC) SC
Birds	*Laterallus jamaicensis*	Black Rail	SR (FSC)

Federal Status: Species under consideration for listing with C – sufficient information, and FSC – insufficient information

5.5 WETLANDS

North Carolina's estuaries and the coastal wetlands that feed them serve numerous important functions, providing benefits for humans and wildlife. Estuaries function as habitat for seventy-five percent of commercial fish catch and eighty percent of recreational catch. Coastal wetlands support estuary health and provide habitat for endangered and threatened birds. Healthy estuaries contribute to healthy near-coastal aquatic ecosystems, and serve commercial fishing and recreational purposes such as swimming, boating and recreational fishing.

The primary causes of estuary degradation are pollution and alteration of natural water flow. Pollution in the form of nutrient enrichment causes algae growth, which depletes available oxygen and thus causes fish kills. Dredging and filling of wetlands for navigation and development purposes has also contributed significantly to estuary degradation. Wetlands absorb nutrients from water as it travels to estuaries. Destruction of wetlands removes the natural filtration process that protects estuaries. In order to restore estuary function, wetlands that historically fed degraded estuaries must be restored and the sources of pollution must be curtailed. Restoration of wetlands may require significant modification of canals and dams.

Wetlands are defined as lands where saturation with water is the dominant factor determining the nature of soil development and the type of plant and animal communities living in the soil and on its surface (Cowardin, et. al. 1979). These lands are considered transitional areas between terrestrial and aquatic environments, and provide a range of ecosystem benefits that cannot be provided by terrestrial or aquatic systems. Because wetlands are such an important part of the environment, federal legislation restricts modification of these habitats.

The US Geological Survey (USGS) National Wetland Inventory (NWI) has produced maps based on a national survey of wetland areas since 1954. NWI maps are not true wetland delineations, but are considered suitable for general planning. According to NWI data (1982-83), DCR contains 180 acres of non-wetland (i.e., upland) habitat (Figure 13). Lake Worth and Whipping Creek Lake make up 356 acres of lacustrine (lake) habitat. The remaining 46,083 acres (99%) of DCR are wetlands. The majority of this wetland area is forested or shrub-dominated "pocosin" wetland. Pocosin is an Indian word meaning "swamp on a hill", referring to the fact that these wetlands can occur in elevated landscape positions. Both impact areas are located entirely on wetlands or filled wetlands.

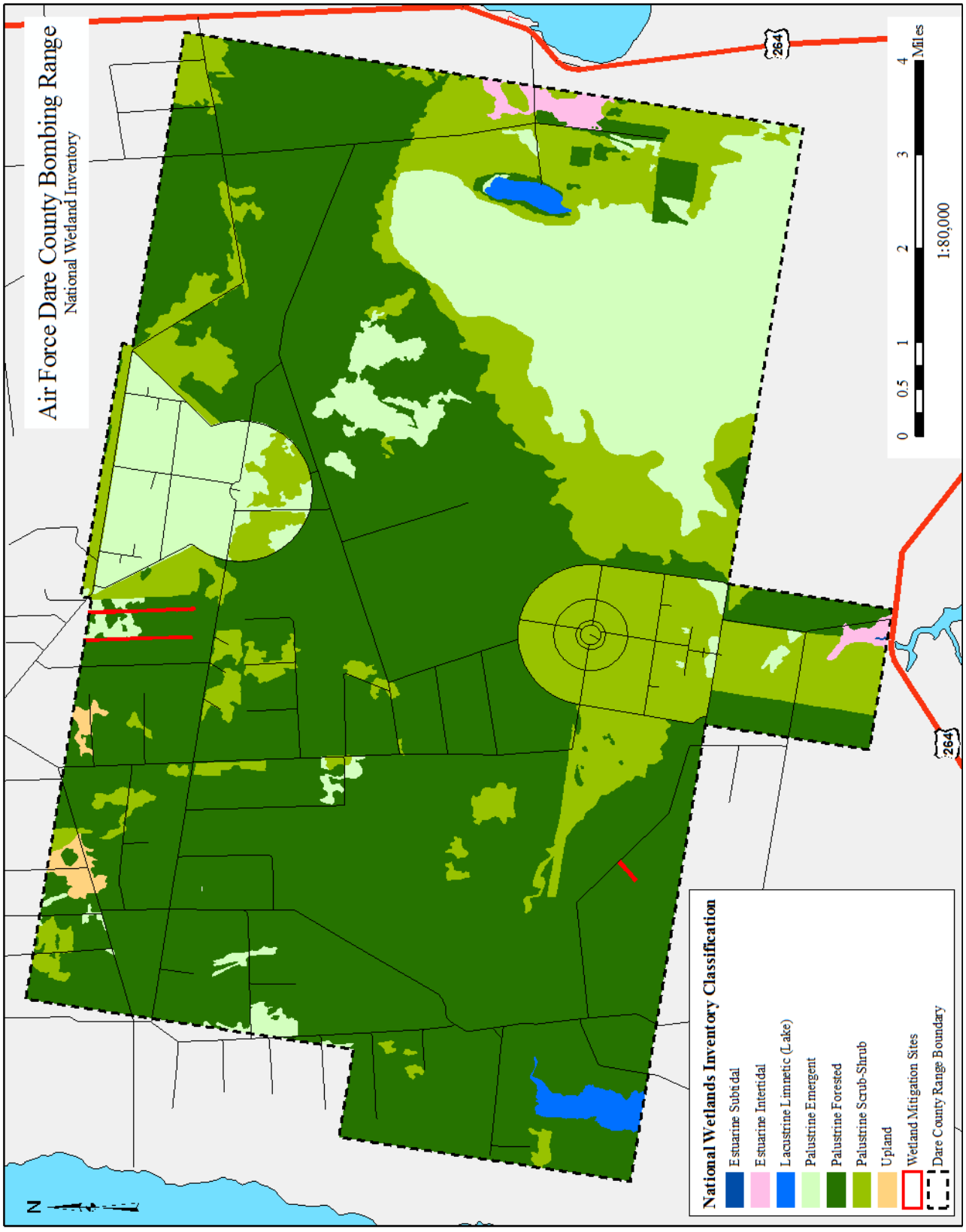

Figure 13. National Wetlands Inventory

5.5.1 Other Natural Resources Information

The Air Force voluntarily registered three areas of DCR with the North Carolina Natural Heritage program as Natural Heritage Areas under a 1986 cooperative agreement. In 2007, more accurate mapping using new GIS-based technology determined that the boundaries of these units should be changed to more effectively protect high-quality habitat. The current Natural Heritage Area boundaries can be found in Figure 14. These areas are unique and/or high-quality examples of habitat types that are either rare or declining throughout their range. Within these areas, alterations that reduce habitat quality or convert the site to a different habitat would require a change to the cooperative agreement. Because this agreement was entered into voluntarily, the Air Force can remove these areas from the Natural Heritage program after a 30 day notice. These areas are not currently being used for any training and their registry does not place a constraint on the USAF at this time.

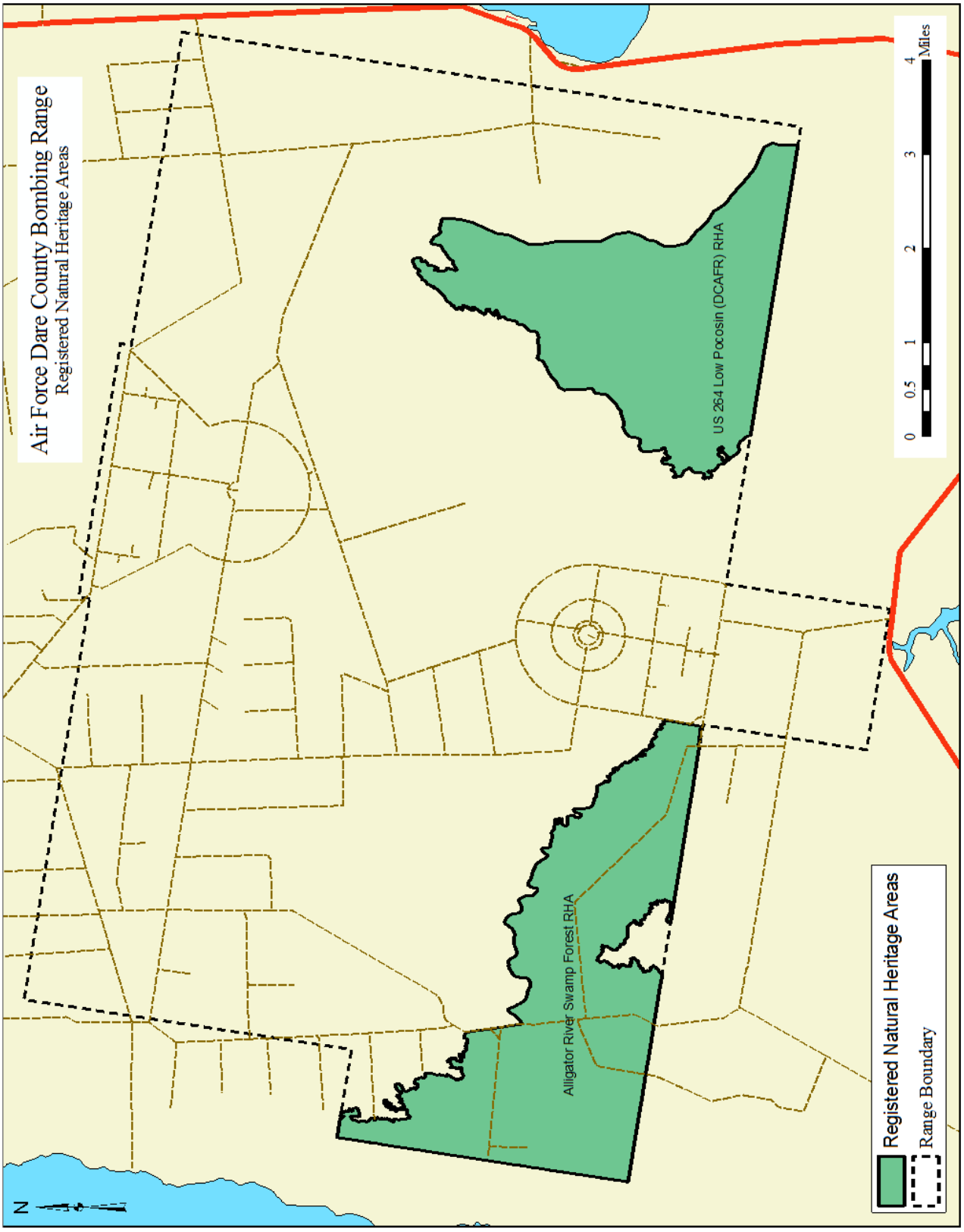

Figure 14. DCR Natural Heritage Areas

6 MISSION IMPACTS ON NATURAL RESOURCES

6.1 LAND USE

DCR is 46,619 acres of USAF property, of which 4,388 acres are classified as "impact areas". The two separate deforested impact areas are maintained by the Air Force (2,279) and the Navy (2,109). The Navy operates their impact area through a lease agreement with the Air Force. The impact areas are used for basic weapons delivery training. The remaining acreage is used as a safety buffer and consists of roads and forested wetland managed by 4 CES/CEIE.

DCR supports two types of training activities: air-to-surface bombing and gunnery (B&G) and electronic combat (EC). DCR is categorized as a "Primary Training Range" (PTR) and is critical to the readiness of combat aircrews. Of all aircrew training, over 60% is accomplished at PTRs such as DCR. That makes the property and the training opportunities provided at DCR very valuable and an asset not only to Seymour Johnson AFB, but to other USAF and DoD units throughout the region.

The AF impact area is an air-to-ground range used for simulated special and conventional weapons delivery. Only training ordnance is authorized at DCR, specifically training bombs and inert general purpose bombs up to 2,000 pounds (BDU-33, BDU-48, inert MK-82/83/84, MK-76, MK-106), 2.75 inch inert rockets and training practice ammunition (20mm, 30mm,50/7.62/5.56 cal). The use of self-protection flares and chaff is permitted on DCR. Tracers, white phosphorous, and live ordnance are prohibited. The impact area contains a variety of standard Class A practice targets to include a centrally located nuclear target (Nuke Bull), one conventional target, six improved targets on gravel pads, three heated targets for Infrared training, two strafe pits and two Military Operations in Urbanized Terrain (MOUT) target arrays.

DCR is used for day and night tactical ground attack training. The strafe targets are scored with the IRSSS, Improved Remote Strafe Scoring System. The impact area also permits laser tracking and accuracy scoring of a variety of targets via the LSVRS, Laser Spot Video Recording System. DCR is capable of WISS scoring both day and night.

All lands are characterized as unimproved except for the footprint of facilities, roads, and cleared areas and targets in the impact area.

6.2 CURRENT MAJOR IMPACTS

The acreage impacted by military training at DCR is minimal compared to the acreage that receives no direct impact, yet is actively managed to enhance wildlife and habitat. Of the 46,619 acres, only 4,388 acres are cleared and receive direct impacts. Over 41,000 acres are managed as forestland, endangered species habitat, and wetlands. This land is important to the military mission because it serves as a safety buffer for the impact areas. A properly functioning ecosystem reduces the risk of catastrophic wildfire escaping from USAF property onto surrounding lands and communities.

Current impacts include ground disturbance from ordnance deliveries, urban warfare training, UXO decontamination, and wildfires ignited by natural causes and mission related activities. Maintenance of target sets and road construction/repair are also minor sources of impacts.

6.3 POTENTIAL FUTURE IMPACTS

As threats to national security change and as technology develops, the military mission at DCR will continue to evolve and may increase in scope. Added operational capabilities may result in changes to

wetlands management to meet regulatory and stewardship requirements. Impacts of an expanding military mission on natural resources can be managed and minimized in the same manner as current air to ground operations. Military technology, which is growing rapidly, employs many tools that allow the Air Force to accomplish the mission through computers, lasers, mobile technology, all of which reduce the direct impacts to natural resources. Virtual training does not provide the same qualities as live training though, and there will always be the need for quality lands on which to train.

6.4 NATURAL RESOURCES REQUIRED TO SUPPORT THE MILITARY MISSION

Natural resources required to provide quality military training are: available airspace, natural landscapes, and areas buffered from encroachment (uses incompatible with military training activities and noise). Military training is enhanced when conducted on lands in a natural state, and this approach benefits both the training mission and natural resources. When the ecosystem is healthy, it is better able to respond to damaging events, such as wildfire, storm damage, or mission impacts. A functional ecosystem provides a realistic environment for military training and ensures sustainability.

The use and management of lands for military testing and training mission needs and the decision-making process regarding such land use directly affect the sustainability of the ecosystem. Specific components of land management include forested wetlands management, threatened and endangered species programs, invasive and exotic species control, soil conservation and erosion control, water quality control and floodplain management. To protect and maintain natural resources while ensuring the continuation of the military mission, DCR has implemented an ecosystem management approach to environmental stewardship. DCR's management strategy is to maximize land use for military training while minimizing impacts to natural resources.

6.5 NATURAL RESOURCES CONSTRAINTS TO MISSIONS AND MISSION PLANNING

Threatened and endangered species (TES) have the potential to impact military operations by restricting certain military actions in areas inhabited by TES. Non-compliance with the ESA could have negative impacts to the USAF in the form of punitive actions by USFWS. The USFWS is precluded from designating critical habitat, which can be very restrictive to military operations, if the USAF provides a benefit to TES species, through special management and implementation of an INRMP. TES at DCR do not currently impact military operations and this INRMP is designed to protect the mission from TES impacts.

Wetlands are an important encroachment buffer, and also a mission constraint. The expanse of wetlands in Dare County makes development of residential or commercial properties difficult and undesirable, which reduces encroachment issues, but also complicates facility placement on the range. The recent addition of a MOUT target array in the impact area was accomplished with wetland mitigation on the installation and saved the USAF from having to pay into the State Ecosystem Enhancement Fund or other private mitigation banks.

Wildfires, tropical storms, and flooding all pose short term constraints to mission planning, and are typically acute events with little chronic impact to the mission.

7.1 NATURAL RESOURCES PROGRAM MANAGEMENT

There are a number of organizations on DCR that are crucial to proper implementation of the INRMP.

While development and implementation of the overall INRMP is the responsibility of the 4 CES/CEIE Environmental Flight, all organizations are responsible for compliance with the INRMP. Key players in the implementation of the INRMP include the Range Operating Agency, the 4th Operations Group; the 4th Operation Support Squadron, Range and Airspace Flight (4 OSS/OSOR) oversees the operation of the Range. Additional management of the Range in such areas as environmental and real property is performed by the 4 CES/CEIE Environmental Flight and the Base Real Estate officer (4 CES/CER).

Additional support is provided by the Air Force Civil Engineer Center (AFCEC), East Region Support Team and the Robins Installation Support Team (CZO); AFCEC/CZTQ Technical Subject Matter Specialists; and HQ Air Combat Command (ACC) A3AA, Ranges and Airspace.

The development and implementation of the INRMP is accomplished through coordination with the USFWS and NCWRC. The SAIA requires that INRMPs be prepared in cooperation with, and reflect mutual agreement of, the USFWS and NCWRC, and affords them signatory authority of DCR's INRMP. Dare County Range is surrounded by Alligator River National Wildlife Refuge and the USFWS is an important partner in ecosystem management strategies. DCR is also a member of NCWRC's Gamelands Program. Cooperation and coordination with the USFWS and NCWRC is an integral part of the USAF's natural resources management program.

7.2 GEOGRAPHIC INFORMATION SYSTEMS (GIS)

Installations are the combat support backbone for the Air Force mission. Just as the battlespace relies on information superiority and agile combat support, installation operations also require disciplined creation, management and sharing of critical georeferenced information through modern mapping processes. The USAF GeoBase Program fills this critical need across the installation mission spectrum.

GeoBase focuses on information resource management rather than IT acquisition. IT components are necessary to attain, serve, and exploit capabilities; however the aim is to exploit existing communications network assets and IT resources where possible to avoid redundancies. GeoBase includes the people, processes, and resources used in the collection, analysis, and display of georeferenced information to support the installation mission. GeoBase capabilities are served and exploited via the existing base communications network using geographic information systems (GIS) and related technologies such as global positioning systems (GPS) and are exploited in a cross-functional fashion, thereby enhancing functional mission systems and processes by visualizing the installation "basingspace".

The USAF GeoBase program provides a data service, referred to as the "GeoBase Service2", that can be simultaneously accessed and exploited on Air Force networks by any number of base and HQ organizations to visualize the "basingspace". Installation maps (geospatial data) are made available via the GeoBase Service to provide a single point of access for visualizing installation assets and facilities. The GeoBase Service may be fused with functional AIS and other IT solutions providing the ability to view functional information assets via the base map. Installation geospatial data are thematically organized within the GeoBase Service into layers such as buildings, roads, airfield surfaces, etc. and are further organized into the Common Installation Picture (CIP) and Mission Data Sets (MDS).

The Common Installation Picture (CIP) is the high-fidelity base map for an installation, including facilities that are typically viewed for reference by all functional communities at a given installation, including an overhead satellite image or aerial photograph. The CIP should serve as the foundation for the

USAF Comprehensive Planning C-1 Installation Layout Map. The CIP is maintained by the Civil Engineering (CE) organization at each installation, should be stored in and served from the base network control center (NCC) from where it is widely shared across the base local area network (LAN).

The vision of the USAF GeoBase is "one installation, one map" with a mission to attain and sustain a breakthrough capability enabling shared, efficient use of trusted integrated georeferenced information delivering situational awareness across installations. The USAF GeoBase enables users to visualize their mission assets in a shared, intuitive, cross-functional manner, reducing their time to insight and decision superiority.

7.3 FISH AND WILDLIFE MANAGEMENT

The Sikes Act requires DoD to provide for the conservation of natural resources on military installations. Air Force policy also requires that installations comply with those laws designed for the protection and management of wildlife and initiate, where consistent with military mission, programs for the development, enhancement, and use of wildlife resources. As stated earlier, military training is enhanced when conducted on lands in a natural state, and this approach benefits both the training mission and wildlife.

7.3.1 Hunting

The NCWRC Game Lands program is cooperatively funded under provisions of the Federal Aid in Wildlife Restoration Act administered by the USFWS. Hunting on DCR is managed by NCWRC under the Game Lands Program. Revenue collected from this program is channeled back through the Air Force to DCR to be used for game species management. NCWRC manages hunting activities only and DCR wildlife staff has the final authority in implementing management decisions on the range. The NCWRC Game Lands program is extremely beneficial in that it provides wildlife management income without tying up the wildlife staff in fee collection, regulation pamphlet publishing, or law enforcement.

7.3.2 Fishing

Fishing opportunities are limited at DCR due to the high acidity of Lake Worth, Whipping Creek, Whipping Creek Lake, and roadside canals. NCWRC and the Division of Marine Fisheries (DMF) have licensing, management and regulatory authority for fishing activities in North Carolina. The WRC has jurisdiction in inland waters, and the DMF has jurisdiction (except that pertaining to inland game fishes) in coastal waters. Both agencies have licensing and regulatory authority in joint waters. Residents that use the public Game Lands are required to obtain a Sportsman license and comply with fishing regulations (http://www.ncwildlife.org/fs_index_03_fishing.htm). Any fish not classified as a game fish is considered a nongame fish in inland fishing waters and includes shellfish and crustaceans. The public is required to comply with all nongame fishing regulations (http://www.ncwildlife.org/pg02_Regs/pg2b4.pdf).

7.4 MANAGEMENT OF THREATENED AND ENDANGERED SPECIES AND HABITATS

7.4.1 General T&E Species Management

Only red-cockaded woodpeckers are actively managed on DCR. While the American alligator and red wolf are found on DCR, they do not require specific management and benefit from other non-species-specific ecosystem management such as maintaining wetlands, reducing erosion, controlling noxious and invasive species, and other conservation work.

7.4.2 Red Cockaded Woodpecker

Twenty-four known RCW clusters (2 active, 22 inactive) were monitored on DCR during the 2015 breeding season. Nineteen of the 22 inactive clusters occur in approximately 2,600 acres of pond pine woodland north and northeast of the Air Force impact area. Two of the inactive clusters (DCR 15, 17) are located in pond pine woodland west of the Air Force impact area and relic/inactive cluster (DCR 14) is located on the fringe of the high pocosin northeast of the Air Force impact area.

Results of 2015 monitoring show that the only two active clusters (21, 23) are recruitment clusters established in 2009 and 2010. After the fire many of the remaining clusters have lost all or most artificial cavities and several are in stands decimated by the wildfire that are no longer classified as pond pine woodland. Stands destroyed by the fire may come back as either mixed pine hardwood, bay forest or open water depending on the severity of damage to the peat soils. Therefore, several clusters have been relocated to adjacent stands with surviving pine trees and they are being provisioned with four cavity inserts each. After running several scenarios in the USFWS RCW Forage Matrix, some clusters that have been inactive for over 10 years, lost all cavity trees and no longer have suitable nesting or forage habitat nearby will be managed as relic clusters and be dropped from active management.

DCR's recovery goal is based on available and potential habitat. Due to the uncertainties of traditional RCW management practices in pond pine, RCW habitat will be maintained at 1 group per 300 acres. After the Pains Bay fire, the remaining pond pine woodland community consists of 5,377 acres, which can support 18 groups. Population growth above the 18 groups will be encouraged where habitat exists. Achieving these goals may be accomplished via augmentation (translocation) whenever the environmental staff believes that would best assist the DCR population.

Three natural community types, pond pine woodland, high pocosin and nonriverine swamp forest are considered, either wholly or in part, as current or potentially suitable nesting and foraging habitat. Areas of high pocosin and nonriverine swamp forest will be managed as travel corridors and foraging habitat. Pine plantation is also classified as RCW habitat though it is a human artifact community. All stands 30 years old or older in pond pine woodland and pine plantation (former pond pine woodland), are considered current habitat. Clearcuts, standing dead timber, stands less than 30 years old and stands with less than 50 percent pine in the overstory constitute potentially suitable habitat in these three community types.

RCW habitat management requires long rotation ages of pine species to provide cavity trees and traditional RCW management includes thinning of stands to provide suitable foraging and nesting habitat and the removal of hardwoods to maintain desired habitat characteristics. However over the past 20 years, these management strategies have proven largely ineffective. In fact RCW groups often tend to gravitate to nest trees in, and construct natural cavities in, unmanaged areas. Since little is known of these unique RCW habitats, it has been suggested by William McDearman (USFWS RCW Recovery Coordinator, personal communication, 2013) that wildlife managers on the range perform minimal habitat management in and around clusters resorting to only removing hardwoods adjacent to cavity trees, leaving the pond pine forest relatively undisturbed.

The RCW population at DCR is considered a highly significant remnant population, and is designated an essential support population in the USFWS RCW Recovery Plan. Their presence is a reflection of the quality of the habitat historically found on the Dare County mainland. Fire suppression in recent years was causing habitat quality to decline. Prescribed burning and other active management strategies must be continued in order to support RCW populations and reduce fuel loading and the threat of future wildfires.

Prescribed burning is being incorporated to manipulate the required habitat. The reintroduction of fire will assist with the natural regeneration of the pond pine pocosin. This will allow for a vegetative community more closely associated with the historical community, attracting wildlife species that once inhabited the area. Prescribed burning is addressed in the Wildland Fire Management Plan for Dare County Range (Appendix X).

Translocation is another tool available for attaining population goals for DCR set by the USFWS RCW Recovery Plan. RCW numbers were significantly reduced in 2003 after Hurricane Isabel destroyed cavity trees and foraging habitat for the species on DCR. Translocation will be used to increase the population to pre-hurricane numbers. In a letter (dated 13 September, 2006) addressed to 4 CES/CEV, Ralph Costa, the USFWS RCW Recovery Coordinator, stated that "because the DCR population is less than 30 potential breeding groups, translocation of sub-adult birds to the site will be the primary technique required to achieve your ESMP population goal, thereby simultaneously satisfying your ESA recovery responsibilities." As RCWs are currently located on DCR, and the USAF follows regulations and prescriptions for endangered species under the ESA, the translocation of birds from another population will create no additional requirements or restrictions to the military mission. A robust, healthy population strengthens the military mission since the USFWS is more inclined to "provide incidental take for larger, growing populations than for smaller declining populations" (Ralph Costa).

The Air Force will continue to pursue equitable Mid-Atlantic RCW recovery goals among the various federal agencies.

7.5 WATER RESOURCES PROTECTION

Soil conservation is an essential component of DCR land management and the implementation of ecosystem management. Soils are particularly susceptible to erosion from uncontrolled stormwater runoff and may discharge into waterbodies from point and nonpoint sources. Sediments in stormwater runoff have the capacity to obstruct drainage infrastructure and to reduce the volume capacity of wetlands, potentially resulting in damaging flood conditions. Turbidity pollution, derived from soil erosion, may also affect surface water quality in adjacent freshwater, estuarine, and near-coastal marine environments. Soil erosion can effectively undermine roadways and other military structures, and often results in water quality problems (e.g. increased turbidity). Actions contributing to the susceptibility of the soil to erosion include:

- Grading of dirt road surfaces;
- Excessive and improper mowing activities and practices;
- Human-made alterations to the natural vegetative cover and topography, including: the channeling of water flow (e.g. ditches) which decreases infiltration and increases the quantity and rate of flow; the exposure of soils and increased soil slopes; and/or the creation of impervious surfaces; and
- Forestry practices (e.g. prescribed burns, thinning, and reforestation) that expose soils to rainfall and stormwater runoff.

Areas at the DCR that are either particularly susceptible to erosion or presently have an erosion problem include road shoulders and forest management areas. Proper grounds maintenance which emphasizes vigorous growth of vegetation and reforestation are the best and most economical means of erosion control.

7.6 WETLANDS PROTECTION

By direction of Section 404 of the Clean Water Act (CWA), the US Army Corps of Engineers regulates dredging and filling activities on wetlands and deepwater habitats in the United States. These regulations are particularly important to DCR, where nearly every ground activity has the potential to affect wetland habitat. Wetlands are managed in accordance with the CWA and USACE permits. All projects are screened through the NEPA process and all necessary permits are acquired prior to project implementation. Maintenance work under existing permits is carefully monitored for permit compliance.

7.7 GROUNDS MAINTENANCE

Grounds maintenance on DCR is limited to very small areas around the personnel complex. Mowing and some weed control occurs infrequently. The Natural Resources Manager and the Installation Forester are primarily responsible for maintaining the natural infrastructure.

There are approximately 100 miles of permanent, unimproved roads that provide access to much of DCR. Maintaining these roads is necessary in order to provide access for natural resources management activities and access for outdoor recreation such as hunting, fishing, bird watching, wildlife viewing, canoeing and kayaking.

Routine maintenance includes grading and resurfacing roads with crushed rocks or other material and road shoulder and ditch bank mowing to control surface runoff from forest roads.

7.8 FOREST MANAGEMENT

7.8.1 Forest Inventory

Three forest inventories have been conducted. Two forest inventories were conducted in 1999. The first inventory focused on the loblolly pine and hardwood resource on the western side of the range, and was based almost entirely on aerial photography analysis. The second 1999 forest inventory of the AWC resource provided volumes and growth and yield predictions for 1,261 acres. Results from the 1999 forest inventory indicated there was considerable evidence that these stands are beginning to decline in vigor and in numbers of trees due to age-related mortality.

The third forest inventory that was conducted in 2009 provided volumes and growth and yield predictions of 1,170 acres in the AWC resource and 2,260 acres in the loblolly pine and hardwood forest resource. Results of the 2009 inventory concluded that the rates of growth of the AWC stands were occurring at a decreasing rate; field condition notes and the number of dead trees observed indicated competition-induced mortality and declining stand conditions.

A continuous forest inventory (CFI) system is recommended. CFI data provides the Installation Forester with feedback on forest health, composition, trends within ecosystems, and the effectiveness of forest management activities. A CFI system establishes a permanent plot network across all forest types with a subset of plots inventoried each year, resulting in each plot being visited at a regular interval, usually every 5-10 years. Analysis of plot data collected over time provides information on growth rates, forest health, stand structure, and landscape composition change over time.

7.8.2 Management Units

For management purposes, DCR is divided into eight loblolly pine management units with an average size of 600 acres and eight AWC conservation units with an average size of 1,600 acres (Figure 15). Each compartment is further divided into timber stands. A stand is a forested area typically ten acres or larger where the entire area can be said to have a specific vegetation alliance, age class structure, stocking

density, and management history. Management and conservation prescriptions are written at the stand level. The impact areas, the south approach, and prescribed burn units have also been delineated, though they are not included in the stand level prescription process.

7.8.2.1 Pine Management Units

Management for timber products will be limited to the eight loblolly pine management units. These units are located on the mineral soil lens on the northwest portion of the range, which are the most trafficable soils on the range. This mineral soil lens is made up of Cape Fear and Hyde loam soils surrounded by deep organic Pungo, Roper, and Belhaven mucks. Several recently harvested stands in this area had been bedded for the establishment of loblolly pine plantations by previous owners. Loblolly pine regenerates most successfully on sites with abundant seed sources in close proximity, with little overstory competition and no hardwood sprout competition. To achieve these conditions, clearcut and seed tree harvesting techniques are most appropriate. Herbicides such as Arsenal may be used following loblolly pine establishment to control hardwood sprout competition. Thinning treatments may be used to maintain forest health by preventing overcrowding; a basal area factor of 80 ft2 is an appropriate target.

Some areas within these management units are appropriate sites for loblolly pine management, yet due to past management practices, they currently support low-quality hardwood (sweetgum / red maple) dominated stands. These stands will be evaluated for conversion to loblolly pine management. Primary considerations in assessing hardwood stand quality will include soil type, mast production, wildlife value, age and size of existing hardwoods, and position in the landscape relative to the pre-settlement extent of hardwood vegetation types.

7.8.2.2 Atlantic White Cedar Conservation Units

Eight AWC conservation units have been delineated in areas of the range that historically supported or currently support peatland AWC forests. These units are located primarily on Pungo, Roper, and Belhaven muck soils, which are not appropriate for pine timber production due to their depth, weak structure, and poor trafficability. Nearly all of this area was harvested by railroad logging between 1860 and 1900, and much of it has been harvested at least once more since that time. The Atlantic Forest Products Company harvested approximately 1,400 acres within these units between 1975 and 1989; thus much of the cedar within these units is less than 30 years old.

Management strategies within these units will use ecological forestry management techniques. Specific management tasks within the cedar conservation units are expected to consist of monitoring regeneration, applying herbicides when necessary to reduce hardwood competition, and salvaging damaged timber to reduce wildfire risk and ensure that pure cedar stands are not replaced with mixed cedar – hardwood stands. Within these units, some stands occur on sites that once supported peatland cedar forests but currently support other forest communities (degraded stands). Degraded stands will be evaluated to assess their potential for restoration to peatland Atlantic white cedar ecosystems. To achieve these conditions, clearcut and seed tree harvesting techniques are most appropriate. Herbicides such as Arsenal may be used following AWC establishment to control hardwood sprout competition.

There is interest in AWC from the science research community. Research will be permitted on a case by case basis, with consideration given to the research plan's compatibility with the mission of the Range, extent of support required from natural resource personnel, degree of integration with the goals of forest management on the range, and the quality of the research plan.

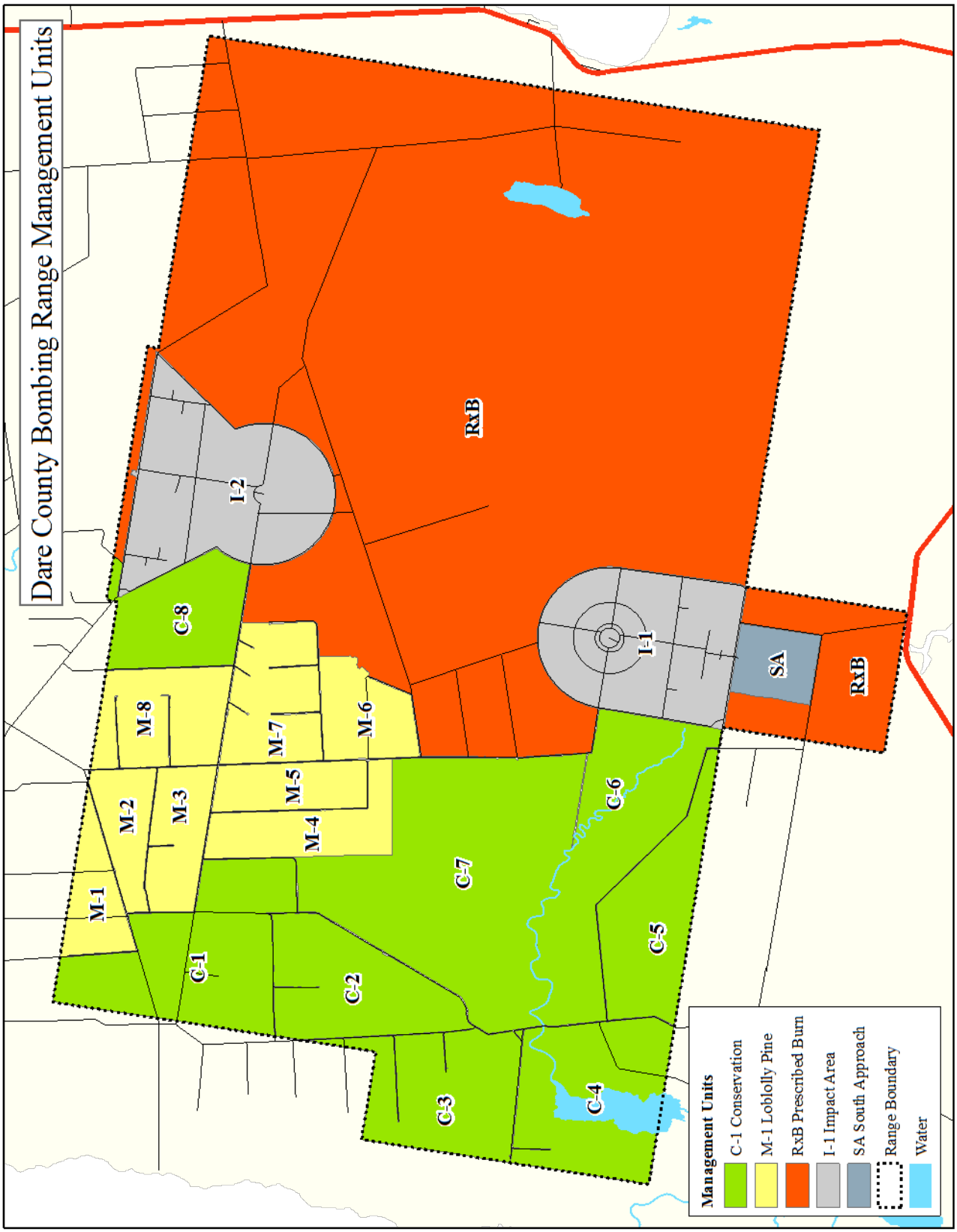

Figure 15. DCR Forest Management Units

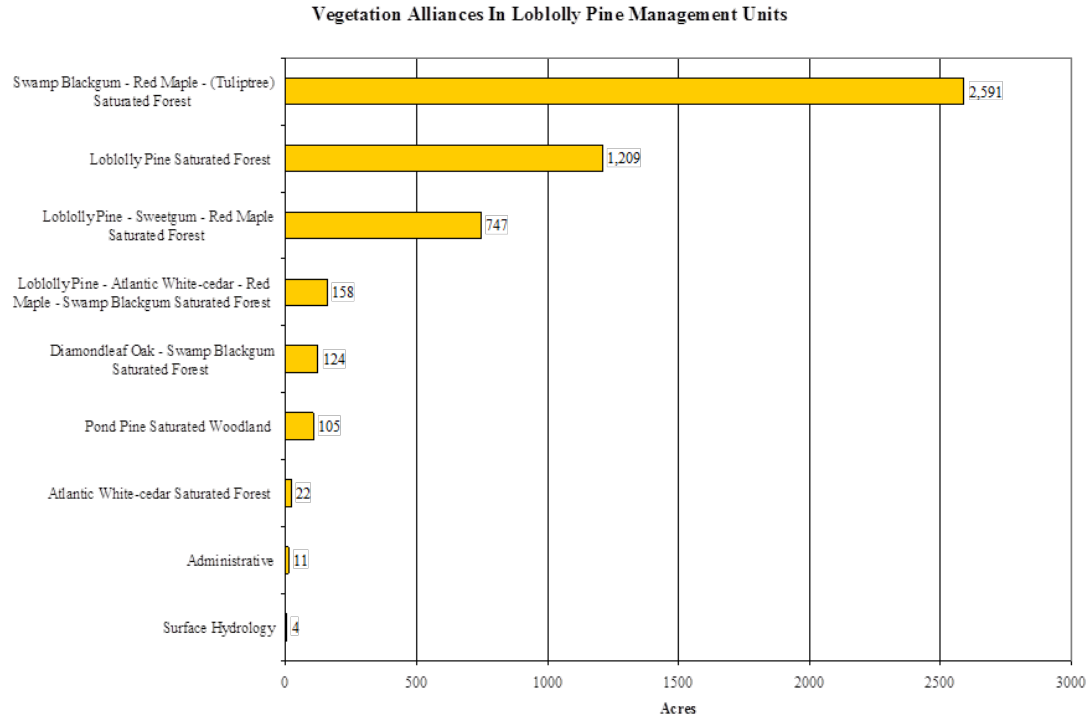

Figure 16. Vegetation Alliance within loblolly pine management units

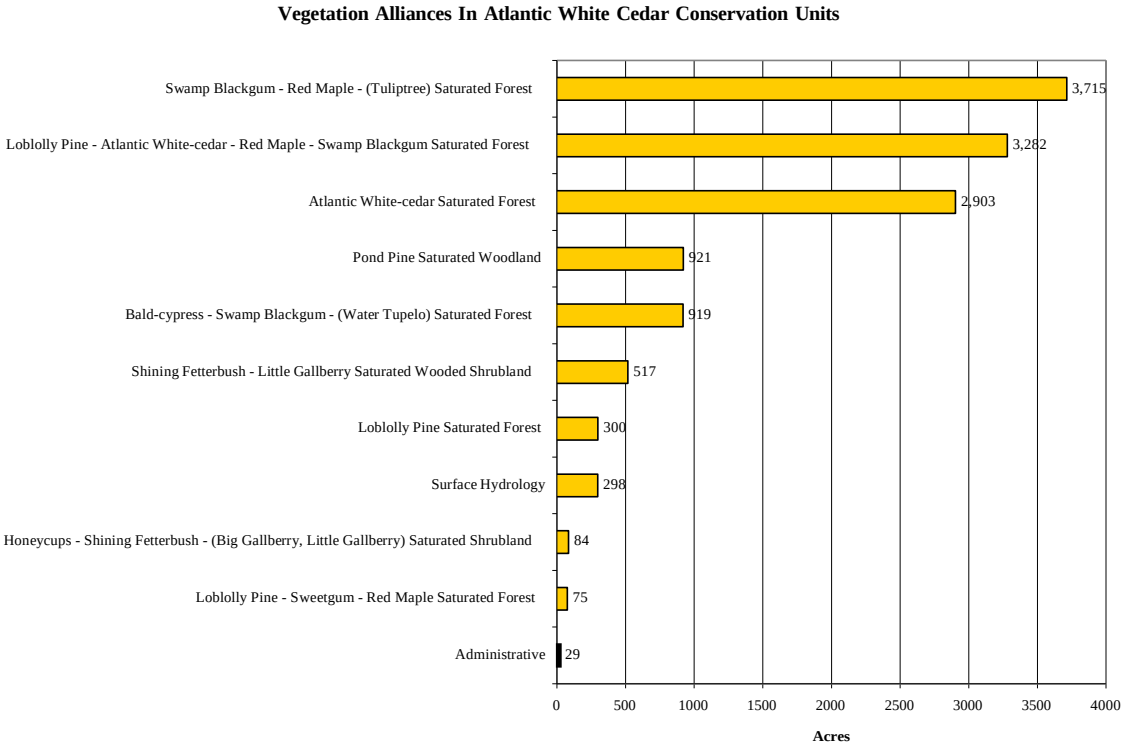

Figure 17. Vegetation Alliance within Atlantic white cedar conservation units

7.8.3 Silvicultural Practices

Silvicultural practices are the methods used to modify the forest environment to meet management program objectives. These include the following:

Thinnings are harvests which occur between stand establishment and achievement of rotation age. They are designed to increase the growth rate of the remaining trees by removing trees that are ready for sale, removing suppressed trees, or by removing low-value competitors.

Improvement cuttings are made in older stands to change the composition of the forest; typically these are made to favor the dominance of one species at the expense of another. In addition to removing merchantable trees of undesirable species, trees with poor form, disease, or injury are also removed. Thinnings and improvement cuttings may be used concurrently to minimize site entries.

Salvage harvests remove dead or injured trees which have been damaged in storms, fires, or insect/disease outbreak. Salvage harvests are typically designed to reduce the risk of further damage from subsequent fire or insect outbreaks. By nature, they are executed shortly following tree death or injury in order to maximize the value of the salvaged timber.

Clear-cut harvests involve the removal of all trees in a stand, and are appropriate for the management of some species which regenerate in even-aged stands following catastrophic events. Clear-cut harvesting will be used when there is an identified need to remove over mature or diseased stands, following a natural disaster, when multiple site entries may increase the potential for severe soil damage, or when regeneration of the species requires all overstory vegetation to be removed for successful regeneration. Mission objectives may also require clear-cut harvests.

Shelterwood harvests involve multiple harvests staggered over a period of time, designed to accomplish regeneration under the shelter of the overstory trees. A “preparatory harvest” removes suppressed trees, or those with poor form, disease, or injury, and stimulates growth and seed production in the remaining trees. A second “establishment harvest” reduces overstory stocking levels and allows light to penetrate to the forest floor, encouraging the establishment of seedlings from the desired tree species. A final “removal harvest” removes the overstory trees and releases the next crop of trees. Cuttings may be separated by as many as 20 years, but the resulting forest is even-aged.

Seed tree harvests involve the removal of all trees on a site with the exception a few residuals as a seed source. Regeneration of loblolly pine stands require six to twelve “seed trees” per acre. Regeneration of AWC require five “seed trees” per acre due to the abundance of viable AWC seed in the seed bed. These trees are left to provide sufficient seed to reseed the harvested area, and thus typically are trees with good form and excellent seed production. Because the remaining seed trees are very exposed, they are at significant risk of windthrow, and may not be available for harvest.

Herbicide applications are typically used to control undesirable competing species in timber stands and conservation areas. Herbicides can be applied either via aerial spray or ground application.

Site preparation activities are designed to prepare the seed bed for natural regeneration or planting tree seedlings, increase germination and seedling survival rates, discourage undesirable competing species, and increase seedling growth rates. Examples useful on the Range include debris removal, shearing debris, piling debris, site bedding, and herbicide applications.

Regeneration includes natural seeding, planting tree seedlings, and broadcast seeding. In order to take advantage of site-specific adaptations in desirable tree species, regeneration will use genetic material native to the Dare County peninsula whenever possible.

7.8.4 Prescribed Burning

Prescribed burning is not used as a silvicultural management tool in the forested areas of DCR due to the risk of escape and limited personnel with which to conduct a prescribed burning program. Burning for hazard reduction, wildlife management, and impact area maintenance is described in the DCR Wildland Fire Management Plan.

7.8.5 Forest Pest Management

Southern Pine Beetle (SPB) and Ips bark beetles have caused substantial mortality on DCR in the past. Outbreaks often start where pine trees have been weakened by wildfire, saltwater intrusion, or overcrowding. In the spring of each year, pheromone traps are monitored and samples are sent to the USDA Forest Service Southern Research Station for analysis to estimate the risk of an outbreak. At present, the risk of an epidemic beetle outbreak is low. The most effective management strategy to preserve these conditions is to maintain healthy, vigorously growing trees. The North Carolina Division of Forest Resources conducts reconnaissance flights to detect beetle activity during the summer. If beetle infestations are detected through aerial reconnaissance, field crews will visit each infestation site, assess beetle activity, and recommend control measures.

The North Carolina Department of Agriculture monitors DCR for gypsy moths with the use of pheromone traps. To date, no gypsy moths have been captured on DCR.

7.8.6 Rotation Ages

Using current timber prices, net present value of loblolly pine on DCR is maximized between 30 and 40 years of age. To ensure a revenue stream that is capable of funding active ecosystem management, the rotation age for loblolly pine is established at 35 years.

Rotation ages for AWC will not be mandated because the goal for AWC management is ecosystem restoration and sustainability. Stands will be monitored for forest health. Stands which are declining in health due to conversion to cedar-hardwood stands, insects or disease, severely damaged by storms, or at risk for wildfire will be regenerated to ensure that mission goals continue to be met by healthy forests.

DCR possesses 7,400 acres of swamp hardwood forests in two NVCS alliances: swamp blackgum – red maple – (yellow-poplar) saturated forest, and bald-cypress – swamp blackgum – (water tupelo) saturated forest. These forests occupy more of the DCR land area today than they did 300 years ago due to fire suppression and poor regeneration of Atlantic white cedar forests. Because these forests are not at risk of decline and are of little value commercially, no rotation age has been set, and no management is recommended beyond forest health protection.

The laurel oak - swamp blackgum saturated forest alliance makes up 124 acres in DCR. This forest type was once common on the drier mineral soil lens now designated for loblolly pine management. Because laurel oaks are a valuable source of mast for wildlife species, and the alliance is now rare on the Dare County peninsula, active management is appropriate to maintain the forest community. A rotation age of 150 years is established for laurel oak, using the shelterwood method for regeneration.

7.8.7 Prescription Process

One objective of DCR's silvicultural system is to provide healthy sustainable forest ecosystems with a minimum of environmental restrictions to support Air Force training objectives. To accomplish this objective, the Installation Forester will manage forest resources to regenerate stands of commercially viable forest tree species, provide a sustainable flow of timber products that return economic value to the local community, and conserve and restore threatened ecosystems.

A second objective of DCR's silvicultural system is to conserve and restore healthy peatland AWC forests. A study in 1997 found that DCR possesses 21% of the remaining peatland AWC forests in North Carolina, the second largest ownership in the state. As managers of a resource considered to be "Imperiled" by NatureServe and the NC NHP, it benefits DCR to manage for healthy, functioning AWC forests.

The forest prescription process is the basis for making stand-level forest and wildlife management decisions that accomplish long-term ecosystem management goals. During the forest prescription process, the Installation Forester:

- Determines the site productivity, forest type, age, stocking densities, operability, and forest condition classes at the stand level.
- Collects data required to determine the pre-harvest condition of habitat used by TES and determines the effects of management actions on that habitat.
- Determines the silvicultural treatment, if any, required on a stand by stand basis, and determines the effect of that treatment on the forest ecosystem and military training operations.
- Develops plans to manage ingress and egress to any stands requiring entry.
- Collects data to determine timber stocking and volumes within stands which will be affected by silvicultural treatments.
- Ensures that all proposed actions are consistent with applicable laws and regulations and have undergone the NEPA process.

The prescription process ensures that forest management activities are integrated with other land management and land use activities on the range. Prescriptions will be reviewed by the Natural Resources Manager, Air Force Range Operations Manager, and Navy Range Operations Manager. The Installation Forester reviews and incorporates comments and implements modifications to prescriptions as required to achieve natural resource management integration. Final prescriptions will be kept available by the Installation Forester for review.

7.8.8 Timber Sales Procedures

Deep organic soils and restricted access to timber resources due to military training are conditions not commonly faced by timber buyers in the region. Timber buyers will be asked to visit harvest sites to assess site conditions before bidding on a sale.

Site boundaries will be marked by the Installation Forester (or a designated representative) prior to harvest, on boundary trees using vertical stripes of blue paint. The buyer must keep all equipment within the boundary; boundary trees are not to be harvested. Stands where the boundaries are apparent due to a change in tree species type or stand structure will not be marked and will be available for harvest. An integrated use of the global positioning system and geographic information system may be used to designate stand boundaries.

Certain timber sales may contain designated "leave trees" which must not be harvested. These trees may be marked using paint or tape in an obvious fashion and the marking will be communicated verbally and in writing to the buyer. In the areas where standing AWC trees are present, the purchaser shall leave five "leave trees" per acre; these trees shall be representative of the average diameter and live crown ratio found in the unit.

Prior to offering a stand for sale, the stand will be examined by a qualified forester, either the Installation Forester or a designated representative. Timber volumes will be estimated by product class and furnished to prospective bidders. No guarantee as to the accuracy of these estimates will be given, and buyers will be encouraged to determine their own estimates.

Sale by sealed bid is the preferred method of conducting timber sales. Each interested contractor must submit a bid including estimated volume in each product class, prices per ton or board feet for each product class, and an estimated total bid. Any bid may be rejected, whether above or below the government estimate. Typically, the contract will be awarded to the highest bidding contractor. Timber sale contracts typically expire within one year or less from the date a sale contract is awarded. For sales extending longer than three years, include a rate predetermination clause to reflect changes in market value. An extension may be granted if weather events or the military training affect access to the harvest sites. The Installation Forester may extend the time allocated for removal of forest products after a written request for an extension from the contractor.

The contractor is responsible for meeting all of the terms and conditions of the contract. The Installation Forester will document discrepancies and report them to the Contracting Officer. The Contracting Officer will make a determination of contract completion based upon a final inspection report from the Installation Forester indicating that all contractual obligations have been met by the contractor.

The Installation Forester will inspect the harvesting operation for contract compliance throughout the harvesting time period. During timber harvesting operations, the contractor is responsible for the maintenance of haul roads, and must return roads to pre-sale conditions upon completion of the harvest.

The contractor is required to receive a safety briefing prior to starting work, showing actual inert ordnance devices that are deployed during military training. The contractor must acknowledge on paper that he is aware of the possible existence of hazardous munitions and will inform his employees and subcontractors of all safety procedures and requirements. If ordnance is encountered during harvest operations, the contractor must stop work and inform the Installation Forester. The briefing will also cover procedures for soil and waterway protection, fire prevention, endangered species protection, cultural resource protection, access through the range (ingress and egress routes), evacuation procedures, and precautions necessary for working around low-flying jet aircraft and laser targeting systems.

7.8.9 Reforestation Methods

Site preparation following harvest is critical to achieving successful regeneration. Proper site preparation controls shade and root competition, reduces soil compaction, and protects soil from erosion. Shade-intolerant species such as loblolly pine and AWC usually require some degree of site preparation in order to out compete prolifically sprouting hardwood species such as red maple and sweet gum. The least intensive site preparation method that results in a successful reforestation effort will be applied to each site on a stand by stand basis.

Natural regeneration will be used when parent material is of sufficient quality and abundance to provide a high probability that the site will be restocked with vigorous seedlings. When natural regeneration is selected as the reforestation method, residual non-merchantable and undesirable species will be felled.

Site preparation will consist of clearing brush and debris from the seedbed to allow full sunlight on the seedbed. For loblolly pine regeneration, the surface of the mineral soil must be exposed to seed fall for regeneration to occur. The majority of AWC regeneration originates from the seed of previous years, so disturbance of the duff layer of the soil must be kept to a minimum in order to ensure successful natural regeneration.

Site preparation techniques for artificial regeneration of loblolly pine and AWC are dependent on the amount of post-harvest debris, woody and herbaceous competition, and the amount of loblolly pine in surrounding stands. Selection of the technique is consistent with the desire to ensure successful stand establishment and a minimum of soil disturbance. Site preparation may include shearing, windrows, bedding, and fertilizer applications. The establishment of improved seedlings may be considered in order to maximize site productivity, with the expectation that parent material originate in the Southeast Atlantic Coastal Plain. Herbicide application may be considered as a site preparation tool if woody competition threatens successful establishment of the desired species.

All site preparation and reforestation methods will be conducted in compliance with the NC Forest Service Best Management Practices to Protect Water Quality manual as amended in 2006. The Installation Forester may halt site preparation at any time if impacts to water quality are anticipated, or if conditions on the site become unsuitable for successful reforestation.

7.8.10 Forest Roads

Forest roads will only be constructed when absolutely necessary. Design, construction, and maintenance of forest access roads will be in accordance with applicable North Carolina Forest Service Best Management Practices, U.S. Army Corps of Engineer recommendations, and any applicable permit requirements.

7.9 WILDLAND FIRE MANAGEMENT

The Wildland Fire Management Plan for Dare County Bomb Range was signed May 2002, revised in 2009 and updated in 2013. Air Force Instruction (AFI) 32-7064 requires installations with unimproved lands that present a wildfire hazard, and installations which utilize prescribed burns as a land management tool, to develop and implement a Wildland Fire Management Plan (WFMP). The DCR Wildland Fire Management Plan is a component plan to this INRMP. DCR utilizes prescribed burning, in cooperation with ARNWR and NCDFR, as a management tool to reintroduce fire onto the Dare County peninsula.

Fire played a role in shaping the plant community in Dare County as evidenced by the persistence of charcoal in the organic profile and the presence of fire-adapted species (Motzkin et al, 1993). Uncontrolled fire today has more dangerous implications in regards to human safety and private property. Prescribed fire is the best method to achieve the goal of restoring fire, thereby protecting private property and public lands, resulting in a healthy ecosystem.

Fire suppression and preparedness responsibilities are contracted to the NCDFR. Included in the contract is the maintenance of roads and canals and ditches, to support fire suppression activities. NCDFR is responsible for 30 miles of roadways and 30 miles of canals and ditches.

The range is divided into four Fire Management Units (FMU) to facilitate efficient wildfire suppression and prescribed burning program. Within each FMU, there are smaller management units compartmentalized by distinguishable features such as roadways or canals. These compartments are further delineated into burn units which are large enough to carry a prescribed fire and small enough to be safely and effectively managed while staying within smoke management guidelines.

Each FMU has objectives and strategies specific to that unit, which still adhere to the overall fire management objectives. FMU 1 is 5,756 acres and is the Air Force and Navy impact areas. These two impact areas are not contiguous, but they are both intensively maintained and are administratively similar. FMU 2 is 15,336 acres and covers southeastern portion of the Range. FMU 3 is 8,684 and is found in the central portion and northeast portion. FMU 4 at 16,840 acres is the largest block and covers the entire western boundary of DCR.

DCR contains four coastal plain terrestrial ecosystems as described in the NC Wildlife Action Plan. All of these ecosystems have been affected by the removal of fire from the system. According to the WAP, fire suppression is the most important factor threatening the pocosin ecosystem. Historically, fire occurred less frequently in the floodplain forest ecosystem, but the loss of large canebreaks can be attributed to its suppression. This is also true of nonalluvial mineral wetlands. While fire was not a major factor in maintaining the system, the lack of it has reduced the biodiversity of habitats in these mineral wetlands. The tidal swamp forest and wetlands have seen successional changes in marsh habitats due to a reduced fire regime. This lack of fire has led to an increase in shrub and tree growth.

In June 2012, SJAFB and the ARNWR signed a Fire Suppression Memorandum of Agreement (MOA) and subsequent Annual Operating Plan (AOP). The MOA describes responsibilities of property owners (USAF, USFWS) as related to wildfire suppression on the Dare County peninsula.

SJAFB maintains an annual Cooperative Agreement with the State of North Carolina, North Carolina Division of Forest Service (NCDFS). The purpose of this agreement is to provide for the maintenance and improvement of natural resources on the DCR. NCFS provides personnel, training, tools, materials, supervision, and other items and services necessary to perform fire prevention and fire suppression on the Range.

All wildland fire management will be conducted in accordance with the USAF Wildland Fire Center approved Wildland Fire Management Plan for DCR

7.10 AGRICULTURAL OUTLEASING

Agricultural outleasing is the use of non-excess DoD lands, as allowed by 10 U.S.C. 2667, under a lease to an agency, organization, or person for growing crops or grazing domestic animals. Agricultural leases are for 1 year, but may be renewed for four additional 1-year periods unless special needs dictate a longer lease period. Lessees are required to comply with the conservation provisions of the Food Security Act of 1985, which is administered by the USDA NRCS and the conservation plan developed for the lease area. Agricultural outleasing is strongly advocated by the DoD as a means of showing good stewardship of government lands. Agricultural outleases must be competitively bid and the government must get fair value. A major benefit of such leases is the savings realized by the Installation in grounds maintenance costs. DCR does not have an agricultural outleasing program.

7.11 INTEGRATED PEST MANAGEMENT PROGRAM

The DoD Directive for pest management uses the following definition: “Arthropods, birds, nematodes, fungi, bacteria, viruses, algae, snails, marine borers, snakes, weeds, and other organisms (except for human or animal disease-causing organisms) that adversely affect readiness or military operations or the well-being of man and animals; attack real property, supplies, equipment, or vegetation; or are otherwise undesirable.” Simply stated, a pest is a plant or animal out of place. The Air Force pest management mission is to prevent pest and disease vectors from adversely affecting military operations or missions-by establishing and maintaining safe, effective, and environmentally-sound integrated pest management programs.

To accomplish pesticide reduction, DCR will employ an integrated pest management strategy. Integrated pest management, or IPM, is an approach to pest control that utilizes regular monitoring to determine if and when treatments are needed and employs physical, mechanical, cultural, biological, and educational tactics to keep pest numbers low enough to prevent intolerable damage or annoyance. Least-toxic chemical controls are used as a last resort. In IPM programs, treatments are not made according to a predetermined schedule; they are made only when and where monitoring has indicated that the pest will cause unacceptable economic, medical or aesthetic damage. Treatments are chosen and timed to be most effective and least disruptive to natural pest controls. Pest management at the personnel facilities is conducted on an as-needed basis by 4 CES Entomology Shop.

Invasive species management is performed to support ecosystem management at DCR. Executive Order 13112 and the Plant Protection Act require executive agencies to prevent the introduction of invasive species, respond economically and ecologically to eradicate invasive species, monitor invasive species populations, and provide for the restoration of native species in habitats that have been invaded. The EO defines invasive species as "an alien species whose introduction does or is likely to cause economic or environmental harm or harm to human health." Invasive species can be non-native species that have been introduced into a habitat, or native species that colonize an area and create a monoculture. The terms exotic, alien and noxious species also refer to invasive species.

The following species occur in Dare County and are considered invasive:

- Common reed (Phragmites australis)
- Alligator weed (Alternanthera philoxeroides)

The management of invasive species is a fundamental component of the ecosystem management concept. Invasive species typically out-reproduce native species, by definition, and have a propensity to spread into unstable or disturbed areas (e.g. highway and utility rights-of-way, site disturbance areas, ponds, and wetland areas). Therefore, the control of invasives and replacement with native species within DCR is essential for the protection and enhancement of biodiversity, and for the proper functioning of forested wetlands as water storage and purifying systems.

Invasive species can directly impact military operations due to their ability to spread virtually unchecked. If invasive species colonized the impact areas, target arrays could become difficult to see and the mowing/burning interval would need to be increased. Currently, the risk of that occurring is low due to the types of invasive species found on DCR, but vegetation surveys will be used to continually monitor the situation. Invasive species can displace federally listed flora and/or fauna and affect water quality by reducing the water purification capacity of wetlands. This puts the USAF at risk of violation of the ESA and CWA.

4 CES/CEIE will restrict the introduction of any species that could be considered invasive. The early detection / rapid response protocol will be followed by including invasive species as a target species during any flora or fauna survey. Known populations of invasive species will be eradicated primarily through the use of herbicides, as it is the most effective for common reed. The use of herbicides will be conducted in accordance with federal and state laws regulating their use. All herbicides will be approved for aquatic use.

Potential impacts to non-target species and water quality must be considered during pesticide use. To ensure that the application of pesticides does not contaminate surface waters and/or inadvertently affect desirable flora or fauna, pesticides will be applied by skilled, certified applicators and according to label instructions. Careful prescription of the type and amount of chemical to be applied and the use of buffer

areas around surface waters will also help prevent misdirected application or deposition. Personnel will use pesticides with lower toxicity and apply them at rates below those specified on the label, when it is believed that such modifications can adequately address the problem. The use of non-pesticide removal methods will also be considered when determining the best method for removal.

7.12 BIRD/WILDLIFE AIRCRAFT STRIKE HAZARD (BASH)

The BASH program and plan is owned by the Safety Squadron (4 FW/SEF). Operations at DCR are designed to reduce the bird/animal strike potential through promulgation of avoidance procedures, monitoring bird/animal activity, and controlling bird/animal populations and movements through habitat manipulation and land use planning. Wildlife occurs at or near air operational areas generally because of food, water, shelter, and/or because of local migrations. By managing areas to be less attractive to wildlife, it is possible to reduce hazards. Thorough and periodically updated ecological studies of wildlife in the impact areas and their vicinity are vital to reduce BASH. BASH programs also address wildlife strikes, but because DCR does not have a runway, only bird strikes will be discussed in the INRMP.

DCR uses the MERLIN Aircraft Birdstrike Avoidance radar system which is the most advanced technology available for BASH management and for real-time detection and tracking of hazardous bird activity at military training and bombing ranges. MERLIN is proven technology currently operating at sites worldwide with documented results in reducing bird strikes, increasing safety, and reducing aircraft damage. MERLIN was developed by experts in military and commercial aviation safety, airfield bird control, and radar remote sensing to provide a system that integrates seamlessly and effectively into airfield operations.

7.13 OUTDOOR RECREATION

Outdoor recreation enhances the quality of life for military and civilian personnel, and enhances public awareness of environmental stewardship and issues. The Sikes Act requires that military lands with suitable natural resources be managed to allow outdoor recreational opportunities. Military, civilian personnel and the public have access to outdoor recreation such as bird watching, wildlife viewing, and canoeing at DCR. The inclusion of USAF buffer areas in the North Carolina Game Lands program greatly increases outdoor recreation opportunities on DCR.

4 CES/CEIE strives to meet the mandates of the Sikes Act while ensuring the military mission is not impacted. 4 CES/CEIE will coordinate outdoor recreation use of DCR with appropriate federal, state, and local government officials and other public groups with interest or jurisdiction in accordance with AFIs 32-7065 and 13-212, DoDD 6050.1, and the DCR Range Management Plan and with planners of installation activities that affect outdoor recreation resources. Any planned actions that would substantially affect outdoor recreation resources will be reviewed by the ESOH Council.

The DCR Natural Resources Manager is the primary entity responsible for maintaining and developing outdoor recreational activities on DCR. The demand for outdoor recreational opportunities at DCR is expected to increase as the population increases from coastal development. It will become necessary to determine demand for specific outdoor recreational opportunities and to incorporate future demand into DCR planning.

Public access is limited to areas outside of the gated restricted zones.

Recreational canoeing and kayaking is available on 6 miles of Whipping Creek and on Whipping Creek Lake (283 acres) and Lake Worth (114 acres). These areas, on the western portion of the Range, are a safe distance from the impact areas and are rarely closed to recreational activities.

Off-road vehicle use is not permitted on DCR accept by authorized personnel.

7.14 COASTAL ZONE AND MARINE RESOURCES MANAGEMENT

Because of DCR's unique configuration on the peninsula, Coastal Zone management is a component of every conservation activity. Preventing soil erosion, forestry practices, wetlands protection, and floodplain management strategies all collectively contribute to appropriate Coastal Zone management. See sections 7.5 and 7.6 for management strategies that benefit Coastal Zone management.

7.15 CULTURAL RESOURCES PROTECTION

In 1996, a Phase I cultural resources survey was conducted by Panamerican Consultants, Inc. (Grover 1996). Their work included archaeological field testing. The SHPO stated in an August 6, 1996, letter that no further archaeological surveys of DCR were required.

There are currently no previously recorded archaeological resources or any prehistoric or historic period archaeological sites, buildings or structures considered potentially eligible, eligible, or listed on the NRHP at DCR. SJAFB will institute an Unanticipated Discovery Protocol (UDP), developed in consultation with the SHPO, in the event that either previously unrecorded prehistoric or historic period archaeological evidence or human remains are recovered during an undertaking as outlined in the Seymour Johnson AFB Integrated Cultural Resources Management Plan.

7.16 CONSERVATION LAW ENFORCEMENT

Several organizations and DCR staff provide enforcement capability to help ensure compliance with natural resource laws, regulations, and management initiatives. These include DCR Range Operations and Natural Resources staff, NCWRC, USFWS ARNWR, and the Dare County Sheriff's office. The services of state and federal fish and wildlife agency enforcement personnel are involved as needed for their technical expertise or manpower. Air Force policy is to permit access to installation lands by federal, state, and local conservation personnel for official enforcement duties.

The enforcement of conservation laws and regulations on DCR maintains order and a safe environment for USAF personnel, and reduces the risk of interruption to military operations.

DCR Range Operations is the on-site controlling agency for all ranges, training areas, and air space. DCR Natural Resources staff is responsible for ensuring that fish and wildlife, and natural resources laws on DCR are enforced in accordance with federal and state, other applicable regulations. The staff assists in the administration of DCR's hunting, fishing, camping, and other outdoor recreational programs. Law enforcement activities on DCR are aided by the USFWS ARNWR law enforcement officers, NCWRC officers, and the Dare County Sheriff's office.

All conservation laws and administration of the hunting, fishing and trapping, and off-road recreational vehicles enforcement programs on DCR are administered by NCWRC.

Duties of the NCWRC within the DCR include:

- Enforcement of natural resources regulations
- Administration of the hunting, fishing, and trapping programs
- Responding to inquiries or problems involving wildlife
- Recovering selected injured wildlife and road kills 39

7.17 PUBLIC OUTREACH

Public outreach programs are designed for both military and civilian members at DCR and SJAFB, and for the general public. 4 CES/CEIE seeks to increase awareness of environmental regulations pertaining to conservation of training lands. Outreach of environmental requirements for mission success is targeted toward all levels of military personnel. 6

One method of increasing awareness of environmental programs is through SJAFB's Environmental Management System (EMS) program, which applies to DCR as well. The EMS manual "*integrates environmental management into 4 FW operations with the intent of enhancing the mission through systematic management of environmental risks"* (Col. James Holmes, Commander 4 FW, 2005). 4 CES/CEIE developed and distributes magnets which highlight the EMS program and contain the base's environmental policy. These magnets are distributed to the base population through briefings given to new base personnel, training courses conducted by 4 CES/CEIE personnel, and outreach events such as Earth Day and America Recycles Day. 15

Direct communication between 4 CES/CEIE personnel and interested persons is the most effective means of getting specific information to identifiable audiences. These audiences may include high ranking enlisted or officer personnel, environmental organization officers, outside agency personnel, and civic leaders.

7.17.1 Prepared Talks

Prepared talks are given at the request of various groups such as schools, boy and girl scouts, civic organizations and other federal agencies involved in natural resources. Talks have been given at various professional meetings such as National Military Fish and Wildlife Association, Atlantic White Cedar Restoration Conference, Department of Defense Legacy Program Conference, and Ecological Society of America Annual Conference. 26

In many cases, topics can be chosen to explain specific management programs that are bolstered by public understanding and support. General presentations about the USAF and DCR natural resources program highlight the Air Force as a good steward who allocates considerable funding to natural resources protection.

7.17.2 Special Events

The Environmental Flight also participates in other special events to inform the public about natural resources management at both SJAFB and DCR. Earth Day events are held every year with information booths which highlight the Air Force's commitment to protecting the environment and conserving natural resources. SJAFB has been a participant in the Cliffs of the Neuse State Park Earth Day to advertise its environmental program, including DCR natural resources. Seymour Johnson AFB has been named a Tree City by the Arbor Foundation's Tree City USA program for the past 8 years.

7.17.3 Disabled Sportsmen

The Sikes Act requires that special consideration be given to disabled sportsmen. This consideration is to include "disabled veterans, military dependents with disabilities, and other persons with disabilities, when access to a military installation for such persons and other civilians is not otherwise restricted." The majority of the DCR is wetlands and movement across the landscape is difficult for all personnel. The majority of hunting occurs on or near roads, which are unimproved. DCR does not have any areas specifically designated for disabled sportsman, but does not restrict them from accessing the Range. Any future improvements or outdoor structures will take disabled sportsmen into account in the design of the structure.

8 MANAGEMENT GOALS AND OBJECTIVES

This Chapter contains the management goals and objectives which reflect the direction of DCR's natural resources management program during the planning period. They were developed in response to issues and management concerns obtained from cooperating agencies, the military mission, and other interested stakeholders. Goals are the primary focal points for the implementation of this plan over the 5-year planning period, and include primary and supportive goals.

Goals. Goals are the primary focal points for the implementation of the INRMP over the five years covered by the plan. A goal should reflect the values of the installation by expressing a vision of a desired condition for the installation's natural resources in the foreseeable future. Each goal is supported by one or more objectives.

Objectives. Each goals is supported by objectives which indicate a management initiative or strategy that will be used to achieve the stated goal. An objective specifically states what will be done and how it will be done. An objective must be time-bound and measurable. The objective statement, therefore, should include timelines for completion and quantifiable units for measuring results (e.g. acres treated) so that you are able to determine exactly when the objective is completed. Briefly explain the performance measures that will be used to monitor the success or failure in achieving each objective.

Projects. Projects (or Tasks) are the individual component actions required to achieve an objective. Projects statements describe the specific methods and procedures that will be used (i.e. scopes of work) to achieve the objective supported. Projects are actions that become line items in the proposed budgets (e.g. ACES-PM) for INRMP implementation. Projects must be achievable within the period covered by the INRMP.

The mission statement of the natural resources management program at DCR is to facilitate and enhance the military mission through the conservation, protection, and consideration of natural resources on the installation. Inherent in this mission statement is the requirement to maintain realistic training areas with viable populations of native plants and animals, including RTE species, through the professional management of the natural infrastructure. Within the context of this mission statement, the following management goals and objectives are provided to ensure compliance with the terms and intent of the 1997 amendments to the Sikes Act and other applicable natural resources laws and regulations and to ensure no net-loss in the capability of the natural infrastructure to support the military mission of DCR.

Goal 1: Manage T&E Species to maintain or increase population numbers.

Objective 1.1: Monitor RCW numbers on DCR annually.

Project 1.1.1: Conduct annual RCW surveys of bird population and breeding success and collect data on the status of all clusters and cavity trees.

Project 1.1.2: Assess suitability of nesting and forage habitat on 1000 acres annually; identify potential habitat for establishment of recruitment sites to expand the population to the recovery goal.

Objective 1.2: Manage RCW habitat.

Project 1.2.1: Remove hardwood species adjacent to cavity trees.

Project 1.2.2: Use prescribed fire to remove understory when possible.

Project 1.2.3: Protect cavity trees by establishing and maintaining mechanically cleared buffers prior to prescribed fire.

Objective 1.3: Increase RCW numbers to 18 Potential Breeding Groups (PBGs) or one PBG per 300 acres of habitat by 2025.

Project 1.3.1: Maintain restrictors on existing cavity trees to prevent unwanted wildlife from using as recommended by monitoring.

Project 1.3.2: Install 5 artificial nest cavities per year in suitable habitat near existing occupied habitat.

Goal 2: Maintain appropriate levels of wildlife, including game and non-game species.

Objective 2.1: Obtain wildlife use and habitat occupancy data.

Project 2.1.1: Conduct annual surveys for game species.

Project 2.1.2: Obtain game harvest data from NCWRC.

Project 2.1.3: Survey bear habitat and census bear populations every 5 years.

Project 2.1.4: Conduct annual Audubon Christmas Bird Count and spring migration census.

Objective 2.2: Improve wildlife habitat over 100 acres annually.

Project 2.2.1: Use prescribed fire, invasive species treatments, and erosion control measures appropriately in key areas. See Projects 1.2.1, 1.2.2, 4.1.1, 4.1.2, 6.1.2, 6.2.1, 7.2.1, 7.3.1, and 7.3.2.

Project 2.2.2: Maintain existing wildlife food plots

Goal 3: Participate in local, regional, and national opportunities for natural resources awareness and management.

Objective 3.1: Participate in Wings over Water.

Objective 3.2: Participate in the Department of Defense Federal Partners in Flight Program.

Objective 3.3: Continue regional collaboration with ARNWR and NCWRC on shared natural resources management opportunities on the Dare County peninsula.

Goal 4: Manage wetlands and water resources for wildlife habitat and ecosystem function.

Objective 4.1: Improve hydrology in altered wetlands.

Project 4.1.1: Install six 72" x 40' culverts (with control structures) to improve/enhance hydrology.

Project 4.1.2: Replace six restricted 48" culverts with 72 " culverts to improve water flow.

Objective 4.2: Protect high-quality wetland and forest ecosystems and wetland habitats supporting threatened and endangered species and in accordance with applicable laws and regulations.

Project 4.2.1: Use prescribed fire, invasive species treatments, and erosion control measures appropriately in key areas. See Projects 1.2.1, 1.2.2, 4.1.1, 4.1.2, 6.1.2, 6.2.1, 7.2.1, 7.3.1, and 7.3.2.

Project 4.2.2: Maintain North Carolina Natural Heritage Areas (NHAs) by deferring active forest management within the NHAs.

Goal 5: Manage forests for wildlife habitat, ecosystem function, and sustainable timber production and harvest.

Objective 5.1: Determine forest composition, species richness, resource density and locations.

Project 5.1.1: Establish a continuous forest inventory (CFI) system using previous forest inventory data, wildland fire data, and other existing data to provide a current forest inventory baseline.

Project 5.1.2: Conduct forest plot sampling over 100 plots annually to determine forest species composition and health.

Project 5.1.3: Conduct timber compartment assessments to prioritize timber sale lots.

Objective 5.2: Conserve and protect forest species with high ecological or regionally significant values.

Project 5.2.1: Evaluate degraded Atlantic white cedar stands for potential restoration and prioritize sites for restoration.

Project 5.2.2: Restore 100 acres of Atlantic white cedar annually by invasive/hardwood/overstory species removal, and tree planting.

Objective 5.3: Manage harvestable timber to maximize ecosystem function and timber sale revenues.

Project 5.3.1: Create and maintain a long-term loblolly pine timber harvest plan and schedule. Prioritize and define timber sale lots annually.

Project 5.3.2: Conduct timber harvest in the eight loblolly pine management units using seed tree harvesting techniques, on a 35 year rotational basis.

Project 5.3.3: Use thinning treatments, herbicide applications, and other management to reduce hardwood species encroachment in management units.

Objective 5.4: Provide forest pest surveillance and management.

Project 5.4.1: Participate in local and regional pest surveillance with US Forest Service Southern Research Station and North Carolina Division of Forest Resources.

Project 5.4.2: Establish pheromone traps annually in spring to monitor southern pine beetle.

Project 5.4.3: Apply control measures to treat affected areas and reduce or eliminate pest infestations.

Goal 6: Manage prescribed and wildland fire to protect life and safety, the mission, resource values, and personal property.

Objective 6.1: Reduce fuels in high-hazard areas to preclude wildfire.

Project 6.1.1: Provide annual prescribed burns within the target areas to reduce the possibility of mission-caused wildfire.

Project 6.1.2: Construct and maintain fuel breaks and roads to support wildland firefighting response and protect private lands and other values from wildfires.

Objective 6.2: Use prescribed burns to restore ecosystem functioning.

Project 6.2.1: Prescribe burn acres in accordance with USAF Wildland Fire Center recommendations and WFC approved Wildland Fire Management Plan.

Goal 7: Manage vegetation for wildlife habitat and ecosystem functioning.

Objective 7.1: Maintain vegetation inventory data to support decision making processes.

Project 7.1.1: Use GIS data from natural resources management projects to keep species composition/richness/alliance, fuel loading, forestry, and wetland vegetation data current.

Project 7.1.2: Obtain high-resolution ortho-rectified photography of DCR every five years to update/verify vegetation layers in GIS.

Objective 7.2: Maintain wetland vegetation.

Project 7.2.1: Restore wetlands vegetation.

Objective 7.3: Identify and control invasive species.

Project 7.3.1: Survey 30 miles of roads and treat invasive species wherever found annually.

Project 7.3.2: Survey all RCW habitat and ecologically important areas annually and treat for invasive species.

Goal 8: Maintain infrastructure to provide access for management activities.

Objective 8.1: Maintain and repair road surface

Project 8.1.1: Survey roads and repair damage wherever found.

Objective 8.2: Maintain vegetation on road shoulders and ditch banks.

Project 8.2.1: Mow 30 miles of road shoulders and ditch banks

9 INRMP IMPLEMENTATION

This INRMP was developed by the DCR natural resources staff and approved by the Seymour-Johnson AFB Wing Commander or his/her designee. In accordance with the Sikes Act and 32 Code of Federal Regulations (CFR) 989, *The Environmental Impact Analysis Process*, the plan was also coordinated with appropriate federal, state, and local government officials, public groups, and individuals with interest in or jurisdiction of natural resources in North Carolina.

9.1 NATURAL RESOURCES MANAGEMENT STAFFING

The SAIA states "Section 107 of the Sikes Act (16 U.S.C. 670e-2) requires sufficient numbers of professionally trained natural resources management personnel and natural resources law enforcement personnel to be available and assigned responsibility to perform tasks necessary to carry out Title I of the Sikes Act, including the preparation and implementation of integrated natural resource management plans". DCR is currently staffed by one Natural Resource Manager and one Forester.

The professional development of natural resources management staff greatly enhances the effectiveness of this INRMP. This requires the maintaining of staff knowledge through training and participation in conferences and workshops.

The management of natural resources requires a specialized skill set on the part of personnel. In addition to holding science based degrees, Environmental Flight personnel acquire skills by attending training through the Air Force Institute of Technology, Civil Engineer and Services School, Civil Engineering Corps Officers School, and National Conservation Training Center. All natural resources managers at Category I installations must take the course *DoD Natural Resources Compliance*, developed by the DoD Interservice Environmental Education Review Board (ISEERB) offered by the Naval School, Civil Engineer Corps Officer School (CECOS).

Natural resources staff keep abreast of current issues by attending annual workshops or conferences held by various professional societies. Societies such as National Military Fish and Wildlife Association, The Wildlife Society, Society of American Foresters, and Society for Ecological Restoration all host annual meetings focused on the management of natural resources. Additionally, specialized conferences, such as Atlantic White Cedar Symposium, Red-cockaded Woodpecker Symposium, Fire Behavior and Fuels Conference, wetlands training and GIS training courses are regularly attended by staff.

The Air Force offers online training modules in environmental and natural resources programs through the Environmental and Safety and Occupational Health program.

9.2 ANNUAL COORDINATION REQUIREMENTS

The INRMP will be reviewed annually to assess the effectiveness of integration linkages. Findings from this annual review will be presented to update senior Base leaders of the status and effectiveness of the Plan. Annual updates of the INRMP, including specific proposed projects for each upcoming FY, will be prepared by 4 CES prior to the preparation of the annual Conservation, Forestry, and Fish and Wildlife budgets.

In accordance with AFI32-7064, annual review and coordination of the INRMP with the state fish and wildlife management agency and the US Fish and Wildlife Service is required to evaluate the progress of INRMP implementation and to make recommendations on how management actions need to be adjusted to improve the efficiency and effectiveness of the Plan. Components will include the review of all goals/objectives/projects, monitoring data, undertakings that required submission of Air Force Forms 332

or 813, and stakeholder involvement activities. Each review should result in adding another year of projects to the Plan. The target date for conducting annual reviews is immediately following the close of each FY (i.e., between 1 Oct and 30 Nov).

A critical consideration is to ensure that there is no net loss of military capability as a result of implementing the INRMP. Specifically, this evaluation will require careful examination of management objectives from which annual projects are developed.

Consensus should be reached on (1) whether or not the INRMP was fully implemented, and (2) whether or not the management scheme was effective. If no significant revisions are required, the parties will be requested to sign a memorandum stating that the plan was fully implemented and that management schemes are effective. If it is determined that the plan is ineffective or needs substantial revision, the update process should be initiated.

9.3 MONITORING INRMP IMPLEMENTATION

Monitoring INRMP Implementation will be a component of the annual review. The annual review will capture the previous year's work and any changes necessary in the INRMP or work plans to respond to conditions, both operational and climatological, to ensure the continued effective management of resources and sustainment of the military mission.

The annual review will be captured by the following written documentation:

1. The year the most recent INRMP was completed or revised.
2. The organizations contacted and/or that participated in coordination.
3. Feedback (if any) from the coordination groups/organizations.
4. Any changes made, as a result of the coordination (e.g., project changes, document changes, etc.).
5. Status of project funding.
6. Accomplishments for the previous year and planned future efforts.
7. Determination of whether the INRMP requires revision.

As the foundation for adaptive management on-base, these annual reviews will help keep the INRMP current and relevant with the incorporation of new projects, additional data, new understanding of natural processes and species, knowledge of other Base operations impacting natural resources, and lessons learned from completed and ongoing projects.

Annual reviews and updates will be conducted to account for changes in the military mission, condition of natural resources, the ecosystem, and regulatory requirements. More specifically, the INRMP will be updated for the following reasons:

(1) when mission interference or lack of mission support requires a change in natural resource management direction;
(2) when ecological monitoring data reveals management actions are having a negative effect on the resources and have reached a threshold of significance, requiring a fundamental change in management methods; and
(3) when new laws or regulations require additions or deletions of management activities. If major revisions are needed, the Environmental Element should outline a schedule to accomplish the revision and notify the MAJCOM.

10 WORKPLAN

FY 2016	Proj Description	Implement	Fund Source	Priority
	Conduct annual RCW survey	May 2016	Env Qual	#1
	Assess forage habitat	May 2016	Env Qual	#2
	Remove hardwoods near cavity trees	Nov 2015	Env Qual	#3
	Use prescribed fire when feasible	Nov 2015	Env Qual	#4
	Maintain restrictors on cavity trees	Nov 2015	Env Qual	#5
	Install 5 artificial cavities/yr	Nov 2015	Env Qual	#6

1

FY 2017	Proj Description	Implement	Fund Source	Priority
	Conduct annual RCW survey	May 2017	Env Qual	#1
	Assess forage habitat	May 2017	Env Qual	#2
	Remove hardwoods near cavity trees	Nov 2016	Env Qual	#3
	Use prescribed fire when feasible	Nov 2016	Env Qual	#4
	Maintain restrictors on cavity trees	Nov 2016	Env Qual	#5
	Install 5 artificial cavities/yr	Nov 2016	Env Qual	#6

2

FY 2018	Proj Description	Implement	Fund Source	Priority
	Conduct annual RCW survey	May 2018	Env Qual	#1
	Assess forage habitat	May 2018	Env Qual	#2
	Remove hardwoods near cavity trees	Nov 2017	Env Qual	#3
	Use prescribed fire when feasible	Nov 2017	Env Qual	#4
	Maintain restrictors on cavity trees	Nov 2017	Env Qual	#5
	Install 5 artificial cavities/yr	Nov 2017	Env Qual	#6

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GOLDSBORO, NORTH CAROLINA

BIRD AIRCRAFT STRIKE HAZARD (BASH) PLAN

FEBRUARY 2015

February 2015

4TH FIGHTER WING/SE
SEYMOUR JOHNSON AFB, NC 27531-2524

SEYMOUR JOHNSON AFB BIRD AIRCRAFT STRIKE HAZARD (BASH) PLAN

MEMORANDUM FOR: See Attached Distribution List

FROM: 4 FW/CC

SUBJECT: Seymour Johnson AFB BASH Plan.

1. The Seymour Johnson AFB BASH Plan provides guidance for reducing the bird aircraft strike hazard in the areas where the 4FW and tenant flying units based at Seymour Johnson AFB (916 ARW) conduct flying operations.

2. This plan is effective upon receipt.

3. This document supersedes the previous BASH plan dated October 2013.

4. The office of primary responsibility for this plan is 4 FW/SE.

Mark H. Slocum, Colonel, USAF
Commander

Attachments:
1. Distribution List
2. Environmental Analysis
3. Bird Exclusion Zone (BEZ)
4. Coastal Area Map

RECORD OF CHANGES:

This 4 FW BASH plan has undergone a complete revision and restructure.
A highlight of policy changes are as follows:

2.1.4. BHWG information now presented at the Flight Safety Council instead of ESOH Council.

4.1.1. The BWC can only be downgraded with approval from 4OG/CC or representative.

5.4.3.2. Clarification of aircraft speed while in BWC Moderate on Low-levels, MOA's and R-5306A .

6.1.1. Range Control Officer has the authority to upgrade BWC at Dare Bombing Range.

6.4.1. MERLIN radar capabilities have changed and the altitude and ranges have been updated.

7.3. Dedicated bird clearing pass at Avon Park Range regardless of BWC.

TABLE OF CONTENTS

ATTACHMENTS

1. SUMMARY

1.1. PURPOSE: The 4 FW BASH Plan provides 4 FW agencies and tenants with a program to mitigate bird hazards where SJAFB assigned aircraft conduct flight operations. In areas where the hazard is not controllable, the plan attempts to minimize exposure of SJAFB assigned aircraft to expected bird concentrations that would present an unreasonable risk of bird strikes. The primary flying units and aircraft utilizing the airfield include the 4 FW (F-15E) and the 916th Air Refueling Wing (KC-135R). This plan includes the terminal area, local low levels, and local bombing ranges.

1.2. DESCRIPTION OF LOCAL BIRD HAZARDS: The concentration of birds at and around SJAFB poses a significant risk to flying operations. The terrain, bodies of water and climate are ideal living conditions for birds year-around, as well as those who migrate. Many SJAFB low-level routes and the Dare County Bombing Range are located within the Atlantic Flyway, one of the most concentrated areas of migratory birds in the United States. See attachment 2 for a detailed description of the bird hazards associated with SJAFB.

1.3. CONDITIONS OF EXECUTION: This plan is based on hazards from both resident bird populations and seasonal bird migrations. Implementation of specific portions of this plan is continuous, while other portions require implementation as dictated by bird activity.

1.4. OPERATIONS TO BE CONDUCTED: Specific operations include:

1.4.1. Maintain a Bird Hazard Working Group (BHWG) and a Bird Hazard Working Team (BHWT).
1.4.2. Eliminate or reduce environmental conditions that attract birds to the airfield.
1.4.3. Prevent and eliminate high-risk concentrations of birds in the terminal area.
1.4.4. Outline potential areas and times for high-risk bird activity.
1.4.5. Outline procedures for reporting observed hazardous bird activity.
1.4.6. Outline procedures for altering or discontinuing flying operations to avoid expected and/or actual hazardous bird activity.
1.4.7. Disseminate information to assigned and transient aircrews regarding specific bird hazards and avoidance procedures.

1.5. REFERENCES:

1.5.1. AFI 91-202
1.5.2. AFI 91-204
1.5.3. AFP 91-212
1.5.4. AFSEC BASH TEAM
1.5.5. ACC SE BASH
1.5.6. US BAM
1.5.7. AHAS

2. CONTROL MEASURES

2.1. BIRD HAZARD WORKING GROUP (BHWG)

2.1.1. Function: Collect, compile, and review data on bird strikes, identify and initiate actions to reduce wildlife hazards. Recommend changes in operational procedures, prepare informational programs for aircrews, and highlight BASH issues with off-base agencies.

2.1.2. Authority: The 4 FW Vice Wing Commander chairs the BHWG meetings and approves/disapproves recommendations of the group. 4FW Flight Safety (SEF) will provide oversight.

2.1.3. Composition: IAW AFI 91-202, the 4 FW BHWG will consist of, as a minimum, representatives from:

2.1.3.1. Flight Safety
2.1.3.2. United States Department of Agriculture (USDA)
2.1.3.3. Air Traffic Control
2.1.3.4. Civil Engineering
2.1.3.5. Airfield Management
2.1.3.6. Aircraft Maintenance
2.1.3.7. 4FW Range and Airspace
2.1.3.8. 916 ARW/SE

2.1.4. Meeting schedule: Directly after or combined with the semi-annual Flight Safety Council meetings.

2.1.5. Reference document: A Wildlife Hazard Assessment was conducted by USDA personnel for SJAFB, associated low-level routes and Dare County Range in 2003. The Wildlife Hazard Assessment document should be referenced as a baseline before making any changes to 4 FW BASH policies or procedures. A copy of the assessment is located in flight safety.

2.2. BIRD HAZARD WORKING TEAM (BHWT)

2.2.1. Function: The 4 FW has gone beyond the minimum requirements for a BHWG to establish a local BHWT. The BHWT is a more refined version of the BHWG, intended to accomplish specific and detailed work with regards to the BASH program.

2.2.2. Authority: The 4 FW Flight Safety Officer or the USDA Biologist chairs the BHWT. Decisions of the team are generally agreed upon collectively. However, the chairman will rely on the normal chain of command for appropriate issues.

2.2.3. Composition: The BHWT is composed of:

2.2.3.1. Flight Safety BASH Program Manager
2.2.3.2. USDA Representatives
2.2.3.3. Flight Safety NCOIC
2.2.3.4. 4 FW Stand/Eval (OGV)

2.2.3.5. 4 FW Scheduling (OSOS)
2.2.3.6. Civil Engineering:
2.2.3.7. Pest Management
2.2.3.8. Environmental Management Element
2.2.3.9. Pavement & Construction Equipment
2.2.3.10. Grounds Maintenance
2.2.3.11. Air Traffic Control
2.2.3.12. Airfield Management
2.2.3.13. Aircraft Maintenance
2.2.3.14. Base Foreign Object Debris (FOD) manager
2.2.3.15. Squadron Flight Safety Officers (SFSOs)
2.2.3.16. 916 ARW/SE
2.2.3.17. 916 OG/OGV

NOTE: If a member's participation is not anticipated, it is not necessary for that person to attend.

2.2.4. Meeting schedule: The BHWT meets quarterly, ideally a week prior to the BHWG. Potential topics of discussion for each quarter are: January – Wintering waterfowl, review fall migration, spring migration. April – Grass cutting, nesting season. July – Blackbird flocking. October – Final grass cut, fall migration, FY bird activity. Invitations are distributed by electronic mail and acknowledged with RSVP. An annual review of BASH procedures will be accomplished during the first meeting of each fiscal year typically occurring in October or November.

2.3. BIRD WATCH CONDITIONS (BWCs)

2.3.1. AFI 91-202 outlines the definitions of USAF BWCs as listed below. There are three levels of risk, LOW, MODERATE, and SEVERE, which will be referenced. This terminology will be used for rapid communications to disseminate information regarding significant bird activity and to implement specific operational procedures. Do not confuse the USAF BWC definitions with those used by the Avian Hazard Avoidance System (AHAS).

2.3.2. At the airfield, USAF BWC apply. Observation of local conditions will be the primary means to establish the Seymour Johnson AFB BWC. However, the AHAS should be used as an aid to predicting BASH risk in the local area, especially during night operations. On a low-level or any range in the 4FW Inflight Guide, AHAS BWC applies. Local flight observations and MERLIN Radar (where available) should be used to aid AHAS BWC and ensure safe operating conditions.

2.3.3. USAF BWCs are definied as follows:

2.3.3.1. **Bird Watch Condition LOW**: Wildlife activity on and around the airfield representing low potential for strikes. For example: Up to 20 small birds in the airfield environment, or on a low level or range, one near pass with a small, non-migratory bird may allow for the BWC to remain LOW. Under these circumstances, however, a warning to following aircrew to avoid a known bird hazard, albeit minimal, is expected and encouraged.

2.3.3.2. **Bird Watch Condition MODERATE**: Wildlife activity near the active runway or other specific locations representing increased potential for strikes. BWC MODERATE requires increased vigilance by all agencies and supervisiors and caution by aircrew. For example: 20-50 small birds in the airfield environment, but not near the runway or approach/departure paths, or 1-3 predator (hawk) size birds flying near the runway may constitute BWC MODERATE.

2.3.3.3. **Bird Watch Condition SEVERE**: Wildlife activity on or immediately above the active runway or other specific location that representing high potential for strikes. Supervisors and aircrews must thoroughly evaluate mission need before conducting operations in areas under condition SEVERE. For example: More than 50 small starling size birds or 1-2 hawks congregating near the approach or departure paths would warrant BWC Severe. A smaller group (4-10) of duck size birds or a large concentration (100+) of starlings anywhere within the Bird Exclusion Zone may also constitute BWC Severe. On a low-level, any concentration of birds that causes a flight lead to recommend that the 4 FW Supervisor of Flying (SOF) close the low-level segment, such as a large migration of swans or ducks, would define BWC SEVERE. On a range, any concentration of birds that cannot be safely avoided while flying below 4500' AGL would define BWC SEVERE. Sometimes BWC SEVERE may need to be declared for a protracted time period, potentially halting certain flight training and causing non-effective sorties. The SOF, Tower Watch Supervisor, or Airfield Management should declare the appropriate level of BWC for the current or predicted conditions, regardless of the expected duration or impact on mission effectiveness.

2.3.4. AHAS definitions are defined on the AHAS web site (www.USAHAS.com). AHAS is an internet-accessible system that uses weather radar and thermal data to monitor and predict bird concentrations in near real time. In addition to offering a current observation of bird activity, AHAS is capable of forecasting bird risk for up to 24 hours in advance. Aircrew will follow AHAS BWC and may elevate BWC based on flight observed conditions, but not reduce BWC.

2.3.5. Restrictions based on BWC and flight location are covered in Sections 4-8 of this document.

2.4. BASH PHASE I – 16 November through 14 August. Wildlife activity is generally LOW during these periods with the primary threat resulting from turkey vultures, hawks, and waterfowl. During the rainy periods between December and April, gull activity increases on and around the runway environment. The City of Goldsboro operates a waste water treatment pond facility off the West end of the runway that attracts over 1,000 wintering waterfowl between November and April.

2.5. BASH PHASE II – 15 August through 15 November. Wildlife activity is increased during the fall due to migration. The primary threat is from flocking blackbirds, swallows and mourning doves. Expect Bird Watch Conditions to change to MODERATE or SEVERE at any time during these periods.

2.6. HISTORICAL CONDICTIONS -- The following conditions have historically produced hazardous levels of bird activity.

2.6.1. An approaching weather frontal system
2.6.2. Low cloud ceilings without precipitation
2.6.3. One hour before or after sunrise or sunset
2.6.4. Drastic changes in temperature: 15 degrees/30 minutes
2.6.5. Known migration seasons

3. COMMUNICATIONS

3.1. Information regarding bird hazards may be received through a variety of sources. For example, signs posted around the airfield within the Bird Exclusion Zone instruct observers to report bird activity to the control tower (generally via radio) or to Airfield Management at DSN 722-4097. Aircrew routinely advises the SOF on UHF radio of bird sightings. Flight Safety and USDA are often informed through consultants and local military bases that potential bird hazards exist. Whatever the source of the information, the changes to the BWC must be disseminated quickly and appropriately once it has been declared.

3.2. Because each BWC infers associated restrictions to flight operations, it is imperative that the affected crews be made aware of changes ASAP. For example, BWC Severe essentially closes the pattern, low-level, or range. If the condition is expected to be protracted, a Formal Training Unit (FTU) sortie may be non-effective due to unaccomplished training. With an early warning, however, the instructor may be able to flex to an alternate pattern, low-level, or range to affect a complete sortie.

3.3. Kinston Regional Jetport at Stallings Field is sometimes used by FTU aircrew for student training when the SJAFB BWC is moderate or severe. Kinston does not have a BASH program and there are limited procedures in place to advise aircrew of the bird activity at Kinston. Aircrew will contact Kinston Tower or 4 FW/SOF to determine the status of any hazardous bird activity prior to entering the Kinston visual pattern. Aircrew will exercise good airmanship/ safety of flight while balancing bird activity in the Kinston pattern and effective student training.

3.4. Upon observing hazardous bird conditions, the information must reach the 4 FW SOF, Tower Watch Supervisor or Airfield Management as quickly as possible. The most expeditious manner is to contact:

3.4.1. 4 FW SOF “Lion SOF” via UHF radio, FM Lion Net, or DSN 722-4176
3.4.2. Seymour Tower
3.4.3. Ground Control
3.4.4. ATC Watch Supervisor
3.4.5. Airfield Management

3.5. Once the SOF/Tower Watch Supervisor has been made aware of the hazard, it is their responsibility to declare a BWC as required, and then disseminate the news to aircrew and other affected/interested agencies. The Bird Watch condition, the affected specific location, and the nature of hazard should be issued where appropriate. The level of dissemination depends on the BWC, the location and the expected period of implementation. In general, the following contacts should be made:

3.5.1. **BWC MODERATE/ SEVERE:**

3.5.1.1. Airfield Management Operations (to respond to airfield for bird dispersal)
3.5.1.2. ATIS (for Terminal Area, protracted conditions only)
3.5.1.3. Approach Control (for Airfield, if not on ATIS)
3.5.1.4. Command Post (x1973, x2181 they will announce on Lion Net)
3.5.1.5. Flying Squadrons
3.5.1.6. Wing Flight Safety/USDA Wildlife Biologist (x4227/x4229)
3.5.1.7. 916 ARW (for Airfield or Kinston)
3.5.1.8. AF Dare RCO (if Range is affected)
3.5.1.9. 4 OSS Scheduling (if Range or Low Levels are affected)

4. AIRFIELD

4.1. AUTHORITY

4.1.1 During normal flight operations, the authority to declare a BWC in the terminal area is vested with the SOF. Depending on the location and time, the authority to upgrade a BWC to MODERATE or SEVERE is given to the SOF. If the SOF is not on duty, then the Tower Watch Supervisor or Airfield Management may declare a BWC. Some subjectivity may be involved in declaring a BWC. If doubt exists as to the hazard severity, a conservative declaration should be made. The BWC can only be downgraded with approval from 4OG/CC or representative.

4.1.2 The following individuals will routinely advise the SOF of hazardous bird conditions that may necessitate a change in BWC

4.1.2.1. Air Traffic Control Personnel (4 OSS/OSAT)
4.1.2.2. Airfield Management Personnel (4 OSS/OSAA)
4.1.2.3. USDA Personnel
4.1.2.4. 4 FW Flight Safety Personnel (4 FW/SE, SEF, FSDO)

4.1.3. Generally, the personnel listed above are well trained to understand BASH, but may not have the best situational awareness regarding local area flight operations. Therefore, the SOF (or Tower Watch Supervisor or Airfield Management when SOF is not available), as the OG/CC's representative, will be the final authority to declare a BWC for the airfield.

4.1.4. Once the BWC has been decided, the declaring authority (SOF, Tower Watch Supervisor, or Airfield Management) is responsible to disseminate the change in accordance with this plan.

4.2. . PREVENTION

4.2.1 Bird Exclusion Zone: A perimeter around the airfield property has been defined in which bird concentrations of any significance will not be tolerated. The Bird Exclusion Zone (see attachment 3) includes the runway, all taxiways, and all parking ramps. In addition, much of the base's improved common property that is within one-half mile of the runway is also included in the zone.

4.2.2.1. igns have been erected at strategic locations within the bird exclusion zone to alert base personnel that they are in the zone. The signs state:

4.2.2.2. "THIS AREA IS A BIRD EXCLUSION ZONE. REPORT BIRD ACTIVITY TO CONTROL TOWER OR AIRFIELD MANAGEMENT AT 722- 4097. *Grass height: 7-14 inches*"

4.2.2. Drainage Control: Drainage within the bird exclusion zone is closely monitored and controlled. Routine inspections are accomplished following heavy rains to identify areas where water tends to pool. Civil Engineering is notified where necessary to raise the levels of the low areas to prevent future standing water. Vegetation within drainage ditches is kept clear.

4.2.3. Grass Height: Grass Height within the Bird Exclusion Zone is maintained at 7-14 inches. The 4 OSS/OSAA office maintains a copy of the Bird Exclusion Zone map for reference. Grass is cut to 7 inches, and then allowed to grow to 14 inches. In the late Fall, when grass growth begins to taper, the final cut of the season is made as close to 7 inches as possible.

4.2.4. Training: BASH is discussed in detail at all quarterly aircrew Flight Safety meetings. Semi-Annual SOF training is conducted to emphasize BASH awareness and appropriate actions to minimize hazards while maximizing mission effectiveness. Additionally, BASH training is given by 4 FW/SEF for initial SOF training.

4.3. DETERRENT

4.3.1. Pyrotechnics: Airfield Management and USDA maintain a stock of bangers/screamers/12 gauge cracker shells and other noisemakers intended to scare away birds. Airfield Management and USDA personnel are trained to safely operate the devices. The SOF can call them out to reduce a significant hazard that simpler methods were not sufficient to control. These pyrotechnic devices reach max heights of 500 feet and can quickly be used to disperse bird activity. Airfield Management and USDA will maintain records of all events where pyrotechnics were used.

4.3.2. Guns: USDA should be contacted to coordinate any required depredation. Once this decision has been made, USDA will have responsibility for executing the plan. This method is used when previously mentioned methods have failed to effectively deter problem birds. As the intention is to kill a bird from the problem flock, this measure is also considered effective in convincing the surviving birds that the SJAFB airfield is not a hospitable, or even survivable, habitat. USDA maintains records of all depredations. Permits to depredate migratory birds, deer or small mammals on base property are required by federal and/or state law and hard copies are on file in the 4FW Safety Office. SJAFB follows the current depredation policy established by the AF Safety Center.

4.4. RESTRICTIONS

4.4.1. If a BWC is not announced for the airfield, LOW should be assumed. When a BWC is declared, operations will be affected as follows:

4.4.1.1. **BWC LOW**: Normal operations.

4.4.1.2. **BWC MODERATE**: No formation takeoffs or landings. Weather permitting; the primary entry will be the overhead pattern to a full stop. The 1000 foot hold-down restriction on departure may be deleted at the Tower supervisor discretion and will be communicated in the takeoff clearance. If required, restricted low approaches authorized to 700 feet AGL minimum. 916 ARW aircraft will not conduct multiple approaches or touch and gos. Approaches with the intent of a full stop landing are permitted.

4 FW flights needing to complete checkride or FTU syllabus requirements for an effective sortie may contact the SOF for multiple patterns if BWC is MODERATE. This will only be accomplished for 4 FW aircrew if there are no IFE's in progress, not enough fuel to hold for BWC LOW and patterns could not be accomplished off station. Approval may not be granted depending on traffic, weather or bird conditions.

Tower watch supervisor and SOF will work together along with USDA personnel (Dover-3) to determine if pattern changes can be accommodated in a manner to avoid the bird hazard and not to affect safety of flight. BWC will remain MODERATE when flying modified patterns and ATIS will reflect accordingly. The intent is to balance mission requirements and bird strike potential. Multiple patterns under MODERATE conditions will be coordinated, approved and documented by the SOF. Some examples of possible pattern modification may include:

A. No closed traffic if birds are located on the inside downwind.
B. Mid-field closed traffic if birds are located on departure end.
C. Straight-ins only if birds are located at pattern altitude.

At all times aircrew, SOF and tower personnel will continue to monitor and remain vigilant of increased bird activity and may take such measures as to limit the number of aircraft in the pattern and/or call a "Knock-It-Off" if the situation warrants.

4.4.1.3 **BWC SEVERE**: No takeoffs or landings. Airfield is closed except to emergency aircraft. Aircraft on RTB proceed to an appropriate holding fix and contact the SOF for instructions.

4.4.2. With approval from the 4 OG/CC, the SOF can change the above restrictions as required to more effectively manage airfield operations and mitigate bird hazards. For example the SOF may elect to land aircraft in BWC SEVERE, for emergency situations and/or safety of flight.

4.4.3. Between late September and early October, numerous migrating blackbirds flock on and around the airfield near dawn and dusk, posing a major hazard to flying operations. For this reason, there will be no scheduled takeoffs 30 minutes prior to sunrise/sunset to 30 minutes past sunrise/sunset during this period. USDA/SEF will notify OSOS and OGV as soon as possible prior to when this period is forecasted to begin and disseminate restriction via an FCIF.

4.4.4. Seymour Johnson Air Force Base does not have an operational Bird Radar on the airfield.

4.5. COMMUNICATION

4.4.5. **BWC Downgrade:**

4.4.6. Once the hazardous threat of birds and/or mammals have passed the decision to reduce the BWC is vested with the SOF. The SOF must get prior approval to downgrade the BWC by the 4OG/CC or representative.

4.4.6.1. After approval is given to reduce BWC the SOF will relay downgraded BWC verbally to ATC.

4.4.6.2. ATC will then broadcast downgraded BWC to:

4.4.6.2.1.□□□□□□ 4 FW SOF "Lion SOF" via UHF radio, FM Lion Net, or DSN -4176
4.4.6.2.2.□□□□□□ Seymour Tower
4.4.6.2.3.□□□□□□ Ground Control
4.4.6.2.4.□□□□□□ ATC Watch Supervisor
4.4.6.2.5.□□□□□□ Airfield Management

5. LOW LEVELS, MOAs, and R-5306A restrictions:

5.1. AUTHORITY

5.1.1. The authority to declare upgraded and/or downgraded BWC's for specific sections or entire lengths of low-level routes and MOA's is vested in the SOF regardless of AHAS or US BAM restrictions. However, SOF's may not downgrade conditions from the AHAS or US BAM. If the SOF increases the BWC for an area, low level/segment, that BWC will remain in effect until 1) the SOF lowers it back to current AHAS observation (based on aircrew/range controller observations), 2) a higher AHAS BWC is reported, or 3) one-half hour after sunset.

5.1.2. Flight leads that recognize a hazard warranting an increased BWC for following flights should contact the SOF as soon as possible. Specifically, a flight lead must contact the SOF (see 5.5 Communications) if their flight was forced to alter their flight path (i.e. climb) to avoid a bird strike from a significant but avoidable bird concentration. This situation defines BWC Moderate.

5.2. PREVENTION – Birds follow natural migration and behavior patterns; therefore, their presence cannot be controlled in low altitude areas where the 4 FW flies. The large scale of the area affected, coupled with private property issues, prevent the 4 FW from impacting the attractiveness of these areas to hazardous concentrations of birds. The 4 FW is relegated to understanding where and when birds are most likely to be present, then avoiding those locations whenever possible.

5.3 DETERRENT – There is no practical way to deter or scare birds on low-level training routes.

5.4 RESTRICTIONS – Major migration patterns along the Eastern US seaboard have been well studied and documented by experts.

5.4.1. Restrictions are in place for 4 FW aircraft to limit low-level flight operations in known high-risk areas predicted by the Avian Hazard Avoidance System (AHAS). AHAS uses weather radar and thermal data to monitor and predict bird concentrations in near real time. In addition to offering a current observation of bird activity, AHAS forecasts bird risk levels for each leg of a given Military Training Route (MTR) up to 24 hours in advance.

5.4.2. 4 OSS/OSOR will conduct route assessments of locally owned low-level routes annually. 4 OSS/OSOR will coordinate with 4 FW/SEF to accompany the route surveys to the maxium extent practical. In the event a 4 FW/SEF representative is unavailable to accompany on the route surveys, 4 FW/SEF will provide 4 OSS/OSOR with specific areas of interest on the MTR for increased bird activity. Based on 4 FW/SEF observations, changes will be made as necessary to low-level route briefings posted on the 4 OSS/OSOR Sharepoint. 4 FW aircrews will avoid all areas deemed a moderate bird hazard by the annual route assessment by 2000' AGL or 1 NM and all severe areas by 4500' or 3 NM.

5.4.3. AHAS is a tool to be used for bird risk assessment. If AHAS is not operational, attempt to use the BAM website. Aircrew will check AHAS prior to briefing low level or range flights. Flights will attempt to obtain the current AHAS observation from Squadron Top 3's, RCO, or SOF within 30 minutes of low level entry. Top 3's, RCO's or SOF will reference the AHAS RISK column for determination of BWC. Top 3's or SOF can use knowledge of AHAS to convey to aircrew BWC if AHAS is predicting BWC Moderate below 500ft AGL. For example: If AHAS is reporting BWC Moderate based on SOAR up to 400ft AGL, then the Top 3's or SOF can call this "BWC low above 500ft AGL" since the minimum flight altitude for training missions is 500ft AGL. If unable to get the current update, flights will use the more restrictive of the AHAS observation or AHAS forecast.

5.4.3.1. **LOW**: No restrictions on low-level flight. Aircrew will constantly assess bird activity during low altitude flying and adjust profiles to mitigate bird strike potential.

5.4.3.2 **MODERATE**: Flights may plan/ fly at 500 feet AGL. For non TF flights, the maximum airspeed is 400C (480C from IP to target only). For TF flights, the maximum airspeed is the greater of 400C or 420G (480C IP to target only). For FTU syllabus training using TF, 450G will be permitted when necessary to achieve required training. Aircrew will constantly assess bird activity during low altitude flying and adjust profiles to mitigate bird strike potential.

5.4.3.3 **SEVERE**: Flights are restricted to no lower than 4500 feet AGL. If this places the flight outside of the low level route structure, fly the appropriate VFR hemispheric altitudes and slow to airspeeds IAW AFI 11-202V3.

5.4.4. Aircrew will avoid the following lakes by 1 mile or 2000' AGL feet at tactical airspeeds: Smith Mountain Lake, Kerr Reservoir, Lake Wateree, and Lake Gaston. Aircrew will avoid similar-sized bodies of water by 2000' AGL and/or 1nm, unless more

restrictive guidance is published, at tactical speeds, through both diligent mission planning and prudent execution.

5.4.5. When flying on a low-level route, aircrew will cross coastal areas at or above 2000' AGL feet. When flying over coastal areas in a MOA or restricted area, adhere to AHAS restrictions based on current or forecast AHAS BWC.

5.5. COMMUNICATION

5.5.1. If the flight lead believes a low-level segment or MOA should be closed or elevated to preclude bird strikes, he must take the following action:

5.5.1.1. Aircrew will notify the SOF ASAP after route aborting for birds or if a change of BWC is recommended.
5.5.1.2. Aircrew will transmit bird activity observed on 255.4 stating location and recommended BWC.

5.5.2. Currently there is no ability to reduce BWC on low-levels or MOA's based on flight observations. Aircrew will abide by current AHAS BWC.

6. DARE COUNTY RANGES:

6.1. AUTHORITY

6.1.1. The authority to declare upgraded BWC's for R-5314 is vested in the 4 FW RCO regardless of MERLIN, AHAS or US BAM restrictions. However, RCO's may not downgrade conditions from MERLIN, AHAS, or US BAM. If the RCO increases the BWC for Dare County, that BWC will remain in effect until:

6.1.1.1 The RCO lowers it back to current MERLIN/AHAS observation (based on aircrew/range controller input),
6.1.1.2 higher MERLIN/AHAS BWC is reported
6.1.1.3 One-half hour after sunset.

6.1.2. If a RCO declared BWC needs to be altered by subsequent flight leads due to current conditions, that flight lead will notify the RCO and recommend an increase/decrease of the BWC to an appropriate level.

6.2. PREVENTION – Dare County Range is near several wildlife refuges, making it an attractive area for migratory waterfowl. There are no practical means available to deter or scare birds at Dare County Range. The 4 FW is relegated to understanding where and when hazardous bird activity is likely to occur, then avoiding those locations whenever possible.

6.3. DETERRENT – Air Force Dare Range Control Officers (RCOs) are trained to have a working knowledge of the 4 FW BASH Plan. Therefore, they are qualified to advise flight leads of bird hazards that warrant altering flight operations. BWC's declared for Air Force Dare Range Complex will apply to 4 FW flight operations in all of R-5314, including Navy Dare. The RCO will relay his upgrade of the BWC to the 4 FW SOF.

6.4. RESTRICTIONS

6.4.1. MERLIN is an avian detection radar system used to detect bird activity and is the primary means of determining BWC for Dare County Range. MERLIN has fidelity out to a 4NM radius and up to 20,000 ft AGL. When MERLIN is operational the following restrictions apply:

6.4.1.1. **LOW:** No restrictions

6.4.1.2. **MODERATE:** Flights will avoid Moderate reported areas by +300 feet or 2 NM laterally.

6.4.1.3. **SEVERE:** Flights will avoid Severe reported areas by +500 feet. Lateral deconfliction is not authorized.

6.4.2. If MERLIN is not operational, revert to AHAS restrictions in accordance with paragraph 5.4.3. For all sorties planning on using Dare County Range, AHAS will be checked prior to the flight briefing and within 30 minutes of range entry regardless of MERLIN status. If AHAS is not operational attempt to use the BAM website.

6.4.3. In November, the Tundra Swans conduct their migration to their winter nesting areas along the east coast, especially flying on clear nights around the full moon. These birds migrate through the airspace containing R-5314 and R-5306A bombing ranges. During this period, 4 FW/SEF and 4OG/OGV will coordinate flight restrictions in the bombing ranges and disseminate via an FCIF. USDA and 4FW/SEF will notify 4 OSOS and 4 OG/OGV as soon as possible prior to when this period is forecast to occur. This period will be defined as +/- 5 days of a full moon occurring during the migration.

6.5. COMMUNICATIONS

6.5.1. When a BWC has been established, the decision to upgrade can be accomplished by any range user or the RCO. This will be communicated via UHF through the RCO and passed to any aircraft utilizing the range.

6.5.2. Once the bird threat has passed, the decision to downgrade the BWC is vested in the RCO as covered in paragraph 6.1. This information will be relayed to affected aircraft via UHF radio.

7. OTHER RANGES and MOA's:

7.1. The 4 FW also uses other bombing ranges and Military Operating areas such as:

7.1.1. BT-9 & BT-11 (R-5306A)
7.1.2. Avon Park, FL (R-2901)
7.1.3. Gamecock I MOA, SC
7.1.4. Gamecock C MOA, SC
7.1.5. Farmville MOA, VA

7.2. AHAS will be used with the same restrictions for MODERATE and SEVERE as in paragraph 5.4.3.

7.3. Prior to operating at Avon Park Range in Florida, 4 FW flight leads should contact the RCO telephonically for a BASH briefing before aircrew step. Upon entering the range airspace, flight leads will ensure they receive a current BASH update from the RCO over UHF. Avon Park is a known problem BASH area; 4 FW flight leads will operate in the area with caution and vigilance. A dedicated bird clearing pass at 350C and 500' AGL min (1500' if AHAS Moderate, 4500' if AHAS Severe) prior to tactical maneuvering at Avon Park is **MANDATORY** regardless of BWC.

8. TASKED ORGANIZATIONS

8.1. 4 FW Wing Staff Agencies:

8.1.1. 4 FW Safety and USDA:

8.1.1.1. Prepare and maintain basic plan and changes to this document.

8.1.1.2. Maintain a bird awareness program in conjunction with squadron flying safety officers. The program can include briefings, films, posters and information on bird hazards, reporting procedures.

8.1.1.3. Establish procedures for reporting and recording all bird strikes at SJAFB involving 4 FW, tenant, and transient aircraft.

8.1.1.4. Brief aircrews on seasonal bird hazards and provide information on migrations of local and seasonal bird activities through contact with government wildlife organizations and contract avian experts.

8.1.1.5. Routinely monitor and inspect airfield for bird activity. Emphasize awareness during flight operations. Any hazardous bird activity will be reported appropriately, with recommendations to adjust the BWC as required.

8.1.1.6. Collect and maintain bird strike data, which includes all SJAFB flying units, and look for trends. Disseminate hazard data to BHWG and flying units from all available sources.

8.1.1.7. Establish and maintain procedures for declaring, communicating, and terminating BWC's.

8.1.1.8. Ensure a portion of the bird remains (snarge) are sampled from the aircraft or from the airfield after an actual bird strike and sent to Smithsonian Institute for species identification analysis.

8.1.1.9. Submit BASH data on the Air Force Safety Automated System (AFSAS) for all 4 FW, tenant, and transient aircraft.

8.1.1.10. Ensure the 916 ARW/SE has access to all SJAFB BASH information.

8.1.1.11. Flight Safety and USDA personnel make timely and educated recommendations to the SOF regarding Bird Watch conditions for the airfield.

8.1.1.12. Review this plan and requirements annually. Plan review will be done with the supervisor or shop chief and this person will be responsible for plan review and/or implementation within the shop. Training will be accomplished for most members in a BHWT meeting. Document training on bird strike sheet.

8.1.1.13. Notify 4 OSS/OSOS, 916 ARW scheduling, 916 OGV and 4 OGV up to three weeks prior if bird forecasts warrant (i.e. annual blackbird migration during the period 1 September to 30 November at dawn and dusk, tundra swan migration in November) limiting takeoffs and landings for certain times of the day or use of Dare County range. Provide 916 OGV and 4FW OGV with desired information to be transmitted to aircrew via FCIF.

8.1.1.14. Obtain depredation permits and/or licenses. The USDA Wildlife Biologist will coordinate and obtain necessary Federal permits and/or licensees for actual bird and/or mammal kills.

8.1.1.15. Work with OGV to issue specific guidance via FCIF in accordance with this plan regarding procedures to be followed by 4 FW aircrews under BWC's on the airfield, low-level routes, working areas, and ranges.

8.1.1.16. Provide a representative to fly on annual route surveys to assess bird risks.

8.1.2. 4 FW Command Post Responsibilities:

8.1.2.1. Disseminate changes to the Bird Watch condition by broadcasting the change on the Lion Net.

8.1.2.2. If KC-135 flight operations are active in the local area, notify the 916 ARW CP of changes to the Bird Watch condition.

8.1.2.3. If notified of an actual bird strike to 4 FW or 916 ARW aircraft by any source, (aircrew, SOF, MOC, etc.) notify Flight Safety (Dover 2, Dover 3 or the Chief of Flight Safety).

8.1.3 4 FW Public Affairs Responsibilities:

8.1.3.1. Be the releasing authority on any BASH related information to news media representatives, the Seymour Johnson base community and/or general public.

8.1.3.2. Respond to any queries from news media representatives or general public concerning bird strikes, major changes in operations, or pending projects to control bird populations or reduce potentially hazardous bird strikes.

8.2. 4 Operations Group Responsibilities:

8.2.1. 4 Operations Group Commander Responsibilities:

8.2.1.1. rovide guidance on aircrew procedures as described in this plan.

8.2.1.2. Direct OGV to develop SOF procedures and a SOF training program that incorporates the BASH reduction program.

8.2.1.3. Direct the OSS to develop air traffic control procedures as part of the BASH plan.

8.2.1.4. Direct the OSS to develop Airfield Management procedures as part of the BASH plan.

8.2.2. 4 Operations Group Standardization and Evaluation (OGV) Responsbilities:

8.2.2.1. Publish pertinent BASH guidance from this plan in AFI 11-2F-15E Vol. 3 Seymour Johnson AFB Supplement and 4th Operations Group In-flight Guide. The information should include flight restrictions imposed under Bird Watch conditions LOW, MODERATE, and SEVERE for the airfield, low levels, and ranges.

8.2.2.2. Issue specific guidance in accordance with this plan regarding procedures to be followed by the 4 FW SOF upon declaration of a Bird Watch condition (see paragraph 3.2.3). This includes maintaining checklist and providing training to new SOF's during both initial certification and semi-annual SOF meetings held IAW AFI 11-418.

8.2.2.3. When requested by 4FW Safety, issue an FCIF alerting aircrew of recurring annual restrictions due to migrating blackbirds, tundra swans and wintering waterfowl at the City of Goldsboro Waste Water Treatment Facility.

8.2.3. 4 FW Supervisor of Flying Responsibilities:

8.2.3.1. Monitor bird hazards within the terminal area, active local low levels, active local ranges, and working areas.

8.2.3.2. Assist tower personnel by observing bird activity around the airfield.

8.2.3.3. Maintain primary responsibility for ensuring BWC's are altered appropriately for forecasted and real-time hazards.

8.2.3.3. When advised to alter the Bird Watch condition by Flight Safety, USDA, or Airfield Management personnel, consider the recommendation in light of current flying operations. Unless circumstances warrant a safe and appropriate alternate action, the BWC should be declared as advised.

8.2.3.4. When the SOF detects or is advised of a hazardous bird condition on the airfield, low-level route, range, or working area, he/she will:

8.2.3.4.1. Evaluate and if required, alter the Bird Watch condition for the affected area. If assistance is desired in deciding the appropriate BWC, contact Flight Safety/USDA.

8.2.3.4.2. Have the tower supervisor advise 4 OSS/OSAA of the Bird Watch condition.

8.2.3.4.3.□□□□□□ Record all changes in Bird Watch conditions in the SOF Log.

8.2.3.4.4.□□□□□□ When birds are located at one end of the runway, consider a runway change (wind, weather, and airfield conditions permitting) to recover aircraft.

8.2.3.4.5.□□□□□□ Ensure that the information is promptly relayed to airborne aircrew as well as applicable agencies.

8.2.4 4 FW Flying Squadron Commander Responsibilities:

8.2.4.1. Ensure aircrews adhere to the procedures set forth in this plan.

8.2.4.2. Ensure squadron schedulers account for seasonal bird hazards and warnings when scheduling unit flying. Commanders should balance operational needs with hazards.

8.2.5. 4 FW Aircrew Responsibilities:

8.2.5.1 Include BASH reduction procedures when planning sorties that include prolonged low altitude flight. Furthermore, aircrew will brief bird strike mitigation procedures IAW this plan any time proloned low altitude flying is expected.

8.2.5.2. Communicate bird strikes and hazardous bird activities as follows:

8.2.5.2.1.□□□□□□ On airfield, report to SOF or tower/ground controllers.

8.2.5.2.2.□□□□□□ On departure or arrival, report to controlling agency or the SOF.

8.2.5.2.3.□□□□□□ On IR/VR training routes, Military Operating Areas (MOAs), and warning areas, report SOF. On IR/VR routes, relay to appropriate FSS (if possible) and to succeeding flights.

8.2.5.2.4.□□□□□□ On Dare County Range, report to the range control officer who will relay the information to the SOF and succeeding flights.

8.2.5.2.5.□□□□□□ Report all bird strikes to flight safety and maintenance debrief immediately after landing.

8.2.6. 4 Operations Support Squadron Responsibilities:

8.2.6.1. 4 OSS/OSAT (Air Traffic Control Tower) Responsibilities:

8.2.6.1.1.□□□□□□ Remain alert for and advise aircraft of wildlife activity on, over, or near the airfield.

8.2.6.1.2.□□□□□□ Inform RAPCON of hazardous wildlife activity and changes in the Bird Watch condition.

8.2.6.1.3.□□□□□□ Include the Bird Watch Condition on ATIS if MODERATE or SEVERE, and it appears the current bird activity and BWC status will remain constant for 15 minutes or more.

8.2.6.1.4.□□□□□□ If the SOF is on duty, inform him/her immediately of any significant sighted or reported bird activity.

8.2.6.1.5.□□□□□□ When the SOF is not present in the tower, Airfield Management and/or the Tower Watch Supervisor has the authority to declare changes to the Bird Watch conditions for the airfield, and will coordinate with Tower for broadcast of the change. If the SOF is on duty, tower personnel should advise him of hazardous bird conditions, whereby the SOF will declare an appropriate BWC.

8.2.6.1.6.□□□□□□ As per FAAO 7110.65, inform aircraft under their control of hazardous bird activity, to include the Bird Watch condition if other than LOW. Example: "Large flock of small birds vicinity of approach of Rwy 08, altitude approximately 200 feet AGL. Bird Watch condition MODERATE." Note: Omit this information if it is included on the ATIS broadcast and the pilot states the correct ATIS code.

8.2.6.1.7.□□□□□□ Relay or initiate flight instructions to aircraft under their control if abnormal procedures are required due to bird hazards or restrictions imposed by changes in the BWC. (i.e. divert, hold, go-around, hold short, etc.).

8.2.6.1.8.□□□□□□ If bird dispersal is necessary, provide Airfield Management or USDA personnel access to the runway in line with safe aircraft operations. Dispersal methods generally take less than five minute.

8.2.6.2. <u>4 OSS/OSAR (RAPCON) Responsibilities:</u>

8.2.6.2.1.□□□□□□ Inform tower of any reported or suspected bird activity within or near the terminal area.

8.2.6.2.2.□□□□□□ Remain alert for possible bird activity on radar displays.

8.2.6.3. <u>4 OSS/OSAA (Airfield Management) Responsibilities:</u>

8.2.6.3.1.□□□□□□ Monitor conditions during airfield inspections that might present a bird strike hazard. Immediate hazards will be reported to the 4 FW/SOF during periods of normal flying operations. During periods when a 4 FW/SOF is not on duty, contact the Tower Watch Supervisor.

8.2.6.3.2.□□□□□□ When hazardous bird conditions are noticed, Airfield Management will contact the SOF or Tower Watch Supervisor (during non-F-15E flight operations) with a recommendation to declare BWC Moderate or Severe. In general, the SOF will declare the BWC as advised, unless circumstances warrant an alternate action.

8.2.6.3.3.□□□□□□ Receive reports of bird activity from any source and document on AF IMT 3616, Daily Record of Facility Operations.

8.2.6.3.4.□□□□□□ When BWC MODERATE or SEVERE is declared, issue a NOTAM.

8.2.6.3.5.□□□□□□Document unusual bird activity, bird strikes and/or wildlife responses. Documentations must include BWC, time of activity, weather conditions, location of activity, species, estimated number of birds/ mammals and dispersal method used. Report this information to 4FW/SE.

8.2.6.3.6.□□□□□□Bird, bat or mammal remains found within 200 feet of the runway surface must be treated as a strike. Document location, time found and species if known. Place in plastic bag and put in freezer located near the entrance of 4FW Safety Office.

8.2.6.3.7.□□□□□□ Observe environmental conditions on the airfield that could attract birds and report them to USDA biologist x4229 and 4 CES/CEOI (Pest Management, x1350).

8.2.6.3.8.□□□□□□The Airfield Manager will work in connection with USDA to develop plans for control or removal of hazardous bird attractants within the airfield environment. The Airfield Manager and USDA will coordinate with 4 CES/CEOS when needed to reduce BASH issues.

8.2.6.3.9.□□□□□□ When bird dispersal is required, respond, in order of necessity, to include driving to the birds' proximity and activating pistol pyrotechnics or contacting USDA to do so if needed.

8.2.6.3.10.□□□□□□ Brief all transient aircrews on current bird hazards and BWC.

8.2.6.3.11.□□□□□□Issue a NOTAM during the Blackbird migration in the fall alerting transient crews of the increased bird hazard around the airfield.

8.2.6.4. 4 OSS/OSOR (Ranges & Airspace) Responsibilities:

8.2.6.4.1.□□□□□□ Review any proposed new low-level routes (or changes) with 4 FW/SEF and USDA Wildlife Biologist for potential BASH impact.

8.2.6.4.2.□□□□□□ Coordinate with 4FW/SEF and USDA for a representative to fly along with OSS/OSOR on annual route surveys for the purpose of assessing bird risks.

8.3 4 Mainteance Group Responsibilities:

8.3.1. Participate in the BASH reduction program by adhering to the directives contained in this plan.

8.3.2. Record and report all bird strikes to Flight Safety. If possible, maintenance debrief sections should have the aircrew fill out a Bird Strike Information Sheet immediately after landing. If the strike was discovered after the aircrew is no longer available (i.e., by Swing Shift personnel), ensure that all known data is recorded and

reported.

8.3.3. After a bird strike is discovered ensure bird remains are sampled from the aircraft. During the hours of 0700-1700 Flight Safety/ USDA personnel will be contacted to take the sample. 4 MXG/QA will take the sample between the hours of 1700-0700 as needed to augment Flight Safety/ USDA personnel IAW the procedures outlined below:

8.3.3.1 Bird Strike Sampling Procedures: Carefully remove the bird strike sample and place it in a marked plastic zip lock bag. If only a blood smear is present, use an alcohol swab and swipe across the blood smear, then place the swab in a bag. This is critical for accurate identification.

8.3.4. Forward a copy of the Bird Strike Information Sheet (same worksheet as used to report IFEs/Incidents) to 4 FW Flight Safety as soon as possible. AMU OICs will ensure adequate supplies of these forms are available in Maintenance Debrief. Wing Safety will keep the newest version of the IFE/Bird strike sheet on the safety web page.

8.4. 4 Mission Support Group Responsibilities:

8.4.1 4 Civil Engineer Squadron Responsibilities:

8.4.1.1. The Base Civil Engineer is responsible for implementing procedures for removal or control of as many bird attractants as possible on SJAFB. USDA Wildlife Biologist will coordinate changes.

8.4.1.2. Complete necessary surveys and environmental impact assessments as required by law.

8.4.1.3. rovide the following representatives to the BHWT to advise the team and correct environmental conditions on the airfield which increase BASH potential:

8.4.1.3.1.□□□□□□ Pest Management
8.4.1.3.2.□□□□□□ Environmental Management Element
8.4.1.3.3.□□□□□□ Pavement & Construction Equipment, Grounds Maintenance

8.4.1.4. Modify current airfield conditions that attract birds (ditches, standing water, buildings, towers, hangar rafters, perches, nests, food/water sources, etc.).

8.4.1.5. Implement a long-range program in conjunction with all base improvements and modifications that attempts to make the airfield as unattractive to birds as possible. Special emphasis should be to eliminate ornamental trees and shrubs for new construction within the cantonment area.

8.4.1.6. Control vegetation. The Service Contracts Section (4 CES/CEOSS) will control vegetation around the airfield to include all mowing operations, through a service contract. Pest Management (4 CES/CEOIE) will be responsible for vegetation control on airfield pavements and ditches. The Heavy Repair Element (4 CES/CEOH), will assign responsibility ditch construction, filling low spots, planting bare areas, removing dead vegetation, removing taxiway edge effect, and removing plants with berries.

8.4.1.7. Maintain grass height in the Airfield Bird Exclusion Zone between 7 and 14 inches. Only 4 CES/CEOS Quality Assurance Personnel or Contracting Officer's are authorized to direct the contractor on grounds maintenance standards.

8.4.1.8. Control water. The control of water is under the purview of Heavy Repair Element (4 CES/CEOH), who will assign personnel to modify ditches, build culverts, eliminate standing water, remove feed materials, and drain marsh areas as necessary to control bird populations in the airfield environment. These actions will be coordinated with the Environmental Management Element (4 CES/CEIE).

8.4.1.9. Control waste. The collection and removal of waste products on base is provided by 4 CES/CEO through a contracted service, administered by the Operations Support Element (4 CES/CEOS). The proper flight element will ensure waste is collected appropriately and disposed of rapidly.

8.5. 916 Air Refueling Wing Responsibilities:

8.5.1. 916 Maintenance Squadron Commander Responsibilities:

8.5.1.1. Participate in the BASH reduction program by adhering to the directives contained in this plan.

8.5.1.2. Record and report all bird strikes to the USDA or appropriate wing's flight safety office. If possible, maintenance debrief section should have the aircrew fill out a Bird Strike Information Sheet immediately after landing. If the strike was discovered after the aircrew is no longer available, ensure that all known data is recorded and reported.

8.5.1.1.3. When a bird strike is discovered, ensure bird remains are sampled from the aircraft. If USDA or safety personnel are available, they should be contacted to take the sample. If not, maintenance should take the sample in accordance with 8.3.3.1.

8.5.1.1.4. Forward a copy of the Bird Strike Information Sheet to USDA and Safety as soon as possible.

ATTACHMENT 1

DISTRIBUTION

Agency/Office Symbol

HQ ACC/SEF LANGLEY AFB, VA
HQ AFSEC/SEFW, KIRTLAND AFB, NM
9 AF/SEF, SHAW AFB, SC
4 FW/CC
4 FW/CV
4 OG/CC
4 OG/OGV
4 MXG/CC
4MSG/CC
4 FW/SE
4 AMXS/CC
4 OSS/CC
4 OSS/OSA
4 OSS/OSAT
4 CES/CC
4 CES/CEOHE
4 CES/CEOIE
336 FS/CC
335 FS/CC
334 FS/CC
333 FS/CC
4 TS/CC
414 FG/CC
307 FS/CC
916 ARW/CC
916 ARW/MXG
916 ARW/MXS
916 ARW/SE
916 OG/CC
911 ARS/CC
77 ARS/CC
USDA

ATTACHMENT 2

ENVIRONMENTAL ANALYSIS

One of the primary techniques for decreasing the bird strike threat to 4 FW aircraft is avoidance of the high-risk environment by modifying flight operations. Information on the environment in these high-risk areas is provided here both as a reference and as an aid to supervisors and aircrews for the planning and accomplishment of the mission. While flexibility for adjustments has been accounted for, the Seymour Johnson AFB BASH Plan is primarily based on the known environmental conditions outlined below.

A.Airfield/Local Areas:

(1) SJAFB occupies apprixoximately 3,238 acres of Wayne County land located in the warm, humid region at Latitude N 35'20'30", Longitude W 077'58'30", in the coastal plains of North Carolina. This location is 57 nautical miles from the Atlantic Coast at the nearest point and lies within the Atlantic Flyway waterfowl migration corridor. The flat to gently rolling terrain has elevations ranging from 60 to 110 feet above MSL on the base. The elevations increase south to north away from the Neuse River, which defines the southern boundary of the base. The base is in the Neuse River/Stoney Creek watershed and a system of open ditches, covered concrete pipes, drop inlets, and catch basins has been incorporated into the drainage pattern.

(2) Improved grounds cover 1,320 acres and the perennial vegetation cover is composed of common Bermuda grass, Kentucky 31 Fescue, Kobke (legume), Crabgrass (native), and White Dutch Clover. Semi-improved grounds cover 887 acres. The semi-improved ground around the airfield is mowed to 7-14 inches. Vegetation around these grounds consists of Bermuda grass, tall Fescue, Lespedeza, White Clover, and Crabgrass. Approximately 485 acres of the base are unimproved grounds. The vegetation cover on the large majority of these grounds is brush and wood cover of native hardwoods (primarily oak), and soft pines. In these areas starlings, blackbirds, sparrows, and various songbirds are the most abundant species.

(3) Blackbirds and starlings have been observed in significant numbers on the base. Thousands of the birds are routinely seen migrating from feeding areas to roosts, especially during the fall season. The worst time has historically been late October and early November, especially within one half hour prior to sunset until one half hour following sunset. The most common hazardous movement pattern for the birds has been north to south across the approach path of Runway 26 at about 100-200 feet AGL.

(4) The city of Goldsboro operates a wastewater treatment plant off the west end of the runway on the opposite side of the Neuse River. They currently have several holding lagoons that are 5 feet deep and cover 177 acres. Currently, the lagoons attract a large number of birds to include ducks, gulls, geese, herons, swans, cormorants, and egrets. As many as 3,000 birds have been observed using this area during winter months. Gulls from the ponds have been observed in significant numbers on the runway at Seymour Johnson. In addition to the waste water treatment ponds, the City of Goldsboro established a 40-acre wetland site located 1.5 miles northwest of SJAFB. This area also attracts large numbers of geese and ducks.

(5) The base also has an 18-hole golf course that covers 163 acres. In the past, as many as 100 resident Canada geese posed a problem by flying into and out of the small pond near the Pro Shop at the golf course on a daily basis. In the past employing a full time Border collie dog to harass the geese has rectified the problem. Currently, there are no resident Canada geese at SJAFB.

(6) Hawks and vultures have been sighted above or near the runway on numerous occasions.

(7) Seymour Johnson AFB also has a variety of other birds, such as sparrows, Eastern meadowlarks, killdeer, and crows in and around the airfield. These birds ordinarily do not cause damaging bird strikes to aircraft.

B. Low-Level Routes:

(1) The Atlantic Flyway represents the most significant BASH threat to 4 FW aircraft conducting typical low level flight operations along the Atlantic seaboard. For the purposes of this BASH Plan, the Atlantic Flyway is defined only from Delaware to South Carolina, with detailed emphasis on the Eastern North Carolina area. Data for defining the boundaries of the Atlantic Flyway corridor was obtained from Geo-Marine, ACC's primary contractor for bird avoidance models and BASH studies. Also, historical bird strike and sighting data from the AFSEC and the USFWS was employed. The large majority of migrating waterfowl that transit this area uses the Flyway. Its boundaries from Lake Mattamuskeet north to Delaware are thoroughly studied and well understood by waterfowl experts. From Mattamuskeet southward, the Atlantic Flyway boundaries are less understood, and therefore less precise.

The Western edge of the Atlantic Flyway corridor is defined by a line running from:

a. Mason Neck NWR (South of Washington D.C.), to
b. Dismal Swamp NWR (Southwest of Norfolk, VA), to
c. Pungo NWR (Southwest corner of R-5314), to
d. Santee NWR (South Carolina)

The Eastern edge of the Atlantic Flyway corridor is defined by a line running from:

a. Bombay Hook NWR (Delaware), to
b. Martin NWR (in Chesapeake Bay), to
c. Fisherman Island NWR (Southern tip of VA peninsula) to
d. Back Bay NWR (southeast of Roanoke), then follows the Atlantic coastline to
e. Cape Romain NWR (South Carolina).

In the vicinity of the Atlantic Flyway, migratory and over-wintering waterfowl will represent a significant low-level hazard. Migratory waterfowl corridor populations include:

a. 225,000 - 750,000 ducks,
b. 200,000 - 400,000 geese, and
c. 30,000 - 60,000 tundra swans.

Major wintering waterfowl concentration is known to occur in the following locations, which are all in the vicinity of 4 FW routine low level flight operations:

a. Pea Island NWR (15 miles east of R-5314)
b. Pungo NWR (SW corner of R-5314)
c. Presquile NWR (15 miles north of point C, VR-1753)

d. Fisherman Island NWR (15 miles south of point A, VR-1753)
e. Plum Island NWR (20 miles southeast of point B, VR-1753)
f. Cedar Island NWR (in R-5306A)
g. Great Dismal Swamp NWR (10 miles southwest of Norfolk)
h. Swanquarter NWR (20 miles south of R-5314)
i. Mattamuskeet NWR (5 miles south of R-5314)

Waterfowl feeding flights will often extend out 20 miles from refuges, depending on food availability. North Carolina wintering waterfowl numbers will vary depending on weather severity and will increase when severe weather at Delaware refuges (which support over 300,000 geese each fall) drives the birds south. Expect the migratory waterfowl hazard to be greatest at night and dusk/dawn during 15 October - 1 December and 15 February - 31 March, up to 3,500 feet AGL. Expect the wintering waterfowl hazard to be greatest at dawn/dusk (plus or minus 1 hour) during 15 October - 15 April, up to 1,000 feet AGL. Wintering flocks (particularly snow geese and tundra swans) will move throughout the day on feeding flights. Snow geese are ground feeding flocks, and are particularly hazardous to low-level flights since these birds will spook up to 300 feet AGL, then disperse, when an aircraft approaches below 1,000 feet AGL.

(2) Raptors (vultures and hawks) are a year-round hazard and will represent a significant threat to low-level flight. Wintering raptors distributed throughout the region, both along the coast and inland, average 1.2 raptors per square kilometer. One of the highest raptor migration concentration areas in the US (110-220 raptors per hour reported from look-outs) extend from New York City to Virginia Beach, 40 miles inland, and traverses VR-1753 route segment A-B. Migrant raptors tend to disperse south of Virginia Beach. Included in this dispersal region are VR-73 segments F-L; VR-84 segment A-C, F-H; and R-5314.

Red-tailed hawks, other broad-winged hawks, and turkey vultures (41-55 birds per hour) traverse the mountains of western North Carolina, western Virginia, and West Virginia. Spring migration movements are more dispersed than fall, though spring concentrations have been reported of up to 40 raptors per hour along this course. Ninety percent of the resident and migrant raptor activity occurs between 0800 and 1700 with the highest altitudes attained where and when the thermals are greatest. Migrant raptors, especially in October - November, will normally soar to a maximum of 3,000 feet AGL; however, migrants pose a threat at all altitudes -- the record vulture strike occurred at 37,000 feet! Resident raptors will also soar to several thousand feet. Migrant and resident raptors may be found in groups of 10-20 when catching the same thermals. Raptors will not usually fly in the rain or move against a head wind.

C.Dare County Range vicinity:

Five National Wildlife Refuges (NWRs) are located within 60 miles of the Dare County Bombing Range. Significant concentrations of waterfowl, raptors, and shorebirds migrate to and winter at the NWRs. These five NWRs contain more than 300,000 acres. Approximately 50 percent of the total acreage consists of lakes within the Mattamuskeet and Pungo NWRs. Additional water sources in the area include rivers (Chowan, Alligator, Pungos, Pamlico, and Neuse), sounds (Albermarle, Croatan, Roanoke, and Pamlico) and natural marshes surrounding the range. The flat plain between the Albermarle and Pamlico sounds is dominated by extensive swamp, wet savanna, and low pinelands. Limited agriculture areas are restricted to ridge lands with suitable drainage producing corn, soybeans, small grains, truck crops, and winter browse. Fresh and saltwater fish, crustaceans, and plankton are sources of food available to shorebirds. Rich farmlands and fresh water marshes are wintering habitats for geese, ducks, and swans.

Waterfowl concentrations between 1 October and 31 March are highest around Mattamuskeet and Swan Quarter NWRs and at the western side of the mouth of the Alligator River. Timber, marsh, and open water provide for nesting wood ducks, wading birds, and resident game birds. Two hundred and fourteen species of birds, including endangered and threatened species such as the American Bald Eagle, have been seen at Mattamuskeet NWR. The banks, inlets, beaches, and great flats along Cape Hatteras attract many species of shorebirds. In addition to the flight to and from foraging areas during the winter and summer months, birds pose a significant hazard to aircraft operations during spring and fall migrations. Hundreds of thousands of birds from the area fly in the spring to breeding grounds in the northern United States and Canada and return the following fall. Concentrated migration routes include the airspace above and along the Alligator River south to Lake Mattasuskeet, Swan Quarter NWR, and west over to Pungo NWR. Other migration routes include the airspace several miles out to sea paralleling Cape Hatteras National Seashore between Roanoke and Ocracoke Islands crossing Pamlico Sound and follow the coast of North Carolina. Generally, migrants pass through Dare County between early October and mid-December and again between mid-February and mid-April. Waterfowl can migrate at altitudes up to 8,500 feet, but the vast majority has been known to remain below 3,000 feet AGL.

ATTACHMENT 3

ATTACHMENT 4

Coastal Area Map

If not in Special Use Airspace or a MOA, cross all coastal areas at or above 2000’ AGL.