BIOLOGICAL ASSESSMENT
on the Revision of Marine Corps Base Camp Lejeune's Integrated Natural Resources Management Plan (INRMP)

1.0 Background

This biological assessment addresses the revision of Camp Lejeune's Integrated Natural Resources Management Plan (INRMP), and the potential effects of plan implementation on threatened and endangered species. In accordance with the Sikes Act Improvement Act (SAIA) 1997 Public Law 105-85, 111 Statute 1629 (codified and amended at 16 U.S.C. 670a (2000)), each military installation is required to prepare an INRMP, to guide management in support of the primary military mission. Under this law, installations are required to review their INRMP annually, and revise it, if necessary, every five years. For a number of reasons, including a new recovery plan for the red-cockaded woodpecker (RCW), completion of Camp Lejeune's Military Impacts Study (MIS), and new authority under the 2004 National Defense Authorization Act, Camp Lejeune has chosen to revise its INRMP for 2006.

The 2003 Red-cockaded Woodpecker (*Picoides borealis*) Recovery Plan (U.S. Fish and Wildlife Service, 2003) outlines new criteria for good-quality RCW habitat. Camp Lejeune's habitat management, and data collection practices outlined in the revised INRMP are designed to incorporate the new habitat guidelines.

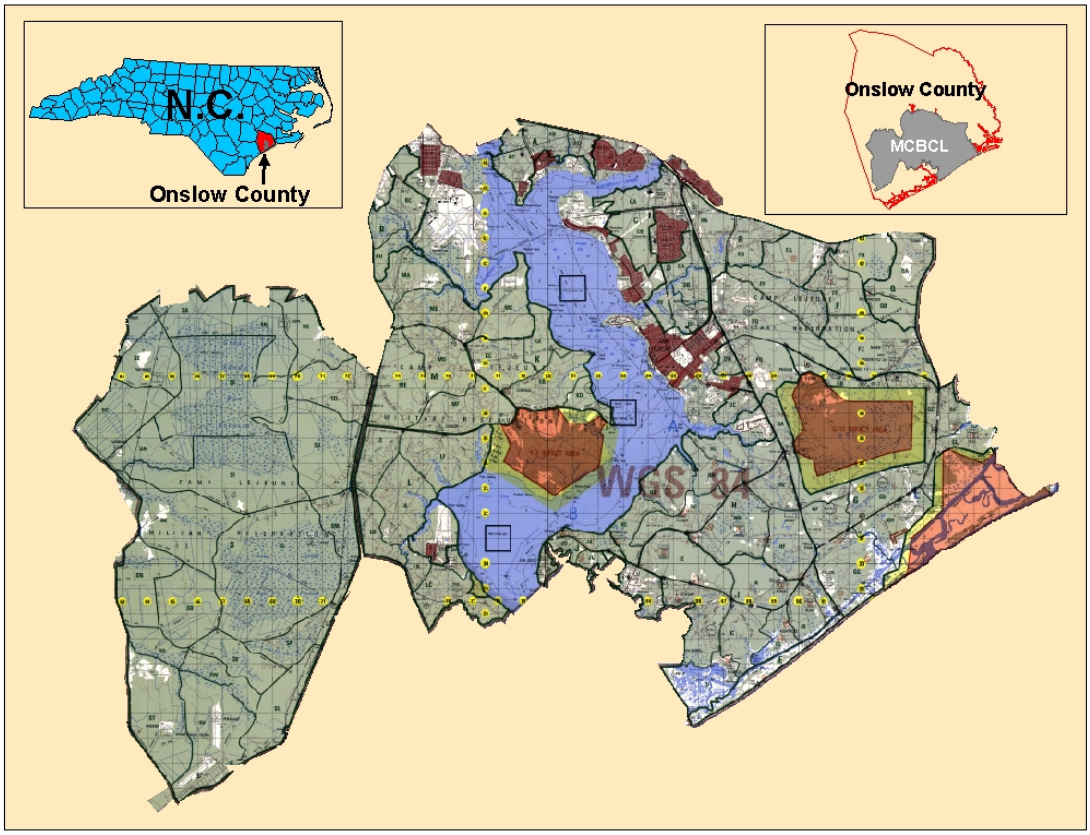
Under the 2004 National Defense Authorization Act, a military installation's INRMP may exempt that installation from critical habitat designation. If a Department of Defense (DoD) installation has federally listed threatened or endangered species, proposed federally listed threatened or endangered species, and/or candidate species on the installation, or unoccupied habitat for a listed species where critical habitat may be designated, the INRMP shall specifically address the benefits of management of these actions for these species or habitats in the document. The FWS uses the following criteria to determine if an INRMP provides adequate management or protection for listed species: 1) The plan provides a conservation benefit to the species, 2) The plan provides certainty that the management plan will be implemented, and 3) The plan provides certainty that the conservation effort will be effective. Although Camp Lejeune currently does not have designated critical habitat within its boundaries, maintaining maximum training flexibility by ensuring that critical habitat is not designated in the future is seen as crucial goal in the current revision of the Base's INRMP.

As a Federal agency, Camp Lejeune is required under Section 7 of the Endangered Species Act to consult with the U.S. Fish and Wildlife Service on actions that may affect threatened or endangered species. Because this INRMP revision includes several changes from the 2001 INRMP (most notably to forest management and protection of RCW clusters) which are likely to adversely affect listed species, Camp Lejeune is required to consult formally on this revision.

2.0 Action Area

Marine Corps Base Camp Lejeune encompasses an estimated 142,852 acres, in the Coastal Plain of North Carolina (Figure 1). Except for the Outlying Landing Field (OLF), Oak Grove, Camp Lejeune is located entirely within Onslow County, North Carolina. The base, established in 1941 is the largest Marine Corps base on the East Coast, supporting over 40,000 Marines. Marine Corps Air Station New River (MCASNR) lies within the northwest portion of Camp Lejeune, and shares resources with the base. For the purpose of this document and the INRMP, MCASNR and the OLF Oak grove is treated as part of Camp Lejeune.

Figure 1. Map of action area - Marine Corps Base Camp Lejeune.



Camp Lejeune encompasses approximately 92,300 acres of forest, including 47,734 acres of pure pine, 21,985 acres of pure hardwood, and 22,596 acres of mixed pine/hardwood stands. An additional 17,328 acres are non-forested and 12,543 acres fall within impact areas. Loblolly is the most common pine species, accounting for approximately 75% of timber on the Base. Blackgum is the most common hardwood.

Onslow Beach and Brown's Island are barrier islands that form the coastline of Camp Lejeune. Together they comprise approximately 11 miles of beachfront.

Camp Lejeune also encompasses 16,650 acres of the New River and 1,720 acres of the Intracoastal Waterway. Approximately 17 miles of the river are found within the

boundaries of Camp Lejeune. Navigable creeks and waters adjacent to or within the boundaries of the Base (including the New River) are generally subject to the public trust rights of the State of North Carolina. Additionally, navigable waters in the New River watershed and the Intracoastal Waterway fall under the jurisdiction of the US Army, Corps of Engineers.

3.0 Description of Proposed Action

The revised INRMP outlines conservation efforts for MCB Camp Lejeune and establishes procedures to ensure compliance with related environmental laws and regulations for fiscal years 2007 through 2011. The INRMP considers resources on installation and regional levels.

Much of the management described is consistent with past consultations, and will not be addressed in detail in this Biological Assessment, other than to state that management is consistent with those past consultations. Major consultations addressing impacts to threatened and endangered species on Base include Camp Lejeune's 1999 Mission Compatible Plan for the Comprehensive Long-term Management of the Red-cockaded Woodpecker, and Biological Assessment on Operations at MCB Camp Lejeune, NC, and the 2002 Biological Assessment on the Effects of Current Use and Modification of Training Areas, Dune Stabilization, and Continued Recreational Use of Onslow Beach, Marine Corps Base, Camp Lejeune. Management actions that diverge from the above consultations are described in sections 3.1-3.11.

3.1 Forest Management

The Forest Management Section provides a forested environment that meets the needs of the military mission and sustains a continuous flow of forest products such as quality wildlife habitat, quality threatened and endangered species habitat, clean water, clean air, outdoor recreation opportunities, and high quality wood products through scientifically-based ecosystem management principles.

Forest management practices described in the revised INRMP represent a shift in management philosophy toward a system that maximizes the acreage and quality of RCW habitat, while allowing for efficient restoration of the longleaf pine-wiregrass ecosystem that historically occurred on Camp Lejeune. Except in longleaf pine restoration areas (which will have negative short-term impacts on RCW habitat), management activities will strive to improve the quality of RCW habitat (as defined in the 2003 RCW Recovery Plan) with each successive management action.

Forest management activities can be divided into those that relate to longleaf pine restoration, regeneration, and thinning. How these activities are carried out will depend on several factors, including dominant species in a given stand, where that stand is on the Base, location within an RCW partition, and the desired condition of a given stand.

Longleaf Pine Restoration - On Mainside Camp Lejeune and the GSRA, longleaf pine will be restored in areas of suitable soils, except where a site-specific analysis shows that short-term impacts would outweigh any long-term benefits to the RCW. Priority conversion soils are listed in Chapter 7 of the revised INRMP, but longleaf restoration may take place on any soil type that historically would have supported longleaf pine.

Camp Lejeune intends to carry out longleaf restoration in a way that does not jeopardize the ability of a partition to support RCWs. If an active partition falls below 120 acres of suitable habitat as a result of management activities, Camp Lejeune will consult with the U.S. Fish and Wildlife Service.

Under the plans described in the revised INRMP, there will be times when suitable loblolly habitat is clearcut in order to restore longleaf. Loss of suitable habitat due to longleaf restoration may affect RCW in certain situations, but it is seen as necessary to the overall goal of habitat restoration, which will benefit RCWs in the long run.

Camp Lejeune will retain potential cavity trees in all areas that are not being restored to longleaf pine, and no regeneration of loblolly will take place on soils that historically supported longleaf pine. However, in a departure from the 1999 RCW Plan, Camp Lejeune will not impose rules that mandate a certain amount of residual loblolly pines be left in conversion stands. Instead, whether to leave overstory trees, and how many, will be left to the discretion of Camp Lejeune managers. The Forestry and Threatened and Endangered Species sections will work closely to determine appropriate areas for leaving residual trees. Decisions will depend on several factors including the ability of the existing groundcover to carry fire, and the foraging resources of a given RCW partition. Essential to this process is overarching goal of maximizing suitable and good-quality habitat for RCW while restoring longleaf in an efficient manner.

Camp Lejeune will attempt to balance this short-term conflict by emphasizing RCW habitat partitions the primary driver of forest management. Management at the partition level, which is described in more detail later in this section, will allow Camp Lejeune to assess for each RCW group or recruitment cluster the need for habitat improvement and the acreage available for conversion to longleaf.

During all restoration efforts, all existing trees of the species to be restored should be retained. This will expedite development of potential cavity trees. In some cases, depending on factors such as available RCW habitat, and groundcover, overstory trees of the offsite species will be left to serve as suitable habitat or potential cavity trees. In such cases of “underplanting,” prescribed fire will be essential to reduce competition from non-longleaf species.

In restoring longleaf to the landscape, Camp Lejeune will employ several methods, with the intent of converting loblolly stands in the most efficient manner, while retaining habitat value for RCW when necessary. Below are options that Camp Lejeune will use for longleaf restoration:

- Conversion of offsite species to longleaf pine
    - Clearcut not to exceed 40 acres (any longleaf will be left on site)
    - Modified clearcut leaving 6-10 residual trees per acre
    - Underplanting longleaf seedlings while leaving 40 ft^2 of basal area of loblolly overstory

Thinning (non-Cantonment areas)- When thinning mature stands (greater than 10 inches dbh), Camp Lejeune will maintain pine basal area of 60 square feet per acre, depending on site and stand condition. The priorities for selecting pine trees to remain after thinning, from high to low priority, are:

- relict trees
- trees greater than 14 inches dbh and/or greater than 60 years old
- trees greater than 10 inches dbh
- trees less than 10 inches dbh

In short, Camp Lejeune will thin pine stands "from below" in order to move the habitat closer to a good quality condition.

In stands where pine trees are less than 10" dbh, a number of intermediate thinning methods may be used, including pre-commercial thins, crown thins, and leave tree thins. Generally, in less than mature stands, the basal area of remaining trees will be higher than 60 ft^2 per acre.

Silvicultural Techniques for Natural Regeneration (non-Cantonment areas) - On Mainside and the GSRA, Camp Lejeune will emphasize natural regeneration methods and prescribed fire as the primary seedbed preparation method, where site conditions allow.

In longleaf pine stands options for regeneration consist of small patch clearcuts, modified shelterwood, and single-tree or group selection. Longleaf regeneration will not occur in a particular compartment until all of the high-priority conversion soils have been restored to longleaf pine in that compartment. These methods are explained below:

- Small patch clearcut—This will be the preferred method at Camp Lejeune. Under this method, harvest areas of 5 acres or less will be clearcut in stands of existing longleaf pine. By regenerating the stand through a series of small clearcuts over time, the spatial continuity of suitable habitat within the partition would not be disrupted. Generally, this treatment will be accomplished concurrently with scheduled thinning operations.
- Modified Shelterwood—The residual seed source in a shelterwood cut should be left to a basal area of 30-40 square feet/acre of the best dominant or co dominant longleaf pines in the stand. Under the modified shelterwood method, 40 square feet of pine basal area remains. The overstory will not be removed, thus allowing the stand to be utilized as RCW foraging habitat. The shelterwood cut is followed by adequate site preparation to ensure seeds have access to mineral soil. Prescribed fire will be the primary method of site preparation.
- Single-tree or Group Selection Cut for longleaf pine— The removal of single or small groups of mature trees uniformly across a stand. This harvest is designed to imitate natural openings such as lightning strikes or wind events. The resulting small openings will provide areas for regeneration with minimal impact to the overall structure of the stand. The preferred outcome of successive cuts is an

uneven-aged stand that is continually regenerating while providing ample older growth for habitat needs.

Mature loblolly stands that are not scheduled to be converted to longleaf will be managed on a 100-year minimum rotation, with an increasing emphasis on two aged and uneven aged management. The following methods may be used for natural regeneration of a mature loblolly stand (either pure pine or mixed pine hardwood): seed tree (with some trees retained indefinitely), small patch clearcut (not to exceed 5 acres), and single tree or group selection.

- Seedtree—This includes either: 1) maintaining the 6-10 crop trees into perpetuity or 2) maintaining a residual basal area of 40 square feet per acre into perpetuity.
- Small patch clearcut for loblolly pine—Under this method, harvest areas of 5 acres or less will be clearcut in stands of existing loblolly pine. Generally, this treatment will be accomplished concurrently with scheduled thinning operations.
- Single or Group Selection Cut for loblolly pine— The removal of single or small groups of mature trees uniformly across a stand. The preferred outcome of successive cuts is an uneven-aged stand that is continually regenerating while providing ample older growth for habitat needs.

Cantonment Areas

The management of forestland located in cantonment areas presents unique management opportunities. Prescribed burning is a key management tool used in the forests of Camp Lejeune for maintaining longleaf pine ecosystem health. However, because of smoke management issues, Camp Lejeune is unable to prescribe burn timber stands that are intermingled with urban areas such as busy highways, schools, housing and industrial complexes. Additionally, much of these areas are expected to be developed in the future which will further increase fragmentation. In these areas Camp Lejeune will emphasize management for mast producing hardwoods and loblolly pine. There will be no longleaf restoration in the cantonment area

Below are options that will be used in cantonment compartments:

- Pine thins for loblolly leaving more than 60 sq ft basal area
- Seedtree cuts that allow for removal of residual trees
- Pine Only Thin—An intermediate harvest in a stand to improve hardwood mast production in hardwood stands with less that 30% pine component.
- Pine Removal—An intermediate harvest, where all pines are removed, in a stand to improve hardwood mast production in hardwood stands with less than 30% pine component.

3.2 Prescribed Burning

Periodic fires historically maintained the open structure of longleaf pine forests preferred by the RCW. Over most of the RCW's range, these fires occurred during the growing season, although natural fires did occur year-round. Continued use of fire, through an intensive prescribed burning program is critical to the survival and recovery of the RCW.

Beginning in FY-06, areas to receive prescribed burn treatments will be scheduled based upon a Prescribed Burning Prioritization Model. This prioritization model transitions the prescribed burning program from one of burning areas on a set schedule, to a program that allows for adaptive management and underscores the relative need for fire among the various habitats throughout the landscape. The model assigns priorities based on various factors, such as time since last burn, RCW clusters maintenance and recruitment site preparation and management. This model will assist in ensuring a suitable allocation of resources across the landscape for application of prescribed burning treatments. Burning will be conducted with the primary focus on restoration of the landscape to more closely mimic that of pre-settlement conditions.

Training ranges will still be scheduled for annual controlled burns. The surface danger zone for the G-10 impact area will continue to be burned every other year in a checkerboard pattern and RCW clusters are scheduled for burning on a 3-year cycle.

In order to maintain and improve the current training environment, while also working towards the goal of RCW recovery, the annual prescribed burning goal will be 20,000-25,000-acre-per-year target, during the 5-year period covered by this INRMP. For reporting purposes, Camp Lejeune will calculate the number of RCW management acres (as defined in revised RCW plan) burned per year.

Camp Lejeune will continue to protect cavity trees by raking or back burning adjacent fuels. Natural firebreaks (streams, swamps, lakes, etc.) will be used wherever possible to reduce the impact from constructing fire lines. When necessary, plow lines will be placed beyond 200 feet of cavity trees to prevent root damage unless needed to protect the cavity trees during an emergency or if site specific circumstances such as location of property boundary etc., dictate the need to locate them closer.

3.3 Midstory/Hardwood Control

Since RCWs prefer to nest and forage in habitat with little to no hardwood midstory, the control of midstory can have a dramatic effect on habitat quality. Prescribed burning is generally the best way to control midstory vegetation, especially small hardwoods. However fire cannot control larger hardwoods (usually greater than two inches in diameter), which are common in stands where fire has been excluded for several years or where dormant season burns have been ineffective. These larger hardwoods can be eliminated by:

- Mechanical methods using a feller buncher, or hydro-ax/mower,
- Manual methods using a chain saw, brush hooks, etc.;
- Herbicides applied by injection, hypo-hatchet, hand sprayer, etc.; or
- A combination of these methods.

In 2004, Camp Lejeune purchased a hydro-ax with a mowing head capable of taking down hardwoods up to 8 in dbh. With this machine, Camp Lejeune intends to treat 600 acres/year for hardwood and midstory.

The goal of mechanical management is twofold. First, mechanical hardwood/midstory management can, in a very short amount of time, turn unsuitable habitat into suitable habitat for RCWs. Second, mechanical management will open up areas to prescribed burning that previously had been too dangerous to burn because of the potential for crown fire. Camp Lejeune will still emphasize prescribed burning as the primary tool to accomplish hardwood/midstory management on a landscape scale, except in areas where smoke management poses a significant health and safety problem. Emphasis will be placed on growing season burning, thereby approximating natural conditions historically prevalent over much of Camp Lejeune. After the midstory vegetation is controlled, prescribed burning during other seasons can be used infrequently.

3.4 Site Preparation

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

The least intensive, effective site preparation method, based on site conditions, will be applied to each regeneration site. Site preparation methods – by general level of intensity – are identified in Figure 7-9 of the revised INRMP

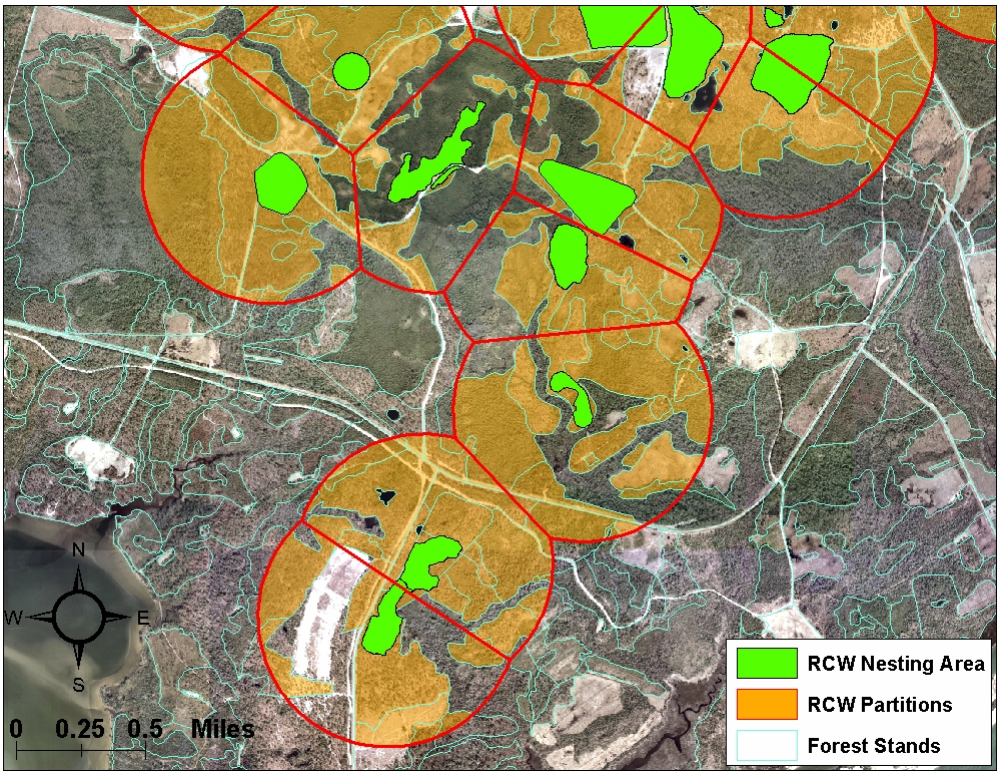
On mainside Base in areas of intact ground cover of desired species, bedding will not be an option. Decisions regarding sites in GSRA, where bedding may be required, will be made on a case-by-case basis as silvicultural plans are developed and implemented. It is a goal of Camp Lejeune to manage the habitat in such a way as to make all forms of site preparation, other than prescribed fire, unnecessary.

3.5 RCW Partition Management

The decision to treat RCW partitions as management units represents a major shift in focus for forest management on Camp Lejeune. Camp Lejeune's intention with this shift is to focus greater attention to RCW management needs at the level of individual clusters. The objective of partition-level management for Red cockaded-woodpeckers is to ensure that each partition has sufficient suitable habitat, and to maximize good quality habitat available to each RCW cluster. Conversion of off-site pine to longleaf may create short-term loss of habitat, but will improve habitat over the long term.

Red-cockaded woodpecker partitions are defined as habitat allocated to existing clusters or recruitment sites. For existing clusters, partitions are delineated according to the 2003 RCW Recovery Plan (Figure 2). Partition boundaries may overlap forest stand and compartment boundaries. Recruitment partitions will be delineated as described above but they will be centered on recruitment site points rather than existing clusters.

Figure 2. Map showing foraging partitions on Camp Lejeune.



Recruitment partitions will contain sufficient acreage of suitable or potentially suitable foraging habitat to support a cluster, and to allow for management activities and landscape flexibility. Partitions will contain approximately 200 acres of suitable or potentially suitable RCW habitat. Partitions will not be so large as to create an unnatural density of spacing of RCW clusters. Partitions containing mostly longleaf pine may be smaller than 200 acres for two reasons. First of all, there will be no need for large clearcuts to promote restoration, and second, longleaf pine can be managed in an uneven aged way, or with much smaller patch cuts. Both methods will retain habitat even while promoting regeneration.

Partitions for existing clusters are in some cases much smaller than 200 acres. In such cases, the size of the partition may dictate the type of management that takes place. For instance, in a partition that contains only 120 acres of loblolly pine habitat, there will be a need to restore longleaf pine while retaining habitat value. In such a case, Camp Lejeune may use novel approaches such as underplanting, to establish longleaf.

Partitions will be assessed periodically for currently suitable habitat, habitat in need of management to improve quality (i.e. thinning or midstory control), and the acreage of offsite species (i.e. loblolly or hardwoods on longleaf soil types) that may be available for conversion to longleaf pine. This assessment will allow managers to improve habitat where necessary, while also determining what a partition can support in terms of conversion to longleaf. In partitions dominated by loblolly pine, the need to convert to longleaf will be balanced with the need to move toward good quality habitat.

In practicing partition-level management, Camp Lejeune will employ a number of different management strategies, all of which are consistent with the 2003 RCW Recovery Plan. Management decisions for a given partition will depend on the quality of habitat within a partition, acreage of suitable habitat, time to expected occupation, and the need for landscape flexibility. Managers will use varying techniques in order to most efficiently promote high-quality habitat, while simultaneously restoring longleaf to the landscape.

3.6 Training Restrictions

Current training restrictions attributable to RCW are imposed within an area encompassing all cluster trees and a 200 ft buffer out from the outermost trees. Currently, the only activities permitted within the 200 ft buffer are as follows:

- Transient foot travel
- Transient vehicular traffic on existing maintained roads and trails
- Blank small arms firing

Army Guidelines - With this plan, Camp Lejeune will adopt the 1996 U.S. Army guidelines (ref.) for RCW cluster protection. With the adoption of the Army guidelines, Camp Lejeune will maintain a 200' buffer on all marked clusters. However, revised buffers will encompass the area within 200' of each cavity, as opposed to a 200' buffer around the aggregate of cavity trees. With the adoption of the Army guidelines many more training activities are allowed within the 200' buffer. The Army guidelines include a secondary 50' buffer around cavity trees. The 50' cavity tree buffer will not be marked, but will be estimated by Marines in the field. A list of training activities permitted and prohibited within 200' and 50' is provided in Table 1.

Table 1. Training activities permitted and prohibited within marked RCW buffer zones.

TRAINING ACTIVITY WITHIN MARKED BUFFER ZONES	YES/NO
MANEUVER BIVOUAC:	
HASTY DEFENSE, LIGHT INFANTRY, HAND DIGGING ONLY, 2 HOURS MAX	YES
HASTY DEFENSE, MECHANIZED INFANTRY/ARMOR 24 HOURS	NO
DELIBERATE DEFENSE, LIGHT INFANTRY 48 HOURS	NO
DELIBERATE DEFENSE, MECHANIZED INFANTRY/ARMOR	NO
ESTABLISH COMMAND POST, LIGHT INFANTRY 36 HOURS	NO
ESTABLISH COMMAND POST, MECHANIZED INFANTRY/ARMOR 36 HOURS	NO
ASSEMBLY AREA OPERATIONS, LIGHT INFANTRY/MECH INFANTRY/ARMOR	NO
ESTABLISH CS/CSS SITES	NO
ESTABLISH SIGNAL SITES	NO
FOOT TRANSIT THROUGH THE COLONY	YES
WHEELED VEHICLE TRANSIT THROUGH THE COLONY *	YES
ARMORED VEHICLE TRANSIT THROUGH THE COLONY *	YES
CUTTING NATURAL CAMOUFLAGE, HARDWOOD ONLY	YES
ESTABLISH CAMOUFLAGE NETTING	NO
VEHICLE MAINTENANCE FOR NO MORE THAN 2 HOURS	YES

WEAPONS FIRING:	
7.62 AND BELOW BLANK FIRING	YES
.50 CAL BLANK FIRING	NO
ARTILLERY FIRING POINT/POSITION	NO
MLRS FIRING POSITION	NO
ALL OTHERS	NO
NOISE:	
GENERATORS	NO
ARTILLERY/HAND GRENADE SIMULATORS	YES
HOFFMAN TYPE DEVICES	YES
PYROTECHNICS/SMOKE:	
CS/RIOT AGENTS	NO
SMOKE, HAZE OPERATOINS ONLY, GENERATORS OR POTS**	YES
SMOKE GRENADES	YES
INCENDIARY DEVICES TO INCLUDE TRIP FLARES	NO
STAR CLUSTERS/PARACHUTE FLARES	YES
HC SMOKE OF ANY TYPE	NO
DIGGING:	
TANK DITCHES	NO
HASTY INDIVIDUAL FIGHTING POSITIONS, HAND DIGGING ONLY, FILLED AFTER USE	YES
DELIBERATE INDIVIDUAL FIGHTING POSITIONS	NO
CREW-SERVED WEAPONS FIGHTING POSITIONS	NO
VEHICLE FIGHTING POSITIONS	NO
OTHER SURVIVABILITY/FORCE PROTECTION POSITIONS	NO

* Vehicles will not get any closer than 50 feet of a marked cavity tree unless on existing roads, trails or firebreaks
** Smoke generators and smoke pots will not be set up within 200 feet of a marked cavity tree, but the smoke may drift through the 200 cluster buffer

Research Clusters, High-Use Training Areas and Population Milestones - In addition to adopting the Army guidelines, Camp Lejeune will implement a strategy to increase RCW population growth, decrease restrictions to training, and continue to monitor impacts to RCW due to military training.

First, Camp Lejeune will attempt to speed up the rate of RCW population growth by promoting growth in areas that previously has been low priority for RCW growth. With the implementation of this plan, Camp Lejeune will promote RCW population growth in designated High-Use Training Areas by allowing unmarked recruitment clusters to be placed there. By designating high use areas where new clusters will not be marked, Camp Lejeune will remove what has been a disincentive to RCW growth in certain areas. It is the intention of Camp Lejeune to have unmarked clusters in these areas subject to incidental take from military training activities, until the goal of 173 active clusters is reached. This plan will allow Camp Lejeune to promote population growth in the best possible habitat, regardless of the training area. Camp Lejeune training areas that will be free from additional training restrictions are as follows: HA, HB, HC, HE, HF, HG, HH, FA, FB, FC, FE, FF, MC, MD, ME, MF. A map of high-use areas is shown in Figure 3. This approach is similar to the approach taken by the U. S. Army with Supplemental Recruitment Cluster (SRC) areas (USACERL Special Report 97/48, Biological

Assessment of the Effects of the Proposed Revision of the 1994 "Management Guidelines for the Red-cockaded Woodpecker on Army Installations). Unmarked clusters on Camp Lejeune will not be considered supplemental, and may not be subject to incidental take at the time of recovery.

In addition, as a way to decrease area restricted to training, Camp Lejeune intends to implement a system by which training restrictions are removed on clusters once population milestones are met. Milestones will be in increments of 25 active clusters, and the percentage of unmarked clusters will increase as each milestone is met. As the population approaches the recovery goal of 173 active clusters, the percentage of unmarked clusters increases. The number of marked clusters will vary depending on the percentage of total clusters, but it is not expected to exceed 64 clusters. As Camp Lejeune's population increases, the percentage of marked clusters will decrease. For instance, between 75 and 100 active clusters, the percent of unmarked clusters will be 35%. Between 100 and 125, it is 45%. This will increase until Camp Lejeune gets closer to the recovery goal of 173 active clusters, at which time, the intervals will get smaller (Table 2). Projected growth of RCW population on Camp Lejeune, including numbers of active, marked and unmarked clusters is presented in Table 2.

Figure 3. High-Use Training Areas on Camp Lejeune (Main Base)

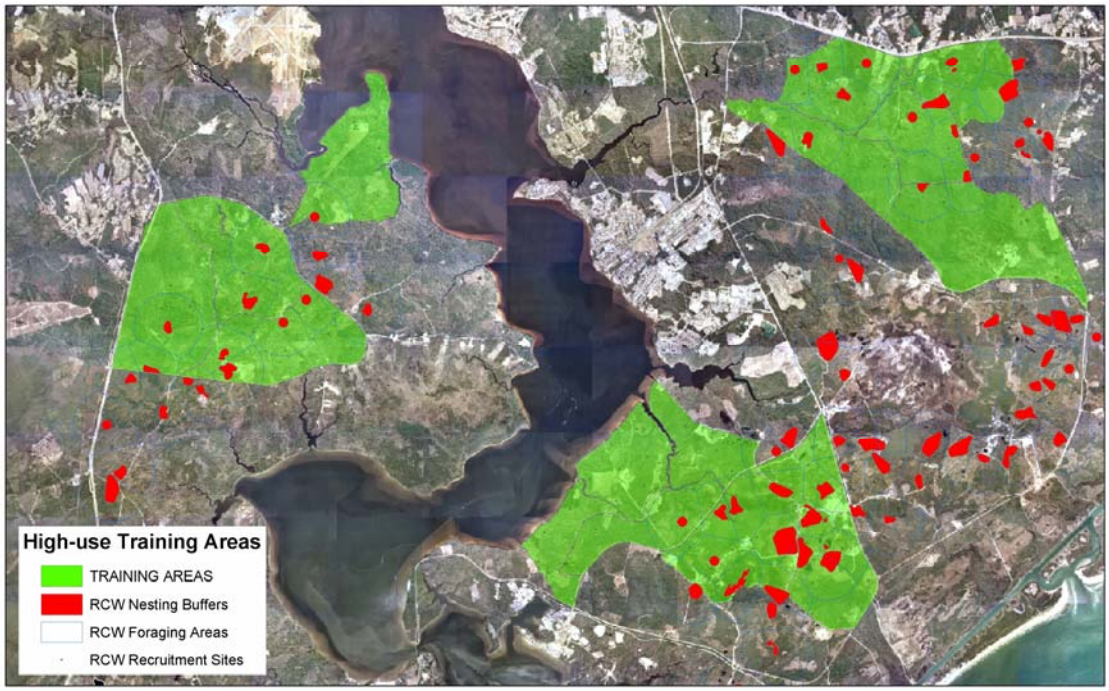


Table 2. Projected growth of RCW population on Camp Lejeune, including numbers of active, marked and unmarked clusters.

YEAR	Total Active Clusters	Total Active Clusters in HUTA Areas	Total Active clusters non-HUTA areas	% unmarked clusters	Total Unmarked clusters	Total Marked clusters	Total Clusters
2005	81	28	53	25	24	66	90
2006	85	29	56	35	38	56	94
2007	89	30	59	35	40	58	98
2008	94	32	62	35	43	60	103
2009	99	34	65	35	47	62	109
2010	104	36	68	45	61	54	115
2011	109	38	71	45	64	56	120
2012	115	40	75	45	68	59	127
2013	121	42	79	45	73	60	133
2014	127	44	83	55	87	52	139
2015	133	46	87	55	92	54	146
2016	139	48	91	55	97	56	153
2017	146	50	96	55	103	58	161
2018	154	53	101	65	122	47	169
2019	162	56	106	65	129	49	178
2020	170	59	111	75	151	36	187
2021	179	62	117	100	197	0	197
2022	188	65	123	100	207	0	207

Camp Lejeune has an aggressive program to convert offsite loblolly pine to longleaf pine. To ensure that longleaf restoration provides a benefit in the long term, and does not cause habitat to fall below acceptable levels in the short term, Camp Lejeune is developing an ecosystem management model to predict RCW habitat quantity and quality.

Consistent with the 1999 Biological Assessment and subsequent Biological Opinion, upon reaching the mission compatible goal of 173 active clusters, in consultation with the USFWS, Camp Lejeune will have the option of removing all RCW military training restrictions. This removal of training restrictions would apply as long as the RCW population remains at or above the mission compatible goal of 173 active clusters. However, once all restrictions are lifted, the incidental take will not be authorized for 173 “recovery clusters”, but will apply only to the number of clusters in excess of 173. As Camp Lejeune approaches its recovery goal, the Base may decide to exceed its recovery goal before removing all training restrictions in order to ensure a buffer against falling below the goal again.

Camp Lejeune will continue to monitor the impacts of military training to the Base’s RCW population. As with the previous plan, control clusters will be marked (i.e. subject to training restrictions) and experimental clusters will be unmarked. Unlike the previous plan, monitoring will not continue the paired design followed by the Military Impacts Study. Instead, locations of unmarked clusters will be determined based on benefits to training.

3.7 RCW Population Monitoring, Management, and Research

Monitoring, management, and research on Camp Lejeune's RCW population, will continue as stated in the 1999 Plan. Camp Lejeune will continue to designate control and research clusters for monitoring military impacts. Camp Lejeune will also continue to utilize tools and techniques available for RCW management, including artificial cavities, cavity restrictors, translocation, and prescribed burning.

3.8 Onslow Beach

With the exception of a change in rules governing off-road recreational vehicle use of Onslow Beach, and a modification of the sea turtle monitoring protocol (covered under a 2004 informal consultation), all management activities are consistent with terms and conditions, and conservation measures from past consultations. Most notable among these consultations is the 2002 BA/BO on the Effects of Current Use and Modification of Training Areas, Dune Stabilization, and Continued Recreational use of Onslow Beach.

In response to increasing concerns about piping plover conservation on Onslow Beach, the INRMP proposes more protections for nesting piping plovers or piping plovers exhibiting breeding behavior. However, for the military training portion of the beach, Camp Lejeune is requesting incidental take for possible impacts to piping plovers, and their nests. The military training section of Onslow beach is not only a vital military asset, but it has generally low quality habitat for piping plovers and is unlikely to see any nesting or breeding behavior there.

3.9 Incidental Take

Under Section 7 of the Endangered Species Act, provisions for incidental take can be granted when the USFWS concludes that an action and the resulting take will not violate Section 7(a)(2). The incidental take statement is included in the biological opinion which specifies the impact and reasonable and prudent measures deemed necessary or appropriate to minimize the impacts. Implementation of this plan could directly or indirectly result in a take of individual listed species.

3.9.1 Incidental Take in the 1999 RCW Plan - Camp Lejeune's 1999 RCW plan and subsequent USFWS Biological Opinion allowed for incidental take for 50 future clusters in the GSRA, 6 future clusters in the cantonment areas, as well as for mission essential military construction around the G-10 Impact Area. Incidental take for those areas will carry over for this revised plan.

GSRA - As a result of the 1999 plan and Biological Opinion, incidental take was allowed for up to 50 clusters in the GSRA. This number was based on 10,698 acres of suitable or potentially suitable habitat in GSRA. At the time of the plan only those soil types and site indices that would support longleaf pine were considered potential habitat.

Cantonment-Housing Management Area - Currently, the Cantonment-Housing Area (Cantonment Area) has no active RCW clusters. An abandoned cluster (RCW cluster 41) is located within the north-central portion of this area, and has been the subject of previous consultation. The Cantonment Area was identified in the 1999 plan as a high

priority area for facilities and infrastructure development due to existing land use and location. Although suitable RCW foraging habitat exists within this area, constraints on the use of appropriate vegetative management practices such as prescribed burning severely limit Camp Lejeune's ability to substantially improve habitat conditions.

In the Biological Opinion on the 1999 RCW plan, incidental take was granted for up to 6 future clusters in the cantonment areas. Camp Lejeune intends for this to carry over for the revised plan.

Mission Essential Military Construction - As part of the 1999 plan, Camp Lejeune consulted on incidental take for 5 potential clusters in an area in the eastern 1/3 of the G-10 Management area designated for the Mechanized Assault Course (MAC).

Incidental Take Applicable to Management Practices – According to the 1999 Biological Opinion, any take resulting from monitoring and cavity management activities would be covered under Section 10(a)(1)(A) permits. Incidental take from prescribed burning was not expected to exceed the loss of two cavity trees over the first five years following plan implementation.

3.9.2 Incidental Take – 2006 RCW Plan

In addition to the incidental take detailed above, the management strategy laid out in this plan may result in adverse affects to RCW. Camp Lejeune intends to implement a system of milestones that will result in more unmarked clusters on the landscape. As with the 1999 plan, unmarked, experimental clusters will be subject to incidental take.

Currently, the GSRA contains 23,111 acres of pine habitat, including longleaf, loblolly, slash and pond pine. Much of this habitat will never be converted to longleaf, because, except for slash pine, the species currently in place are on appropriate soil. It is yet to be determined how much of the loblolly and pond pine habitat in GSRA is potentially suitable for RCW, but it is possible that there is potential habitat in GSRA for more than 50 clusters. However, because of the importance of GSRA to future ranges and the training mission, Camp Lejeune seeks incidental take for all future clusters in the GSRA.

With this Biological Assessment, Camp Lejeune seeks an incidental take statement for the following:

1) **Management strategies including creation of new clusters with no training restrictions in High-Use Training Areas, and removing restrictions as population milestones are met.**
2) **All future clusters (up to 6) in the cantonment.**
3) **All future clusters in the GSRA**
4) **Management practices, including prescribed fire and forest management (take due to population monitoring and management, including capturing and banding of birds, and cavity management, is covered by section 10(a)(1)(A) permit).**

3.9.3 Incidental Take – Piping plover

In response to increasing concerns about piping plover conservation on Onslow Beach, the INRMP proposes more protections for nesting piping plovers or piping plovers exhibiting breeding behavior. However, for the military training portion of the beach, Camp Lejeune is requesting incidental take for possible impacts to piping plovers and their nests. The military training section of Onslow beach is not only a vital military asset, but it has generally low quality habitat for piping plovers and is unlikely to see any nesting or breeding behavior there.

The May 2002 Biological Opinion on the Current Use and Modification of Training Areas, Dune Stabilization and Continued Recreational Use of Onslow Beach authorized incidental take for piping plovers in the form of harassing, disturbing or interfering with piping plovers attempting to nest, forage, or roost within the project area or on adjacent beaches as a result of military training activities or increased use of ORRVs, recreational, pedestrian or animal traffic. This incidental take applied to 6.4 linear miles of foraging and roosting habitat on the frontal beach, and approximately 50 acres of sand and mud flats, sand spits, sparsely vegetated sand dunes and washover habitat located on Onslow Beach adjacent to New River Inlet. With this document, Camp Lejeune seeks incidental take for piping plovers or nests in the training portion of the beach.

4.0 Protected Species Affected by Proposed Action

Threatened and endangered species addressed in this document are listed below (Table 3). Because Camp Lejeune's natural resource management activities addressed in this document are restricted to the land, this document does not address marine species including northern right whale (*Eubaleana glacialis*), fin whale, (*Balaenoptera physalus*), humpback whale (*Megaptera novaeangliae*), sei whale (*Balaenoptera borealis*), sperm whale (*Physeter catadon*), West Indian manatee (*Trichechus manatus*), and shortnose sturgeon (*Acipenser brevirostrum*). Sea turtle species not known to nest on Camp Lejeune, including the leatherback sea turtle (*Dermochelys coriacea*), Kemp's ridley sea turtle, (*Lepidochelys kempii*), and hawksbill sea turtle (*Eretmochelys imbricata*) should not be affected by implementation of this INRMP. However, if nesting of these species were to occur on Camp Lejeune, conservation benefits and potential impacts would be comparable to those of the sea turtle species specifically addressed in this document.

Table 3. List of federally listed species known to occur on Camp Lejeune

Species	Common Name	Federal Status
Picoides borealis	Red-cockaded woodpecker	Endangered
Haliaeetus leucocephalus	Bald Eagle	Threatened
Charadrius melodus	Piping plover	Threatened
Caretta caretta	Loggerhead sea turtle	Threatened
Chelonia mydas	Green sea turtle	Threatened
Alligator mississippiensis	American alligator	Threatened (S/A)*

Lysimachia asperulaefolia	Rough-leaved loosestrife	Endangered
Amaranthus pumilus	Seabeach amaranth	Threatened

*Listed as threatened due to similarity of appearance to the endangered American crocodile.

In addition to the species listed above, Camp Lejeune is inhabited by one Federal candidate species, Hirst's panic grass (*Dichanthelium hirstii*), and has potential habitat for two Federally endangered species, Cooley's meadowrue (*Thalictrum cooleyi*), and golden sedge (*Carex lutea*). Although no occurrences of Cooley's meadowrue or golden sedge have been documented at Camp Lejeune, these species are known to occur within one-half mile of the northwestern corner of the installation boundary.

Pondberry (*Lindera melissifolia*), a federally listed endangered plant, was reported on Camp Lejeune in a single location in GSRA. Currently, however, the presence of pondberry on Camp Lejeune has yet to be confirmed.

5.0 Affected Environment

Camp Lejeune's revised INRMP will be implemented base wide. A detailed description of the affected environment is described in detail in Chapter 2 of the revised INRMP.

6.0 Status and Biology of Protected Species

6.1 Red-cockaded woodpecker

The red-cockaded woodpecker was placed on the Federal list of endangered species in 1970, and was given Federal protection with the passage of the 1973 Endangered Species Act (ESA). According to the 2003 RCW recovery plan, there were an estimated 14,068 individual RCWs living in 5,627 clusters, which is less than 3 percent of the estimated abundance at the time of European settlement (USFWS 2003). Despite ESA protection, RCW populations continued to decline in the 1970's and 1980's. However the 1990's saw an increased understanding of RCW population dynamics, and new tools, such as artificial cavities. As a result of intensive management, and use of artificial cavities, most populations stabilized and many showed increases (USFWS 2003).

Red-cockaded woodpeckers currently range throughout the southeastern United States, from eastern Texas to Virginia. They are most abundant in the coastal plain, but small populations exist in southeastern Oklahoma, southern Arkansas and southeastern Kentucky. Red-cockaded woodpeckers require open pine woodlands and savannas with large old pines for nesting and roosting habitat, as well as mature pine habitat, with little or no hardwood midstory, for foraging. Good RCW habitat typically has a high abundance of native bunch grasses and forb groundcover characteristic of a frequently burned landscape.

Red-cockaded woodpeckers are cooperative breeders, living together in aggregations of cavity trees called clusters. A family group occupying a cluster typically consists of a breeding pair, and it may include one to several male helpers. Group size may vary, depending on habitat quality and abundance of suitable cavity trees.

Factors leading to the decline of the species include habitat destruction and fragmentation, fire suppression, lack of suitable cavity trees, and isolation of small populations.

6.2 Bald Eagle

The bald eagle historically ranged throughout North America except extreme northern Alaska and Canada and central and southern Mexico. Because their diet consists mostly of fish, habitat generally borders large bodies of water, including large lakes, rivers, marshes, and coastal areas.

The bald eagle was listed as endangered, in the coterminous 48 States, under the Endangered Species Preservation Act of 1966, and under the Endangered Species Act of 1973. Causes of decline include widespread killing of bald eagles, pollution, habitat destruction and the widespread use of the pesticide dichloro-diphenyl- trichloroethane (DDT). The pesticide, which is persistent in the environment, tends to accumulate in the bodies animals that ingest contaminated food. In the late 1960's and early 1970's it was determined that dichlorophenyl-dichloroethylene (DDE), the principal breakdown product of DDT impaired calcium release necessary for egg shell formation, leading widespread nest failure. DDT was banned in 1972.

In the 17 years since it was listed throughout the coterminous 48 States, the bald eagle population has clearly increased in number and expanded in range. The improvement is a direct result of the banning of DDT and other persistent organochlorines, habitat protection, and from other recovery efforts.

The bald eagle was downlisted from endangered to threatened in 1995, and was proposed for delisting in 1999. (Volume 60, Number 133, pp 36000-36010)

6.3 Piping Plover

(From the Recovery Plan for the Piping Plover – Atlantic Coast Population) The Atlantic Coast piping plover was listed as threatened in 1986. The population breeds on coastal beaches from Newfoundland to North Carolina (and occasionally in South Carolina) and winters along the Atlantic Coast from North Carolina south, along the Gulf Coast, and in the Caribbean.

Piping plovers nest above the high tide line on coastal beaches, sandflats at the ends of sandspits and barrier islands, gently sloping foredunes, blowout areas behind primary dunes, sparsely vegetated dunes, and washover areas cut into or between dunes. Feeding areas include intertidal portions of ocean beaches, washover areas, mudflats, sandflats, wrack lines, and shorelines of coastal ponds, lagoons or salt marshes. Wintering plovers

on the Atlantic Coast are generally found at accreting ends of barrier islands, along sandy peninsulas, and near coastal inlets.

Loss and degradation of habitat due to development and shoreline stabilization have been major contributors to the species' decline. Disturbance by humans and pets often reduces the functional suitability of habitat and causes direct and indirect mortality of eggs and chicks. Predation has also been identified as a major factor limiting piping plover reproductive success at many Atlantic Coast sites, and substantial evidence shows that human activities are affecting types, numbers, and activity patterns of predators, thereby exacerbating natural predation.

Although numbers of nesting pairs are generally increasing throughout the Atlantic coast range of the piping plover, the Southern Region, of which North Carolina is a part has shown little increase since 1989 (199 to 203 nesting pairs). During that same period, North Carolina has seen a decrease from 55 to 24 nesting pairs (U.S. Fish and Wildlife Service, 2002-2003 Status Update: U.S. Atlantic Coast Piping Plover Population).

6.4 Loggerhead and Green Sea Turtles

The following discussion of green and loggerhead sea turtle biology and status was taken from the USFWS Region 4 Template for Biological Opinions on Beach Nourishment Activities that May Affect Sea Turtles, dated May 1997 (USFWS, 1997), as well as the Draft Loggerhead Sea Turtle Recovery Plan.

Loggerhead Sea Turtle

The loggerhead sea turtle, listed as threatened on July 28, 1978, inhabits the continental shelves and estuarine environments along the margins of the Atlantic, Pacific, and Indian Oceans. Loggerhead sea turtles nest within the continental U.S. from Texas to Virginia. Major nesting concentrations in the U.S. are found on the coastal islands of North Carolina, South Carolina, and Georgia, and on the Atlantic and Gulf coasts of Florida. Total estimated nesting in the southeast is approximately 50,000 to 70,000 nests per year.

From a global perspective, the U.S. nesting aggregation is of paramount importance to the survival of the species and is second in size only to that which nests on the islands in the Arabian Sea off Oman. The status of the Oman colony has not been evaluated recently, but its location in a part of the world that is vulnerable to disruptive events is cause for considerable concern. The loggerhead nesting aggregations in Oman, the U.S., and Australia account for about 88 percent of nesting worldwide.

The major threats faced by loggerheads include incidental take from commercial fishing operations and channel dredging; loss or degradation of nesting habitat from coastal development and beach armoring; disorientation of hatchlings by beachfront lighting; excessive nest predation by native and non-native predators; degradation of foraging habitat; marine pollution and debris; watercraft strikes; and disease.

The highly migratory behavior of loggerheads makes them shared resources among many nations. Therefore, conservation efforts for loggerhead populations in one country may

be jeopardized by activities in another. Protecting loggerhead sea turtles on the U.S. nesting beaches and in U.S. waters alone therefore is not sufficient to ensure the continued existence of the species. However, sea turtle protection programs in many countries are not well organized or supported and, in this context, protection of the U.S. loggerhead population takes on international significance.

Green Sea Turtle

The green sea turtle was listed under the ESA on July 28, 1978. Breeding populations of the green turtle in Florida, and along the Pacific Coast of Mexico are listed as Endangered; all other populations are listed as threatened. The green turtle has a worldwide distribution in tropical and subtropical waters. Major green turtle nesting colonies in the Atlantic occur on Ascension Island, Aves Island, Costa Rica and Surinam.

Within the U.S., green turtles nest in small numbers in the U.S. Virgin Islands and Puerto Rico, and in large numbers along the east coast of Florida, particularly in Brevard, Indian River, St. Lucie, Martin, Palm Beach, and Broward Counties. Nesting also has been documented along the Gulf coast of Florida on Santa Rosa Island (Okaloosa and Escambia Counties) and form Pinellas County through Collier County. Green turtles have been known to nest in Georgia, but only on rare occasions. The green turtle also nests sporadically in North Carolina. The first documentation of green turtle nests in South Carolina was reported in 1996. Unconfirmed nesting or green turtles in Alabama has also been reported

6.5 American Alligator

The American alligator was listed as endangered in 1967. The main cause of decline was overhunting. With the protection provided by the ESA, American alligator populations have rebounded to the point that in 1987, the species was considered recovered by the U.S. Fish and Wildlife Service. However, it is still listed as threatened due to similarity of appearance to a threatened taxon, the Federally endangered American crocodile. Because the American alligator is considered recovered, federal actions that may affect alligators are not subject to Section 7 consultation under the ESA.

6.6 Rough-leaved Loosestrife

Rough-leaved loosestrife (RLL) is endemic to the coastal plain and sandhill regions of North Carolina and South Carolina. It was listed as federally endangered in 1987. Rough-leaved loosestrife generally occurs in the ecotones between pine savannas and pocosin wetlands. The ecotones where RLL typically occurs is maintained by fire, as are the adjacent uplands and wetlands. Lack of fire in RLL habitat leads to encroachment by woody and shrubby vegetation which, when it becomes too tall and dense, can make the habitat unsuitable for RLL.

Rough-leaved loosestrife is an erect, rhizomatous, perennial herb that grows to 1.0-2.3 ft (0.3-0.7 m). Flowering is in May and June, but sexual reproduction and the establishment of new populations is believed to be rare. Colonial growth by asexual, rhizome spreading most likely plays a greater role in population dynamics than does sexual reproduction.

Fire suppression, drainage of associated wetlands, and development have contributed to the decline of this species.

6.7 Seabeach Amaranth

Seabeach amaranth was listed as threatened in 1993. It is an annual plant that grows on barrier islands, where its habitat consists of overwash flats at accreting ends of islands and lower foredunes and upper strands of noneroding beaches. It historically occurred in 31 counties in 9 states from Massachusetts to South Carolina. Currently, it is found only in New York (13 populations), North Carolina (34 populations), and South Carolina (8 populations) (U.S. Fish and Wildlife Service, N.C. ES Homepage).

Seabeach amaranth appears to be intolerant of competition and does not occur on well-vegetated sites. The species appears to need extensive areas of barrier island beaches and inlets, functioning in a relatively natural and dynamic manner. These characteristics allow it to move around in the landscape as a fugitive species, occupying suitable habitat as it becomes available (U.S. Fish and Wildlife Service, N.C. ES Homepage).

Threats to seabeach amaranth include construction of beach stabilization structures, beach erosion, beach grooming, herbivory by insets and feral animals, and damage from off-road vehicles (U.S. Fish and Wildlife Service, N.C. ES Homepage).

6.8 Pondberry

Pondberry was listed as endangered under the Endangered Species Act in 1986. In 1993 (date of Recovery Plan), the species was known to exist in 36 populations spread among 6 states (Arkansas, Georgia, Mississippi, Missouri, North Carolina and South Carolina). It may be extirpated from Florida, Louisiana and Alabama (U.S. Fish and Wildlife Service 1993).

Pondberry is closely associated with seasonally flooded wetlands, and has been adversely affected by wetland drainage, timber harvesting, road construction, and conversion of its habitat to agricultural use (U.S. Fish and Wildlife Service 1993).

7.0 Status of Species Within the Action Area

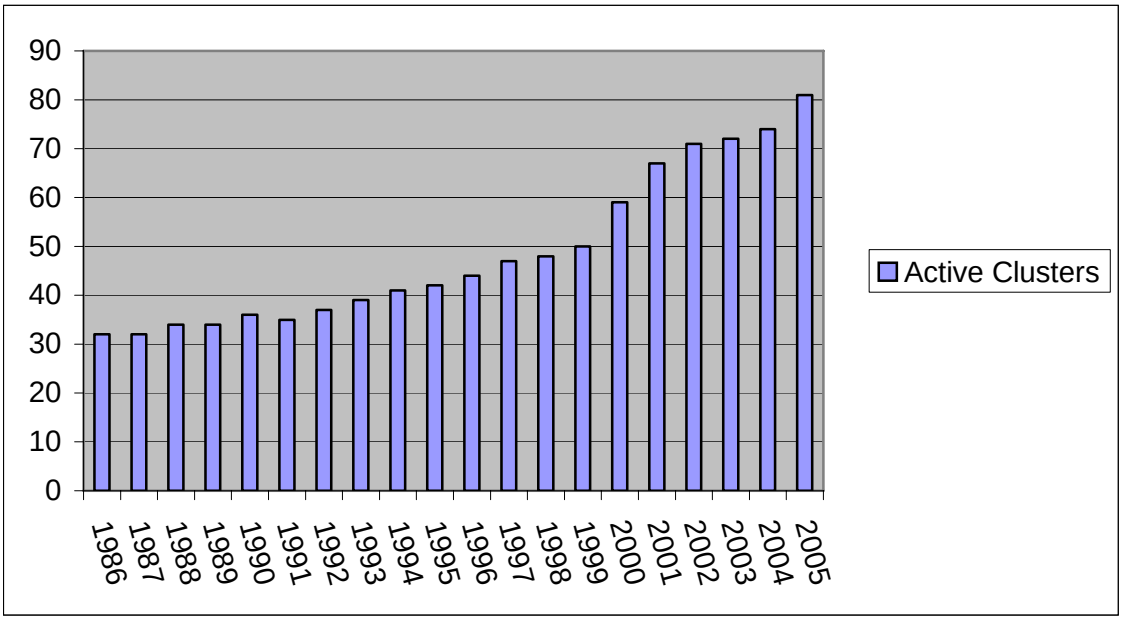
7.1 Red-cockaded woodpecker

At the end of the 2005 breeding season, 81 of the 85 clusters on the Camp Lejeune were active; 71 clusters contained breeding pairs. Eighteen clusters are west of New River in the Verona/Dixon area. All other clusters are east of the New River on Mainside.

G-10 Impact Area and Combat Town contain the best quality RCW habitat on base. Stands in these areas consist mainly of longleaf pine and are maintained by fire, either through controlled burning or through accidental fires that are common around maneuver and impact areas. Fire has cleared most of the understory from these areas, creating fairly open pine stands.

In other portions of the base without the same history of frequent fires, there tends to be a greater need for more aggressive habitat management. In these areas, mechanical vegetation management already has begun to have a noticeable impact on habitat quality. Intensive monitoring of RCW clusters on Camp Lejeune began in 1986, when the base had 32 active clusters. Since that time, Camp Lejeune has seen this number grow by 161% to 81 active clusters in 2005. Figure 4 shows the growth in active clusters and nests between 1986 and 2005.

Figure 4. Number of active RCW clusters on Marine Corps Base Camp Lejeune 1986-2005



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7.2 Bald Eagle

The first recorded bald eagle nest on Camp Lejeune was documented in 2000. The nest, which successfully fledged two offspring in 2000, remains active. Eagles have been observed every year since 2000, although they have not successfully nested since 2000.

7.3 Piping Plover

Although no piping plover nests have been documented on Onslow Beach, potential nesting habitat is available. Nesting piping plovers have been documented both to the north and to the south of Onslow Beach. A single nest was located on South Topsail Beach in 1999. To the north, piping plovers regularly nest on Cape Lookout National Seashore.

Despite the lack of observed nests, piping plovers have been sighted foraging on Onslow Beach during all seasons of the year, including sighting in 2004 during the breeding season.

7.4 Loggerhead and Green Sea Turtles

The loggerhead nesting and hatching season for North Carolina Beaches extends from May 1 through November 30. Length of incubation ranges from about 45 to 95 days. The green sea turtle nesting and hatching season for North Carolina beaches extends from May 15 through November 15. Incubation ranges from about 45 to 75 days. A single green turtle has returned to Onslow Beach every four years since 1990. She is the only green turtle recorded nesting on Onslow beach in the last 10 years.

Sea turtle nesting activity on Onslow Beach is highly variable from year to year, ranging from a high of 85 nests in 1982, to a low of only 7 nests in 2004. Although the total for 2004 is the lowest since intensive monitoring began in 1979, it was preceded by a year, 2003, in which the total of 52 nests was relatively high. The earliest nest recorded since 1987 occurred on May 18.

7.5 American Alligator

The American alligator is considered recovered throughout its range, and the waters in and around Camp Lejeune support a healthy alligator population. Since 1983, Camp Lejeune has conducted surveys for American alligators on several creeks that flow into the New River. Over that time period an average of 17.3 alligators were seen on approximately 13.5 miles of survey route, for an average of 1.3 alligators per mile. The highest individual count of 31 alligators occurred in 2001.

7.6 Rough-leaved Loosestrife

Camp Lejeune supports a growing population of RLL. Areas such as the G-10 impact area and the Combat Town area, that have burned frequently due to training-caused fires have historically harbored the highest numbers and densities of RLL. However the emphasis on growing season burning has begun to improve habitat base wide. With steady increases in the amount of growing season burns, habitat conditions for RLL are expected to continue to improve.

7.7 Seabeach Amaranth

Although seabeach amaranth habitat can be temporary and unpredictable, the natural dynamics on Onslow Beach and Browns Island continue to provide reliable areas of habitat for seabeach amaranth. Concentrations are generally found near the New River inlet, on an overwash area toward the south end of Onslow Beach, and on the beach front near the buffer area north of the Officers' Pavilion. Although Browns Island is not regularly surveyed, due to the fact that it is a duded impact area, it is expected that populations of seabeach amaranth exist on the island.

7.8 Pondberry

Pondberry was collected in the Greater Sandy Run Area in a research plot. The plant was collected in 2004, but was not identified until over a year later. Subsequent attempts to locate the plant have so far been unsuccessful. Camp Lejeune personnel will continue to attempt to locate the plant.

8.0 Potential Effects and Conservation Measures

8.1 Forest Management, Longleaf Pine Restoration, silvicultural techniques for Regeneration, and site preparation.

Forest management activities have the potential to affect the following species: RCW, rough-leaved loosestrife, bald eagle and pondberry.

8.1.1 Effects on RCW

Because forest management under the revised INRMP does not set rules for the retention of residual trees when converting loblolly pine, habitat which may be suitable for RCWs, may be lost in order to establish longleaf plantations. Potential impacts to RCWs from forest management are near-term loss of suitable habitat and damage to high-quality groundcover.

8.1.1.1 Conservation Measures

With this INRMP Camp Lejeune will implement RCW partition-based management, the goal of which is to ensure sufficient suitable habitat for each partition at the time of occupation by an RCW group. Looking at foraging resources available in each partition will allow Camp Lejeune managers to restore longleaf in a way that will help ensure that all RCW clusters have sufficient suitable habitat that is improving in quality. Where high-quality native groundcover exists, care will be taken in the logging process to do as little harm as possible. Timber harvest activities will not take place within 200 ft of occupied clusters during the nesting season. Additionally, when regenerating, or planting pine, the method with the lowest impact to the groundcover (generally burning and flat planting) will be employed.

8.1.2 Effects on Rough-leaved Loosestrife

Forest management has the potential to affect RLL through damage to plants and the ground caused by timber harvesting.

8.1.2.1 Conservation Measures

Camp Lejeune has placed 100’ protective buffers around each known RLL population, within which no ground disturbing activity will take place. Additionally, Camp Lejeune will survey all high-probability habitat prior to any ground disturbing activity. If a new population of RLL is discovered, it will receive the same protections as existing sites.

8.1.3 Effects on Bald Eagle

Forest management has the potential to impact the bald eagle through disturbance of the existing site, and the loss of potential nest trees.

8.1.3.1 Conservation Measures

Camp Lejeune will maintain a protective buffer around the existing nest. Within 750 ft of the known nest, no logging will take place. Throughout the base, Camp Lejeune will carry out management that favors the large old trees that bald eagles favor for nest trees.

In cases of longleaf pine restoration, large trees may be cut, but this is on a small scale compared to the size of Camp Lejeune. In areas where the potential for nesting exists, stands will be surveyed for bald eagle nests prior to harvest.

8.1.4 Effects on pondberry

Forest management has the potential to affect pondberry through damage to plants and the ground caused by timber harvesting.

8.1.4.1 Conservation Measures

As with RLL, Camp Lejeune will place 100' protective buffers around each known pondberry population, within which no ground disturbing activity will take place. Additionally, Camp Lejeune will survey all high-probability habitat prior to any ground disturbing activity. If a new population of pondberry is discovered, it will receive the same protections as existing sites.

8.2Prescribed Burning

8.2.1 Effects on RCW

Although prescribed burning is one of the most important tools for restoring and maintaining RCW habitat, there is the potential to burn up cavity trees when conducting prescribed burning. The biological opinion on the implementation of Camp Lejeune's 1999 RCW plan allowed for incidental take not to exceed two RCW cavity trees in the first 5 years of implementation of the plan. Although Camp Lejeune does not anticipate the loss of cavity trees to prescribed fire, the Base believes the previous incidental take provision was reasonable. However, with the increase in Camp Lejeune's RCW population, and corresponding increase in number of trees, as well as the increasing emphasis on growing season fire, Camp Lejeune seeks to increase the allowable incidental take to three trees over the first 5 years of this plan.

8.2.1.1 Conservation Measures

As covered in the 1999 Plan BA, Camp Lejeune will continue to protect cavity by raking around them prior to burning.

8.2.2 Effects on Rough-leaved Loosestrife

Although prescribed burning in the growing season has the potential to kill the above-ground portions of RLL plants, the plants are perennial and will resprout from their rhizomatous roots if top-killed. Because growing season burning has the potential to dramatically improve RLL habitat by killing back competing shrubby vegetation, the benefits of growing season fires are seen as outweighing the short-term negative impacts.

Another potential impact is disturbance of plants and hydrology through the use of plowed fire lines.

8.2.2.1 Conservation Measures

Camp Lejeune will continue to conduct growing season burning in RLL habitat.

The use of plowed fire lines in the ecotone habitats favored by RLL has been dramatically reduced in recent years. This reduction is expected to continue as growing season burning increases, and the danger posed by catastrophic fires in pocosin wetlands is reduced. When plow lines are necessary to conduct a fire, they will not be placed within the buffer of a known RLL site, and it will not be done in a way that might alter the hydrology of the site. Additionally, before any new fire line is placed in high-probability habitat, the area will be surveyed for RLL. Any new RLL population will be protected in the same manner as existing sites.

8.2.3 Effects on Bald Eagle

Prescribed burning could potentially harm or kill nest trees or potential nest trees. Additionally, burning during the nesting season may disturb nesting bald eagles.

8.2.3.1 Conservation Measures

Camp Lejeune will continue to conduct prescribed burning in a way that minimizes tree mortality across the landscape. Additionally, prescribed burning in areas containing known nests will not be conducted during the nesting season.

8.2.4 Effects on Pondberry

As with RLL, prescribed burning has the potential to kill the aboveground portions of pondberry plants. However, because pondberry exists, and presumably evolved in a fire-adapted landscape, fire will not be excluded from known pondberry sites. As with RLL, prescribed fire is likely to improve habitat for pondberry.

Plowed fire lines may impact pondberry either through disturbance or destruction of plants, or through alteration of hydrology.

8.2.4.1 Conservation Measures

Camp Lejeune will continue to conduct growing season burning in pondberry habitat.

The use of plowed fire lines on Camp Lejeune been dramatically reduced in recent years. When plow lines are necessary to conduct a fire, they will not be placed within the buffer of a known pondberry site, and it will not be done in a way that might alter the hydrology of the site. Additionally, before any new fire line is placed in high-probability habitat, the area will be surveyed for pondberry. Any new pondberry population will be protected in the same manner as existing sites.

8.3 Hardwood/Midstory Control

8.3.1 Effects on RCW

Mechanical hardwood/midstory control is expected, and is intended to have a positive impact on RCW, however there is potential for impact in the form of disturbance during the nesting season.

8.3.1.1 Conservation Measures

Hardwood/midstory will not be conducted within 200 ft of occupied clusters during the nesting season.

8.3.2 Effects on Rough-leaved Loosestrife

Mechanical hardwood/midstory control has the potential to impact RLL through ground disturbance, destruction of plants and alteration of hydrology due to rutting caused by heavy equipment.

8.3.2.1 Conservation Measures

It is not anticipated that there will be a need to use heavy machinery to clear midstory within RLL buffers. However there is the possibility that Camp Lejeune may find it necessary to do so. In such cases, any mechanical hardwood/midstory control conducted within the buffers of known RLL sites will only be done during the dormant season and only when conditions ensure that no rutting or extensive ground disturbance will take place.

8.3.3 Effects on Bald Eagle

Hardwood/midstory control could potentially impact bald eagles by disturbing the birds while on the nest.

8.3.3.1 Conservation Measures

Camp Lejeune will not conduct any forest management activities within 750 ft of known nests.

8.3.4 Effects on pondberry

Mechanical hardwood/midstory control has the potential to impacts pondberry through ground disturbance, destruction of plants and alteration of hydrology due to rutting caused by heavy equipment.

8.3.4.1 Conservation Measures

Mechanical hardwood/midstory control will not be conducted within the buffers of known pondberry sites. Additionally, for practical reasons, heavy machinery will not be placed in areas with the saturated soil that pondberry favors for habitat.

8.4 RCW Partition Management

8.4.1 Effects on RCW

RCW partition management is intended, and expected to have a beneficial impact on RCW management, by ensuring that there is sufficient suitable foraging and nesting habitat in each partition at the time of occupation. It is expected that impacts to RCW from forest management activities, including longleaf restoration, will be minimized by looking at the entire partition.

8.5 Revised Training Restrictions

8.5.1 Effects on RCW

Adoption of the Army guidelines for cluster protection is not expected to result in take. However, this plan outlines a system by which Camp Lejeune will remove restrictions completely on a large number of clusters over time. This has the potential to impact RCWs in two ways, 1) direct disturbance to the birds, and 2) degradation of habitat. It should be noted that, in the large majority of clusters, the removal of restrictions is expected to have little or no impact on either the habitat within a cluster, or the ability of groups to reproduce as before. This position is supported by results of the Military Impacts Study. However, the discussion below addresses possible impacts that could result in extreme cases.

There is the potential for direct disturbance of birds, especially when nesting, due to prolonged occupation of the sites by Marines, including bivouacs and command posts. Prolonged occupation by Marines within clusters has the potential to disturb RCWs to the point that it may impact their ability to nest.

In addition to direct disturbance, there is the potential for degradation of nesting habitat due to greater impact from vehicles driving within the clusters and from prolonged occupation of these sites. Heavier impacts within clusters may lead to reduced density of desired groundcover, which may reduce the ability of that site to carry fire, which in turn may favor undesirable shrubs and hardwoods. Because only the cavity trees will be buffered within a site there is the potential for increased soil compaction, rutting, and root damage around non-cavity trees, which may lead to reduced survival of the non-cavity trees within the cluster. This reduced survival rate may have an impact on the future cavity trees available to a cluster. Finally, the increased disturbance may lead to reduced survival of longleaf pine seedlings within the cluster, further limiting potential future cavity trees.

8.5.1.1 Conservation Measures

Camp Lejeune will continue to monitor its RCW population as it always has, and will continue monitoring military impacts. Any impacts uncovered in the monitoring process will prompt Camp Lejeune to reconsider protective measures for any cluster that seems to be showing negative effects of the reduced restrictions. Additionally, if clusters become highly degraded, Camp Lejeune may, on a case-by-case basis, increase restrictions by protecting the clusters, if necessary.

8.6 RCW Population Monitoring, Management, and Research

8.6.1 Effects on RCW

Potential effects to RCWs from standard monitoring, management, and research were identified in the 1999 Plan. Techniques and potential impacts to RCW remain unchanged, and are covered by Section 10(a)(1)(A) permits.

8.7 Training and Recreational Use of Onslow Beach

The only change to management of Onslow Beach that was not covered in a previous consultation is the restriction of off-road recreational driving on Onslow Beach during the shorebird and sea turtle nesting season. This is intended, and is expected to have a

positive impact on all protected species that use Onslow Beach, including loggerhead and green sea turtles, seabeach amaranth, and piping plovers.

The May 2002 Biological Opinion on the Current Use and Modification of Training Areas, Dune Stabilization and Continued Recreational Use of Onslow Beach authorized incidental take for piping plovers in the form of harassing, disturbing or interfering with piping plovers attempting to nest, forage, or roost within the project area or on adjacent beaches as a result of military training activities or increased use of ORRVs, recreational, pedestrian or animal traffic. This incidental take applied to 6.4 linear miles of foraging and roosting habitat on the frontal beach, and approximately 50 acres of sand and mud flats, sand spits, sparsely vegetated sand dunes and washover habitat located on Onslow Beach adjacent to New River Inlet.

With the adoption of the new rules restricting off-road recreational vehicle traffic south of South Tower from April 1 to August 31, the amount of vehicle traffic on Onslow Beach has been significantly reduced to include only base personnel or volunteers conducting surveys, base range inspectors and Conservation Law Enforcement personnel. Restricted vehicular use of Onslow Beach minimizes the need for the incidental take described above. Although there will be vehicle traffic on the beach front, it will be at a much reduced level, and much less likely to result in incidental take. In addition, Camp Lejeune does not anticipate any vehicular traffic through the 50-acre area of New River Inlet described above. For the past two years, this area has been marked as off limits due to the presence of seabeach amaranth, nesting least terns, and the potential for piping plover habitat. The incidental take described above will still be valid for the training portion of the beach extending from Risley Pier to Onslow South Tower.

8.7.1 *Effects on Piping Plover*

In addition to incidental take described in previous consultations, Camp Lejeune seeks incidental take for any nests that may appear in the training portion of the beach. Nesting in this area is seen as highly unlikely due to the lack of suitable habitat. However, possible effects include destruction or abandonment of a nest, or disruption of nesting behavior. The remote possibility of a nest appearing in this area, combined with the critical importance of this portion of the beach to the Marine Corps' training mission make it necessary for Camp Lejeune to seek incidental take in the event of a nest in the training beach.

8.7.2 *Conservation Measures*

Camp Lejeune intends to allow the portion of Onslow Beach outside the recreational and training beaches to remain in a natural state. Natural beach dynamics have historically created good potential habitat for piping plovers in at the inlets and in a large overwash flat on the south east end of Onslow Beach. Additionally, the inlets and smaller overwash areas on Browns Island provide relatively undisturbed habitat for piping plovers and other shorebirds. In addition, Camp Lejeune posts potential nesting habitat as off limits to vehicles, and to discourage entry of any kind. Finally, Camp Lejeune will continue its monitoring program for piping plovers and fully protect any nests found outside the training area.

8.8 Conclusion

Although this Biological Assessment enumerates a number of potential impacts to listed species, the intent of the revised INRMP is to improve Camp Lejeune's ability to conserve and recover threatened and endangered species on Base. Many of the new initiatives outlined in the INRMP are designed to allow Camp Lejeune to more efficiently manage the landscape in support or listed species and the ecosystem in general, while minimizing or reducing the impact of listed species on the training mission.

LITERATURE CITED

National Marine Fisheries Service and U.S. Fish and Wildlife Service. 1991. Recovery plan for U.S. population of loggerhead turtle. National Marine Fisheries Service. Washington, DC. 64 pp.

U.S. Army Construction Engineering Research Laboratories. 1997. Biological Assessment of the Effects of the Proposed Revision of the 1994 "Management Guidelines for the Red-cockaded Woodpecker on Army Installations." U.S. Army Construction Engineering Research Laboratories, Champaign, IL. 107 pp.

U.S. Fish and Wildlife Service. 2003. Recovery plan for the red-cockaded woodpecker (*Picoides borealis*): second revision. U.S. Fish and Wildl. Serv., Atlanta, GA. 296 pp.

U.S. Fish and Wildlife Service. 1996. Piping Plover *(Charadrius melodus)*, Atlantic Coast Population, Revised Recovery Plan. Hadley, Massachusetts. 258 pp.

U.S. Fish and Wildlife Service. 1996. Recovery plan for seabeach amaranth (*Amaranthus pumilius*) Rafinesque. Atlanta, GA. 59 pp.

U.S. Fish and Wildlife Service. 1995. Rough-leaved loosestrife recovery plan. Atlanta, GA. 32 pp.

U.S. Fish and Wildlife Service. 1993. Recovery plan for pondberry (*Lindera melissifolia*). U.S. Fish and Wildl. Serv., Atlanta, GA. 56 pp.

National Marine Fisheries Service and U.S. Fish and Wildlife Service. 1991. Recovery plan for U.S. population of loggerhead turtle. National Marine Fisheries Service. Washington, DC. 64 pp.