



United States Department of the Interior

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October 20, 2006

Mr. Scott A. Brewer, PE
Director, Environmental Management Division
Marine Corps Base
PSC 20004
Camp Lejeune, North Carolina 28542-0004

FWS Log No: 2006-I-0182

Dear Mr. Brewer:

This document is the U.S. Fish and Wildlife Service's (Service) biological opinion (BO) based on our review of the Biological Assessment (BA) contained in Appendix S of the proposed Integrated Natural Resources Management Plan for 2007-2011 (revised INRMP) for Marine Corps Base, Camp Lejeune located in Onslow County, North Carolina (Camp Lejeune 2006) and its effects on the red-cockaded woodpecker (RCW, *Picoides borealis*) in accordance with section 7 of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et seq.). Your May 16, 2006 request for formal consultation was received on May 17, 2006. This biological opinion is based on information provided in the May 2006 Biological Assessment (BA), electronic mail, and other published and unpublished sources of information. A complete administrative record of this consultation is on file at our Raleigh Field Office.

The natural resource management activities discussed in the revised INRMP and BA are restricted to the land and do not address marine species (e.g. West Indian manatee (*Trichechus manatus*)). Other federally listed species which occur in the project area include the seabeach amaranth (*Amaranthus pumilus*), loggerhead turtle (*Caretta caretta*), green turtle (*Chelonia mydas*), rough-leaved loosestrife (*Lysimachia asperulaefolia*), and the bald eagle (*Haliaeetus leucocephalus*). The Service believes that the conservation measures described within the revised INRMP would have an overall beneficial effect on these species and would not be likely to adversely affect them.

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, as established in a 2004 informal consultation with the Service, all management activities are consistent with terms and conditions, and conservation measures from past consultations. The 2002 biological opinion 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 represents the latest, most comprehensive formal consultation regarding threatened and endangered species conservation in the beach training areas.

Incidental take for piping plover (*Charadrius melodus*) was addressed in the Service's May 2002 Biological Opinion 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. An incidental take statement was written to address incidental take anticipated for 6.4 linear miles of foraging and roosting habitat on the frontal beach and about 50 acres of sand and mud flats and potential substrates located on Onslow Beach adjacent to New River Inlet. Incidental take was authorized 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 as a result of increased use of ORRVs, recreational, pedestrian or animal traffic.

The BA seeks incidental take for piping plover for any nests that might occur in the training portion of the beach. The document also states that nesting in that part of the beach is highly unlikely due to the absence of suitable habitat. No significant changes to training activities are described in the project area, and the Service believes the incidental take statement contained in the Service's May 2002 Biological Opinion remains applicable, and we believe it is sufficient to address the effects of all INRMP-associated activities on Onslow Beach.

Consultation History

<u>July 27, 2005</u>	Camp Lejeune hosts a meeting to discuss the July 2005 Preliminary Draft INRMP, attended by the Service, the North Carolina Wildlife Resources Commission and the North Carolina Division of Marine Fisheries.
<u>October 11, 2005</u>	Camp Lejeune provides the Service with a technical report regarding scientific population monitoring for the installations red-cockaded woodpeckers.
<u>January 4, 2006</u>	Camp Lejeune submits the Draft INRMP to the Service for review and comment.
<u>February 27, 2006</u>	The Service's Raleigh Field Office provides written comments to Camp Lejeune regarding the Draft INRMP and associated Biological Assessment.
<u>May 16, 2006</u>	The Service received the final biological assessment and request for formal section 7 consultation

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

Project Background

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 natural resource management in support of the primary military mission. In compliance with this directive, Marine Corps Base, Camp Lejeune has worked with its Federal, State and local partners and non-governmental organizations to produce the revised INRMP. The revised INRMP would replace the 2002-2006 INRMP currently directing natural resource management on Camp Lejeune as well as the installation's Mission Compatible Plan for the Comprehensive Long Range Management of the Red-cockaded Woodpecker (U.S. Marine Corps 1999; 1999 RCW Plan). The SAIA requires military installations to review their INRMPs annually and revise them if necessary every five years.

The Recovery Plan for the Red-cockaded Woodpecker, second revision (USFWS 2003a; RCW Recovery Plan) outlines criteria for defining good quality RCW habitat that supersedes guidance used to develop previous RCW conservation strategy. Camp Lejeune's habitat management, and data collection practices outlined in the revised INRMP are designed to incorporate the new habitat guidelines.

Project Description

The revised INRMP establishes the framework for Camp Lejeune's conservation efforts and lays out procedures to ensure compliance with applicable environmental laws and regulations for fiscal years 2007 through 2011. The revised INRMP considers resources on installation and regional levels. Two past consultations between the Service and Camp Lejeune are pertinent to the management actions to be directed by the Revised INRMP: (1) Camp Lejeune's 1999 Mission Compatible Plan for the Comprehensive Long-term Management of the Red-cockaded Woodpecker, and Biological Assessment on Operations at Marine Corps Base, Camp Lejeune; and (2) 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. Much of the management to be directed by the revised INRMP is consistent with previous consultations and will be incorporated by reference in this opinion where appropriate.

Forest Management

Forest Management will provide a forested environment that meets the needs of the military mission, sustains a renewable source of forest products, high-quality wildlife and protected species habitat, clean water, clean air, outdoor recreation opportunities, through scientifically-based ecosystem management principles. The Revised INRMP demonstrates a shift in management approach toward a system that maximizes the acreage and quality of RCW habitat, while allowing for efficient restoration of longleaf pine-wiregrass ecosystems that historically occurred on Camp Lejeune. Except in longleaf pine restoration areas (which may have negative short-term impacts on RCW habitat), management activities will strive to improve the quality of

RCW habitat (as described in the 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 installation, location within an RCW partition, and the desired condition of a given stand.

On Mainside Camp Lejeune and the Greater Sandy Run Area (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 inhibit 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 Service.

Under the plans described in the Revised INRMP, there will be times when loblolly pine stands that could be considered suitable RCW habitat are clearcut in order to restore longleaf. Short term effects to the RCW are expected to be insignificant and beneficial to RCWs in the long term. Camp Lejeune will retain potential cavity trees in all areas that are not being restored to longleaf pine. No loblolly regeneration will take place on soils that historically supported longleaf pine. In contrast to the 1999 RCW Plan, Camp Lejeune will not impose rules that mandate a certain amount of residual loblolly pines be left in stands to be converted to longleaf pine and Camp Lejeune forest managers will determine whether or not to leave overstory pines at their discretion. These decisions will be based on several factors including the ability of the existing understory to carry fire and components defining the Recovery Standard expressed in the RCW Recovery Plan. During all restoration efforts, all existing trees of the species to be restored should be retained to expedite development of potential cavity trees. Overstory trees of the offsite species will be retained where necessary to conserve RCW foraging and nesting habitat.

In such cases of "under-planting," Camp Lejeune plans to use prescribed burning to reduce competition with non-longleaf species. In restoring longleaf to the landscape, Camp Lejeune will employ several methods, with the objective of converting loblolly stands in the most efficient manner, while retaining habitat value for RCW when necessary. The following 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; and Under-planting longleaf seedlings while leaving 40 ft² of basal area of loblolly overstory.

When thinning mature stands (pines \geq 10 inches diameter at breast height [DBH]), Camp Lejeune will maintain a pine basal area of 60 square feet (ft²) 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; and, 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 ft² per acre.

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. The following methods will be used:

- Small patch clearcut. This will be the preferred method at Camp Lejeune. Under this method, harvest areas of five 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 will typically be left to a basal area of 30-40 ft²/acre of the best dominant or co-dominant longleaf pines in the stand. Under the modified shelterwood method, 40 ft² of pine basal area would remain. 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 site preparation method.
- 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 ft² per acre into perpetuity.
- Small patch clearcut for loblolly pine. Under this method, harvest areas of five 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.

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, many of these areas are expected to be developed in the future which will further increase habitat 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: (1) Pine thins for loblolly leaving more than 60 ft² basal area; (2) Seedtree cuts that allow for removal of residual trees; (3) Pine Only Thin- an intermediate harvest in a stand to improve hardwood mast production in hardwood stands with less than 30% pine component; and (4) 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.

Areas to receive prescribed burn treatments will be scheduled based on 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 territory 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 cluster sites are scheduled for burning on a three-year cycle.

To maintain and improve the current training environment, and while also working towards the RCW recovery goal, Camp Lejeune's annual prescribed burning objective will be a 20,000 to 25,000-acre-per-year target, during the five-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. Where deemed necessary for RCW conservation, Camp Lejeune plans to eliminate larger, fire-hardened hardwoods by: (1) mechanical methods using a feller buncher, or hydro-ax/mower, (2) manual methods using a chain saw, brush hooks, etc., or (3) herbicides applied by injection, hypo-hatchet, hand sprayer, etc.; or (4) a combination of these methods.

Camp Lejeune plans to mechanically control about 600 acres of hardwood midstory per year to transform unsuitable RCW foraging habitat to suitable habitat and to prepare overgrown stands to be included in the installation's prescribed burning program. The INRMP will 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.

The least intensive, effective site preparation method, based on site conditions, will be applied to each regeneration site. Site preparation methods are identified in Figure 7-2 of the Revised INRMP. On the Camp Lejeune Mainside, 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.

The Revised INRMP will establish the RCW foraging habitat partition as a subunit to be considered a forest management unit of equal importance with the traditional forest compartment. Camp Lejeune's intention with this shift is to focus greater attention to RCW management needs at the individual cluster/territory level. The objective of partition-level management for RCWs is to ensure that each partition has sufficient suitable habitat, and to maximize good quality habitat available in each territory. For existing clusters, partitions are delineated according to the RCW Recovery Plan. Partition boundaries may overlap forest stand and compartment boundaries. Recruitment partitions will be delineated as described above but will be centered on recruitment site points rather than existing clusters.

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 and will not be so large as to create unnatural cluster density. Partitions containing mostly longleaf pine may be smaller than 200 acres since large clearcuts are not required to promote longleaf restoration and 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.

In cases where partitions are much smaller than 200 acres, partition size may dictate the type of management that takes place. E.g., in a partition that contains only 120 acres of loblolly pine habitat, there will be a need to retain foraging substrate while working to restore longleaf pine. In such a case, Camp Lejeune may use novel approaches such as under-planting, 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 conditions toward good quality habitat as defined in the 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.

Military Training Restrictions

Current training restrictions attributable to RCW conservation are established based on the definition of the term "cluster" in the RCW Recovery Plan. A two-dimensional polygon is drawn spatially with the outermost cavity trees of the aggregation representing each corner point. The 200-foot buffer of this polygon establishes the cluster. Currently, the only activities permitted within the cluster are: (1) transient foot travel, (2) transient vehicular traffic on existing maintained roads and trails, and (3) blank small arms firing. In execution of the Revised INRMP, Camp Lejeune proposes to adopt the 1996 Revised Army-wide Guidelines for the Management of the Red-cockaded Woodpecker on Army Installations (USACERL 1997; Army-wide Guidelines) for cluster protection.

With adoption of the Army-wide Guidelines, Camp Lejeune will continue to identify the buffer zone for all marked clusters. However, more training activities will be allowed within the cluster. A secondary 50-foot buffer around individual cavity trees will also be established but will not be marked. Instead, the buffer will be estimated by Marines in the field. A list of training activities permitted and prohibited within the cluster and the 50-foot buffer is provided in Table 1.

Table 1: Training activities permitted and prohibited within marked RCW clusters.

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 OPERATIONS ONLY, GENERATORS OR POTS**	YES

TRAINING ACTIVITY WITHIN MARKED BUFFER ZONES	YES/NO
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 cluster.

In addition to adopting the Army-wide guidelines, Camp Lejeune will implement a strategy to promote 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 have been low priority for RCW expansion. Implementation of the Revised INRMP will promote RCW population growth by allowing unmarked recruitment clusters to be placed in designated High-Use Training Areas (HUTAs). A percentage of clusters that are provisioned or would form naturally in HUTAs would be subject to incidental take from military activities, until the goal of 173 active clusters is reached. The installation would promote population growth in the best available habitat regardless of the training area. New clusters formed within the HUTAs will not be marked and will be free of training restrictions. The training areas contained in the HUTAs are identified in the revised INRMP as follows: HA, HB, HC, HE, HF, HG, HH, FA, FB, FC, FE, FF, MC, MD, ME, MF. A map showing the location of the HUTAs is displayed in Figure 3 of the BA. Unmarked clusters on Camp Lejeune will not be considered supplemental.

The Revised INRMP includes measures by which training restrictions are removed from 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, potentially all clusters may be unmarked. The number of marked clusters will vary depending on the percentage of total clusters, but is not expected to exceed 64 clusters. Camp Lejeune's projected RCW population growth in terms of active, marked and unmarked clusters is presented in Table 2. As Camp Lejeune's population increases, the percentage of marked clusters would decrease. For example, between 75 and 100 active clusters, the percentage of unmarked clusters will be 35%. Between 100 and 125, 45% would be unmarked.

Table 2: Projected growth of Camp Lejeune RCW Population, including active, marked and unmarked clusters.

Year	Total Active Clusters	Total Active Clusters in HUTAs	Total Active Clusters non-HUTAs	% 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

Consistent with the 1999 Biological Assessment and subsequent Biological Opinion, upon reaching the mission compatible goal of 173 active clusters, in consultation with the Service, 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 would 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 installation's RCW population, including designation of control and research clusters for monitoring military impacts. As with the 1999 RCW Plan, control clusters will be marked (i.e. subject to training restrictions) and experimental clusters will be unmarked. However, unlike the 1999 RCW Plan locations of unmarked clusters will be determined based on benefits to training. Camp Lejeune will also continue to use tools and techniques available for RCW management, including cavity provisioning, cavity restrictors, translocation, and prescribed burning.

Obtain the Necessary Incidental Take Statements

Under section 7 of the Act, the Service has the authority to grant incidental take for certain actions that will not violate Section 7(a)(2). Implementation of this plan could directly or indirectly result in a take of individual RCWs on an infrequent basis. This potential for take is

an important consideration when weighing the overall benefits of the proposed activity to the continued existence of the species versus the potential to adversely affect individuals of the population.

The Revised INRMP contains elements of the 1999 RCW Plan for which incidental take was previously authorized by the Service and which Camp Lejeune requests incidental take for the period covered by the Revised INRMP. This take would include implementation of the RCW management strategy, implementation of the management practices, RCW management within the installation Housing-Cantonment Area, RCW management in relation to unmarked clusters subject to military training activities, supplemental recruitment clusters beyond the Mission Compatible Recovery Goal, and RCW management in the GSRA.

In order to conduct a range of Base activities, including training, operational, maintenance, and construction activities, Camp Lejeune requested an incidental take statement for any RCW clusters which would become established in the GSRA. The 1999 RCW Plan requested that this incidental take be in place prior to conducting RCW management efforts in GSRA to attract the bird. As no conspicuous marking or restrictions would apply to supplemental RCW clusters present in the GSRA, there is a possibility of both direct and indirect effects due to military training. In addition, direct loss due to construction or other types of activities is also a possibility. Camp Lejeune will provide the USFWS prior notice when it is known that activities are likely to result in a take. It is not likely that a take of RCWs would occur in the near future on GSRA since no RCWs are known to inhabit the area and habitat conditions do not favor RCW occupation at this time. In the next five years the Service would anticipate the formation of few supplemental clusters due to the lack of suitable habitat, but in a longer term, the area has a potential to support as many as 50 supplemental clusters.

As proposed in the 1999 RCW Plan, any clusters in excess to of the Mission Compatible Recovery Goal of 173 active clusters would be considered supplemental and would be subject to take via indirect land management activities and land use. In the Revised INRMP, the scope of effects to RCWs when Camp Lejeune's RCW population recovery goal is reached has not changed and Camp Lejeune has requested the same level of incidental take upon reaching the Mission Compatible Recovery Goal.

In addition to the incidental take described above, the management strategies laid out in this plan may result in adverse affects to the RCW. The RCW management strategy whereby the ratio of unmarked clusters to marked clusters would increase based on population growth milestones would result in a growing number of unmarked clusters on the landscape. Among the unmarked clusters would also be all new clusters that form naturally or that would be provisioned within the HUTAs. Up to 10% of these "unprotected" groups (i.e., groups occupying unmarked clusters) would be subject to incidental take associated with military training.

Management practices, including fire and forest management may result in the loss or removal of cavity trees and foraging habitat. Established management practices such as translocation, the drilling of artificial cavities and the installation of restrictor plates over cavity entrances introduce a remote possibility of injuring or killing individual RCWs. Many of these practices for conservation of RCWs are covered by separate 10(a)(1)(A) permits which would be held by the personnel carrying out these activities. Camp Lejeune would provide the Service prior notice when they anticipate activities that are likely to result in a take of RCWs. Pursuant to the terms

of this plan, Camp Lejeune would manage forestland to restore the landscape with longleaf pine where suitable soils exist and in accordance with sound ecosystem management.

INRMP Review and Revision

Section 101(b)(2) of the Sikes Act Improvement Amendment requires review of each INRMP developed by a military installation to be reviewed on a regular basis not to exceed five years. Camp Lejeune plans to review the Revised INRMP annually in cooperation with the Service, the North Carolina Wildlife Resources Commission and the North Carolina Division of Marine Fisheries. The document would be revised every five years, if necessary.

More details regarding the Integrated Natural Resources Management Plan for 2007-2011 (U.S. Marine Corps 2006) for Marine Corps Base, Camp Lejeune located in Onslow County, North Carolina and associated Biological Assessment can be found in the Revised INRMP (U. S. Marine Corps 2006).

Considering the biology of the species, geographic area involved, and the extent of the proposed action, the Service has defined the action area in this Biological Opinion as the Camp Lejeune Military Installation. Marine Corps Base, Camp Lejeune encompasses about 142,852 acres, in the North Carolina Coastal Plain. A detailed description and map of Camp Lejeune's location and a thorough discussion of its physiographic and biological environment can be referenced in the revised INRMP (U.S. Marine Corps 2006).

STATUS OF THE SPECIES

Species description

The RCW is a territorial, non-migratory, cooperative breeding species (Lennartz et al. 1987, Walters et al. 1988) and is the only North American woodpecker that exclusively excavates its roost and nest cavities in living pines. In 1970, the Service listed the RCW as endangered (Federal Register 35:16047), and in 1973, the RCW was provided protection as an endangered species with the passage of the Endangered Species Act. No critical habitat has been designated for the RCW.

Historically, the RCW occupied a wide range throughout old-growth, fire-maintained pine ecosystems of the southern United States. Although still widely distributed, the range of the RCW is now limited and fragmented as a result of past and present human activities (e.g., resource extraction activities and urban development) and natural factors (e.g., hurricanes and pine beetle outbreaks). The remaining RCW populations exist primarily on Federal lands located in the Coastal Plain from North Carolina to Texas, the Piedmont of Georgia and Alabama, the Sandhills of North Carolina and South Carolina, and the interior highlands of Arkansas, Oklahoma, and until recently, Kentucky (Costa and Walker 1995).

Life history

The RCW has an advanced social system that revolves around family groups. A typical RCW group includes one pair of breeding birds, the current year's offspring (if any), and zero to four helpers. Helpers are usually male offspring from previous breeding seasons that assist the

breeding pair by incubating eggs, feeding the young, excavating cavities, and defending the territory (Ligon 1970, Lennartz and Harlow 1979, Lennartz et al. 1987, Walters et al. 1988). The RCW nesting season occurs from April to July. Incubation lasts approximately 10 days, and the young fledge 24 to 26 days after hatching. Some juvenile males disperse from their natal territory prior to the next breeding season in an attempt to find vacant territories, or to establish their own (Hooper et al. 1980, Service 2003a). Others may remain and become helpers during subsequent nesting seasons. Most juvenile females disperse after fledging, although some may remain with the group as helpers (Walters et al. 1988). The average dispersal distance of fledgling males and females is about three miles (Walters 1991, Letcher et al. 1998).

Each group of RCWs occupies a discrete territory consisting of its cavity trees, called a cluster, and adjacent foraging habitat (Walters 1990). The RCW requires mature (usually 60 or more years old), live pine trees to excavate its nesting and roosting cavities. The cavity trees are essential to the RCW because they provide shelter and a place to nest and raise young (Ligon 1970). A typical cluster contains between one and 20 cavity trees, and the breeding male usually chooses the most recently excavated natural cavity as the nest tree, or selects cavity trees with higher resin yields (Conner and Rudolph 1989). Such cavity trees may enhance the survival of the nestlings by decreasing the parasite load of nestlings and incubating adults and providing a resin barrier to snake predation.

RCW cluster stands are typically less dense than surrounding stands and may be the least dense stands available (Service 2003a). For clusters, basal areas as low as 40 square feet (ft²)/acre in longleaf stands and from 40 to 60 ft²/acre in shortleaf/loblolly stands are suitable (Conner et al. 1991). Seedtree and shelterwood cuts with excessive pine or hardwood midstory, however, are not acceptable as nesting habitat. Once established, clusters are often utilized for many consecutive years or even decades (Walters 1990). Hardwood midstory lessens the habitat quality, eventually leading to cavity abandonment when the hardwood midstory reaches cavity height (Conner and O'Halloran 1987, Costa and Escano 1989). Cluster abandonment may also occur as a result of displacement by competing cavity dwellers or stochastic events such as hurricanes (Conner and O'Halloran 1987).

The Recovery Plan for the Red-cockaded Woodpecker, Second Revision (RCW Recovery Plan; Service 2003a) establishes guidelines that if followed, are expected to increase RCW populations. These guidelines, referred to as the Recovery Standard are to be followed by all federal agencies and by all state land administrators for lands that are being managed to support recovery populations. To attain the Recovery Standard, the objective is to manage, at a bare minimum, 120 acres of good quality habitat per cluster. Good quality habitat is defined as having: (1) ≥ 20 ft²/acre basal area of pines ≥ 60 years in age and ≥ 14 in. DBH, (2) between 0-40 ft²/acre basal area of pines 10-14 in. DBH, (3) ≤ 10 ft²/acre basal area of pines < 10 in. DBH, (4) groundcover that is comprised of at least 40% herbaceous, pyrophytic species (5) hardwood midstory is nonexistent or sparse and less than 7 feet in height, (6) canopy hardwoods are either nonexistent or are 10% of canopy trees in longleaf forests or 30% in loblolly/shortleaf forests, (7) all habitat is within 0.5 miles of the cluster center, and (8) foraging habitat should not be separated by more than 200 feet of non-foraging areas. Although not always practicable, 50 % or more of the habitat managed for the recovery standard should be within ¼ mile of the cluster epicenter.

RCWs scale and probe bark on the trunks and limbs of living pine trees while foraging for insects. The amount of foraging area used by a group is dependant upon the quality of the habitat and population density. Research indicates that birds generally forage within one-half mile of the cluster (Service 2003a). RCW home ranges may vary seasonally and encompass 60 to 300 acres. Habitat typically consists of open pine and/or pine/hardwood forests. Although in some habitats RCWs will use smaller pine trees as foraging substrate (DeLotelle et al. 1987), they prefer pines greater than 10 inches in dbh (Service 2003a). Groups may forage on pines scattered through hardwood stands, but pure hardwood stands are of little value to the RCW (Conner and O'Halloran 1987). The highest populations of the birds occur on areas with active prescribed burning programs that control hardwoods. Many complex and interrelated factors, such as condition of the understory plant community, annual weather fluctuations, forest type, soils, physiographic province, season of the year, fire frequency and intensity are important in determining foraging habitat quality.

The RCW is territorial and defends its home range from adjacent groups (Hooper et al. 1982, Ligon 1970). Territories tend to be smaller in areas with few hardwoods, presumably because of higher quality habitat. Home range size is related to both habitat and demographic (e.g., group size and population density) variables (Hooper et al. 1982, Lennartz et al. 1987) and has been found to be inversely related to habitat quality (DeLotelle et al. 1987, 1995). Studies by Hardesty et al. (1997) and James et al. (2001) suggested that habitat structure, and not just the quantity of total resources, is an important determinant of home range size, territory quality, and reproductive success. The availability, quantity, and quality of foraging habitat affects RCW cluster status, group size, home range size, and reproductive success (Conner and Rudolph 1991, DeLotelle et al. 1987, 1995, Hardesty et al. 1997). Low-quality foraging habitat and large reductions in available foraging habitat can cause RCWs to abandon clusters, reduce fledging rates and disrupt social interactions (Conner and Rudolph 1991, DeLotelle et al. 1995, Jackson and Parris 1995).

Population dynamics

According to the RCW Recovery Plan, the recovery of the RCW is directly linked to the viability of discrete populations within selected southeastern states. Populations required for recovery are distributed among 11 recovery units based on physiographic region to ensure the representation of broad geographic and genetic variation in the species. Viable populations within each recovery unit, to the extent allowed by habitat limitations, are essential to recovery of the species as a whole. Until recently, most RCW populations were considered stable at best or declining. RCW population trends since the early 1990's are improving, with an estimated 5,627 active RCW clusters range-wide (Service 2003a). The species can be delisted when five criteria are met that establish a tier of populations within the 11 recovery units that contain sufficient suitable nesting and foraging habitat and are not dependent on the installation of artificial cavities to remain stable.

Long-term viability of an RCW population, in genetic terms, depends on the presence of an adequate number of breeding individuals for the natural processes that increase genetic variability (e.g., mutation and recombination) to offset the natural processes that decrease genetic variability (e.g., genetic drift and inbreeding). Additionally, any prediction of a population's viability should also consider the population's ability to survive population fluctuations due to demographic and environmental fluctuations (Koenig 1988) or natural catastrophes.

Reproductive rates, population density, and recolonization rates may influence RCW population variability more than mortality rates, sex ratios, and genetic viability. Therefore, dispersal of adult birds into breeding vacancies is essential for population persistence (Daniels et al. 2000, Schiegg et al. 2002).

Although the relationship between RCW population variability and density is not well understood, recent studies indicate spatial distribution of territories is important in long-term population stability. Conner and Rudolph (1991) found that, in sparse populations, RCW group size and the number of active clusters decreased as fragmentation increased. Hooper and Lennartz (1995) suggested that populations with less than 4.7 active clusters within 1.25 miles on average had critically low densities that inhibited population expansion. Results from a spatially explicit simulation model of RCW population dynamics suggest that population growth rate may depend more on the number and spatial distribution of territories, than on the initial composition of the population (Letcher et al. 1998). Achieving a self-sustaining population required fivefold more territories when territories were randomly spaced than when they were maximally clumped, and populations with as few as 49 territories were stable when those territories were highly aggregated. Populations of more maximally aggregated groups are likely to persist over the short term (i.e., 20 years) (Crowder et al. 1998).

Natural population growth (i.e., without recruitment clusters) occurs at extremely low rates (one to two percent per year) in this species (Walters 1991), and the availability of cavity trees is limiting (Copeyon 1990, Allen 1991). New groups or new territories arise by two processes, pioneering and budding (Hooper 1983). Pioneering is the occupation of vacant habitat by construction of a new cavity tree cluster and is relatively rare. Budding is the splitting of a territory, and the cavity tree cluster within it, into two. Budding is more common than pioneering in RCWs, since the new territory contains cavities from the outset (Service 2003a). Inactive clusters are important to maintaining extant populations of RCWs and may provide a short-term opportunity to enhance habitat available to RCWs and, thus, increase the number of groups in populations (Doerr et al. 1989). After a territory is abandoned for two or more years, however, it is almost never reoccupied (unless habitat is improved and maintained), typically because cavities are unsuitable due to deterioration or hardwood encroachment (Beckett 1971, Conner and Locke 1982, Copeyon et al. 1991).

However, the technology to create new territories at desired locations exists and management for optimum territory clumping is therefore possible (Letcher et al. 1998). Artificial cavities can be installed in unoccupied habitat that is otherwise suitable (Copeyon 1990, Allen 1991), with subsequent occupancy by dispersing birds, typically subadults (Carrie et al. 1999, Conner et al. 1999). Adding artificial cavities to sites already occupied increases group size (Carrie et al. 1999). Artificial cavities provide additional roosting opportunities for subadult males, encouraging them to remain in their natal clusters and potentially inherit the territory (Carrie et al. 1999). Females may also benefit when additional cavities are provided because they are the most subordinate members of the RCW social group and, therefore, may not always be able to secure adequate roost cavities. RCWs exhibit relatively low adult mortality rates; annual survivorship of breeding males and females is high, ranging from 72 to 84 percent and 51 to 81 percent, respectively (Lennartz and Heckel 1987, Walters et al. 1988, DeLotelle and Epting 1992).

Inducing the formation of RCW groups in restored habitat with artificial cavities is an established and successful technique (Copeyon et al. 1991, Walters et al. 1992, Gaines et al. 1995, Watson et al. 1995). Within two years of restoring habitat and providing artificial cavities at 20 unoccupied territories in the Sandhills of North Carolina, 90 percent of the sites were occupied by RCWs (Copeyon et al. 1991). Translocating RCWs is another method successfully used to establish new groups (Rudolph et al. 1992, Allen et al. 1993, Hess and Costa 1995, Costa and Kennedy 1994, Franzreb 1999). Translocation can include augmenting a solitary-bird group or translocating a pair of subadult RCWs (i.e., unrelated male and female (Costa and Kennedy 1994)). Franzreb (1999) found that 63.2 percent of translocated birds (including adults and juveniles) remained at the release site for at least 30 days and 51.0 percent reproduced.

Status and distribution

The RCW was listed as endangered due to documented declines in local populations and massive reduction in foraging and nesting habitat. The life history of RCWs is closely tied to the occurrence of fire-maintained old growth pine forests that once dominated the southeastern United States. Only three million acres of longleaf pine forest remain of the estimated 60 to 92 million acres once in existence (Frost 1993). Timber clearing for agriculture, short timber rotations and the suppression of fire has reduced the amount and quality of RCW foraging and nesting habitat.

At the time of listing, the total number of individuals had declined to less than 10,000 in widely scattered and isolated populations (Service 2003a). Most RCW populations (regardless of location or land ownership) were considered stable at best, but were more likely declining (Costa 1995). Costa and Escano (1989) documented RCW population declines in at least ten, and perhaps as many as 17, populations on National Forests. James (1995) estimated that the number of active clusters range-wide declined 23 percent between the early 1980s and 1990. Recently, numerous RCW populations have increased, particularly on Federal lands, as a result of management activities.

Currently, an estimated 14,068 RCWs inhabit 5,627 active clusters across 11 States in the southeast United States. National forests (NF), military installations, and national wildlife refuges (NWR) contain the majority of extant populations and most of the habitat that is potentially suitable for RCWs. Conservation of RCWs as a species will depend on prudent management of habitats on those federal lands. National forests support the majority of the core populations required for delisting of the species, and therefore, have a uniquely important role in the species' recovery. Prior to the 1980s, most populations on national forests were declining, but management efforts during the past decade, especially prescribed burning and cavity management, have stabilized most of those populations and led to increases in some (Service 2003a). Regardless of ownership, few if any populations can be sustained without active management (e.g. prescribed burning, midstory control, appropriate pine thinnings, cavity provisioning, etc.). Colonization of unoccupied habitat would be very slow without application of these activities.

The Service, in response to the apparent range-wide decline of the species on private lands, developed a private lands conservation strategy that has been aggressively implemented, modified as necessary based on new scientific findings, and regularly evaluated to ensure objectives are being achieved. The RCW recovery objectives of the private lands strategy are to

increase the acreage of private land habitat being managed for RCWs, maintain or increase the larger existing RCW populations on private lands, rescue RCW groups from private lands that would be lost as a result of demographic and/or genetic uncertainty, foster and develop cooperative partnerships between and among federal, State and private parties responsible for and/or interested in RCW recovery, and increase the size of designated recovery and support populations while pursuing those objectives (Costa 1995). To achieve those strategic objectives, the Service has implemented three types of agreements involving private landowners: Safe Harbor Agreements, Habitat Conservation Plans (HCPs) and “no-take” management plans implemented via Memoranda of Agreement (Costa 1995).

In North Carolina, the largest and most stable RCW populations are on federal lands: Fort Bragg Army Reservation (396 active clusters in 2004; plus 12 active clusters on Camp Mackall), Marine Corps Base, Camp Lejeune (81 active clusters in 2005) and the Croatan National Forest (60 active clusters in 2005). Smaller populations also exist on the Alligator River and Pocosin Lakes NWRs (eight active clusters in 2003) and the Dare County Bombing Range, maintained by the U.S. Air Force (five active clusters in 2006). At least eight landholdings belonging to the State of North Carolina support RCW populations.

Altogether, seven distinct RCW populations are found in NC. The five small populations of the Croatan National Forest, Marine Corps Base, Camp Lejeune, Holly Shelter Game Lands, Military Ocean Terminal Sunny Point and Alligator River/ Pocosin Lakes NWRs comprise the coastal region. The Sandhills region is composed of two meta-populations: Sandhills East and Sandhills West. In 2004, 629 or approximately eighty percent of North Carolina’s RCW clusters were located in the Sandhills region. The Primary Core population of Sandhills East, which includes Fort Bragg, contained 472 of these clusters. The Essential Support population of Sandhills West consisted of 157 clusters. These meta-populations were historically linked, but are now separated by a gap three to five miles across, and the rates of movement between the two are so low that they are now considered two separate populations (Walters et al. 2001).

The Service is managing an active and successful RCW Safe Harbor program for private landowners in the North Carolina Sandhills, covering all or parts of Cumberland, Harnett, Hoke, Moore, Richmond and Scotland counties. To date, lands that provide habitat supporting 59 baseline groups have been enrolled and the program has assisted in the creation of six new RCW groups. These six groups are not counted toward the regional recovery goal, however they are aiding in the persistence of the species.

RCWs on Camp Lejeune and Surrounding Areas

A summary of RCW status on Camp Lejeune is contained in the “Camp Lejeune 2006 RCW Recovery Plan,” Appendix H of the Revised INRMP. In 2005 Camp Lejeune contained a total of 86 RCW clusters, 81 of which were active and 71 occupied by potential breeding groups. Eighteen clusters are west of New River in the Verona/Dixon area. All other clusters are east of the New River on Mainside Camp Lejeune. G-10 Impact Area and Combat Town Management Areas contain some of 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. 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 2004. The Mission Compatible Recovery Goal of 173 active clusters established in the 1999 RCW Plan was based on a calculation of the number of acres containing pine or pine-hardwood forest present on Camp Lejeune in 1999 (approximately 36,922 acres). While Camp Lejeune has re-evaluated the distribution of potentially suitable RCW habitat on the landscape, the installation will maintain the previously established recovery goal of 173 active clusters. The Holly Shelter Gamelands managed by the North Carolina Wildlife Resources Commission currently contains 38 active clusters (Jenna Begier, pers comm.). Croatan National Forest contained 60 active territories in 2005 (Ralph Costa, pers comm.).

ENVIRONMENTAL BASELINE

This section describes the effects of past and ongoing human and natural factors leading to the current status of the species, its habitat, and ecosystem, within the Action Area. The environmental baseline is a “snapshot” of a species health at a specified point in time. It does not include the effects of the action under review in the consultation.

In 1979, the Service issued Camp Lejeune a jeopardy biological opinion based on a review of the installation’s forest management practices. The biological opinion provided reasonable and prudent alternatives that would enable Camp Lejeune to modify forest management into compliance with section 7 (a)(2) of the Act. Camp Lejeune implemented the forest management guidance outlined in the 1979 biological opinion and related correspondence. Management implemented by Camp Lejeune to remove jeopardy to the RCW included: extending rotation age for loblolly pine to 80 years; extending rotation age for longleaf and pond pine to 100 years; connecting clusters to a minimum of 200 acres of contiguous pine or pine-hardwood habitat; limiting regeneration stand sizes immediately surrounding clusters to 50 acres; and prescribe burning clusters at 2-3 year intervals (Service 1979).

The BA states that intensive RCW monitoring on Camp Lejeune began in 1986, when the base had 32 active clusters. Since that time, Camp Lejeune has seen this number grow by 161% to 81 active clusters in 2005. Camp Lejeune’s RCW population, in terms of active clusters, has grown an average of nine percent per year since 1990. This rate of growth is credited to increased growing season burns, lengthened timber rotation periods (more suitable habitat available), artificial cavity provisioning, and a demographic surplus of non-breeding RCWs on the population (Walter et al. 2000).

Implementation of the 1999 RCW Plan began in 2000. The 1999 RCW Plan and November 30, 1999 biological opinion established a mission compatible RCW goal of 173 active clusters. The 1999 RCW Plan emphasized intensive management of recruitment and replacement stands, protection of the oldest 1/3 of pine and pine-hardwood stands in RCW habitat management areas and proactive prescribed burning, midstory control and longleaf restoration in RCW habitat management areas. The 2001 INRMP (U.S. Marine Corps 2001) adopted the 1999 RCW Plan with some minor modifications. The 2002 document contained procedures to determine whether restoration sites would be true clearcuts or if these locations would retain some overstory trees (e.g. 6 – 10 trees per acre) for potential foraging or nesting habitat. Camp Lejeune consulted with the Service in October 2003 regarding interim forest management guidelines which limited the size of conversion sites to five acres, but removed the mandate to leave overstory trees post-harvest. The interim guidelines stated that loblolly pine regeneration methods would retain an

overstory of 40 ft² per acre and 60 ft² per acre the target for intermediate thins. For the interim guidelines, loblolly rotation age would remain 80 years and longleaf was 120 years. The Service concurred with Camp Lejeune's determination that adoption of the interim forest management guidelines were not likely to adversely affect the red-cockaded woodpecker in a letter dated November 14, 2003.

At the end of the 2005 nesting season, there were 86 active and inactive RCW clusters present on Camp Lejeune. Of those, 65 are marked and protected from specific activities. A total of 1,361.6 acres are thus subject to training restrictions. To comply with RCW conservation established through consultation with the Service, an installation regulation, Base Order P3570.1, was implemented. Accordingly, the following activities are permitted within marked clusters: Transient foot travel; Transient vehicular traffic on existing maintained roads and trails; and blank small arms firing. The following activities are not permitted within marked clusters: operation of any vehicle off designated roads/trails (except for emergency vehicles and wheeled fire fighting vehicles); cutting or damaging pines of any size; any earth-disturbing activity; bivouacking and setting up command posts; tree topping for antennas, girdling pine trees with communications wire, burying assault cable, climbing pine trees with gaffs; firing artillery within 656.1 feet (200 meters) of a cavity tree; removal of RCW warning signs; and, "taking" of RCWs. Reconstruction or maintenance of existing roads through clusters and recruitment stands is allowed if it is shown that such activities will not adversely affect RCWs and the activities are scheduled before or after the nesting season.

Status of the species within the action area (AA)

The condition of Camp Lejeune's RCW population is well described in the report entitled "The Biology and Management of the red-cockaded woodpecker on Marine Base Camp Lejeune, North Carolina: Progress toward Recovery under the New Management Plan," submitted to Camp Lejeune by Dr. Jeffrey R. Walters (Walters et al. 2005; 2005 Progress Report). The report summarizes the results of an eight year period of intensive monitoring (April 1997 through March 2005) that began in 1986. Between 1986 and 1991, the population was considered stable, ranging between 27 and 31 groups. In 1991, Camp Lejeune's RCW conservation began to include cavity management practices that complemented forest management for RCW habitat, including cavity provisioning and addition of restrictor plates to "cavity-limited" clusters (clusters containing less than four suitable cavities). Use of these conservation tools helped elevate the population from 27 groups in 1991 to 43 groups in 1996, a 59 % increase. Dr. Walter's report characterized the population's response to this cohesive forest and habitat management as "unprecedented."

In the 1999 RCW Plan, Camp Lejeune identified eight RCW Management Areas on the installation. The Northeast, G-10, Coastal Ranges and Duck Creek are located on the Main Base east of the New River. Verona Loop and Stone Creek management areas are on the west side of the river. The Cantonment Housing area straddles the New River on the central and northwestern portion of the installation. No active clusters occur in the Cantonment Housing Management Area. The recovery population objectives for Camp Lejeune do not require any groups to reside there and forest management in this area is not intended to provide suitable habitat for the RCW. Cluster distribution among the identified management areas and acreage of suitable and potentially suitable habitat is contained in Table 3.

Table 3: Total Number of Clusters and Number of Active Clusters in Camp Lejeune RCW Management Areas as of April 2006 (Information contained in the BA).

RCW Management Area	Total Number of Existing Clusters (active and inactive)	Number of Active Clusters 1996	Number of Active Clusters 2006	Population Goal (Number of Active Clusters)	Percent achieved
G-10	31	17	29	29	100%
Combat Town	17	12	15	23	65%
Northeast	22	6	20	44	45%
Verona Loop	13	4	11	33	33%
Coastal Ranges	2	1	2	7	28%
Duck Creek	3	1	2	16	12%
Stone Creek	8	3	7	21	33%
Sum:	96	44	86	173	

The 1999 RCW Plan and a contemporary monitoring report provide a description of Camp Lejeune's subpopulations in 1999 and 2000 (U.S. Marine Corps 1999, Walters et al 2000). At that time, the health of groups residing in the G-10 and Combat Town management areas were considered at their best possible condition. RCW numbers in the Northeastern part of Base had increased. The Northeastern, G-10, Combat Town and Coastal Range groups were confirmed as performing as a single demographic unit. Although the number of active clusters on the west side of the New River (Verona Loop and Stone Creek management areas) had increased from seven to eight between 1998 and 1999, those groups remained the most vulnerable due to their isolation from the rest of the population and their small size.

The following is excerpted from the 2005 Progress Report regarding the biological condition of Camp Lejeune's RCW populations:

"The reproductive parameters we monitored are given for each of the 5 years, compared to the mean value and range over the previous 14 year, in Table [4]. These parameters include 3 measures of nesting effort, the proportion of groups that attempt nesting, clutch size, and the proportion of groups whose first nest fail that reneest. They also include whole brood loss (proportion of first nests that fail) and partial brood loss (proportion of eggs that fail to become fledglings in successful first nests). All of these parameters varied considerably over the past 5 years, as they had previously. Which parameters were above average and which were below average are indicated for each of the 5 years in Table [5]."

Table [4]: Reproductive parameters, including proportion of potential breeding groups nesting (% nest), clutch size, proportion of first nests that fail (% fail), young produced per successful first nest (Young/successful nest), partial brood loss in successful nests, expressed as the proportion of eggs that did not become fledglings (Partial loss), the proportion of groups whose first nest failed that renested (% renest), and the number of fledglings produced per potential breeding group (Young/group), by year. The mean and range (in parentheses) of the annual value over the previous 14 years (1986-1999) are shown for comparison.

	1986-1999	2000	2001	2002	2003	2004
% nest	89.0% (0-21.4%)	85.4%	75.8%	92.5%	83.6%	98.6%
Clutch size	3.45 (3.13-3.76)	3.64	3.31	3.42	3.53	3.42
% fail	18.6% (7.7-32.4%)	4.3%	19.1%	19.4%	23.2%	24.6%
Young/successful nest	1.98 (1.58-2.20)	2.09	1.95	2.22	1.74	1.98
Partial loss	43.4% (33.3-53.8%)	43.8%	42.5%	35.6%	48.6%	42.8%
% renest	29.4% (0-85.7%)	100%	11.1%	58.3%	15.4%	35.3%
Young/group	1.5 (1.03-2.00)	1.72	1.21	1.84	1.13	1.59

High renesting effort (Table [4]) contributed to above average productivity in both 200 and 2002 (Table [5]), indicating that the persistence of conditions favorable to breeding was a factor in both years. The proportion of groups nesting was also above average in 2002m but not in 2000. Low rates of nest failure contributed to high productivity in 2000, whereas low rates of partial brood loss did in 2002. Very low nesting effort made 2001 a poor reproductive year (other parameters were average), whereas 2003 was a poor year because all aspects of reproduction except clutch size were below average (Table [5]). The proportion of groups nesting was very high in 2004, but productivity was only average due to a high rate of nest failure (Table [5]).

Table [5]. Entries indicate whether parameters for each year were much more positive than average (++), positive (+), average (0), negative (-), or much more than negative than average (- -). Parameters are defined in Table ([3]).

	2000	2001	2002	2003	2004
% nest	-	--	+	-	++
Clutch size	+	-	0	+	0
% fail	++	0	0	-	-
Young/successful nest	+	0	++	-	0
Partial loss	0	0	+	-	0
% renest	++	--	++	-	0
Young/group	+	-	+	--	0

We conclude that the reproductive performance of the population remains favorable. Reproduction appears to be driven by environmental factors that cannot be much influenced by management, and thus is one aspect that has not changed appreciably under the RCW Management Plan. This is not surprising, nor is it problematic, as it is clear that productivity does not drive population dynamics in this species..."

"Group size is a much better indicator of the health of the population than productivity, as it reflects the size of the helper class, and helpers are critical to population dynamics

because they buffer the population against periods of high mortality and low productivity...”

“The number of adults in the population increased along with the number of groups during the past five years, from 169 in 1999 to a peak of 243 in 2003... The increase in number of adults was roughly proportional to the increase in number of groups, as the mean group size remained about 3 birds per group during this period... Mean group size had been about 2.5 individuals per potential breeding group through 1994, and then increased to about 3.0 birds per group by 1998, where it has remained since... Group size peaked at 3.16 birds per group in 2003 but declined to 2.76 birds per group in 2004...”

“...Relatively large numbers of female floaters and helpers were present during the study, comprising about 30% of the adult females during the breeding season in the past 5 years ... Female helpers are uncommon in red-cockaded woodpeckers, and virtually absent in some populations, but comprised about 10% of the adult female population in the Camp Lejeune population during the past 5 years, with the exception of 2004. The proportion of female helpers declined slightly from the levels reported in the RWO47 Phase 2 (12% in 1998) and Phase 3 (19% in 1999) reports, presumably because initiation of recruitment cluster construction increased the number of breeding vacancies available to helper and floater females. Floaters were even more numerous than helpers, comprising about 20% of the adult female population, again with the exception of 2004...”

“...The large numbers of floaters and helpers of both sexes present throughout the study period indicate a thriving population. Indeed by most standards the Camp Lejeune population is the most vigorous population of the species in existence today. Thus the management employed in recent years has been successful in increasing not only size of the population, but also its health, as measured by the size of the non-breeding adult class, from which recruits to form new groups and counteract breeder mortality come.”

The 2005 Report also contains observations pertaining to population dynamics, mortality, and dispersal patterns. Only five dispersals have been documented between Camp Lejeune’s eastern and western subpopulations over 18 years of monitoring. Despite the steady growth seen at Camp Lejeune, only one bird has transferred between the east and west in the past five years. The report notes that four birds have immigrated into Camp Lejeune from the Croatan National Forest in 12 years and three of these in the past four years. Of interest in 2005 Report is the observation that the non-breeding class experienced a significant reduction that was seen in 2004. A report update entitled “An Experimental Study of the Impacts of Military Training Activities on Red-cockaded Woodpeckers on Marine Base, Camp Lejeune: 2005 Update” is contained in Appendix G of the INRMP. This updated report follows up in this event:

“We expressed some concern about trends in group size in our previous report (Walters et al. 2005) because group size, which had averaged more than 3.0 birds per group since 1998 and reached a peak of 3.16 birds per group in 2003, suddenly declined to 2.76 birds per group in 2004... In 2005 average group size increased to 2.92. This suggests the decline in group size may have been only a temporary aberration, and that group size may recover to its previous level.”

Currently, the Cantonment-Housing Management Area has no active RCW clusters. An abandoned cluster (Cluster 41) is located within the north-central portion of this area, and has been the subject of a previous consultation. Camp Lejeune identified this part of the installation as a high-priority area for facilities and infrastructure development in its 1999 RCW Plan. The 1999 RCW Plan included consideration of incidental take on up to five existing clusters on the eastern side of the G-10 Management Area for the construction and operation of the Mechanized Assault Course (MAC). However, the MAC was not constructed. Currently, all clusters within the eastern side of the G-10 Management Area are now considered part of the Environmental Baseline.

No active clusters are known to exist in the GSRA. The biological opinion rendered for the 1999 RCW Plan acknowledged that as many as 50 active clusters could form in the GSRA as a result of forest management activities. Incidental take was authorized for up to five active clusters that might have formed during the five years of the 1999 RCW Plan. The number of potential clusters that could be established in the GSRA was based on a habitat analysis that was performed in preparation of the 1999 RCW Plan. The BA for the Revised INMRP indicates that despite the heterogeneity of pine species and ecological communities present, the GSRA could potentially support more than 50 active clusters.

Factors affecting species environment in the action area

Forest Management

Until the initial implementation of the 1999 RCW Plan, Camp Lejeune's forest management for RCW conservation adhered to guidance contained in the Service's 1979 biological opinion. Management included: extending rotation age for loblolly pine to 80 years; extending rotation age for longleaf and pond pine to 100 years; connecting clusters to a minimum of 200 acres of contiguous pine or pine-hardwood habitat; limiting regeneration stand sizes immediately surrounding clusters to 50 acres; and prescribe burning clusters at 2-3 year intervals (Service 1979).

The Service promulgated standards for managing and assessing RCW foraging habitat supplemental to the 1985 RCW Recovery Plan (first revision) in 1989 (Henry 1989). These standards, referred to as the "bluebook" or "Henry Guidelines, established target foraging habitat parameters used to direct forest planning and to analyze impacts to RCW foraging habitat that might occur in the completion of proposed construction activities on the installation.

Following approval of the 1999 RCW Plan, Camp Lejeune began to intensively manage recruitment and replacement stands in 2000. The installation instituted protection of the oldest 1/3 age classes in pine and pine/ hardwood stands in RCW management areas. In 2002, Camp Lejeune consulted with the Service and implemented procedures to determine locations where longleaf restoration would result in true clear cuts and where some overstory pines would be retained. Following additional consultation with the Service in 2003, Camp Lejeune again modified its approach to longleaf conversion by limiting conversion sites to five acres but allowing complete clearcuts to occur in these small patches. Guidelines stated that loblolly pine regeneration methods would retain an overstory of 40 ft² per acre and 60 ft² per acre for intermediate thins. Loblolly rotation age remained at 80 years and longleaf was lengthened to 120 years.

Camp Lejeune operates an active and carefully planned prescribed burning program. Base-wide, about 93,000 acres of forest will receive some level of fuels management (Camp Lejeune 2006). The Base Natural Resources Division began using a prescribed burning prioritization model in fiscal year 2006. Burning is conducted with the primary focus on restoration of the landscape, to more closely mimic that of pre-settlement conditions. A description of the Prescribe Burning Prioritization Model can be found in Appendix N of the INRMP. The surface danger zone for the G-10 impact area is burned in a checkerboard pattern on a two year cycle. In order to maintain and improve the current training environment, while also working towards the goal of RCW recovery, the annual prescribed burning goal is 20,000-25,000 acres/year.

Military Training

Currently protected clusters are marked with single bands of white paint and signs identifying them as protected areas. Specific activities are prohibited within the marked areas including vehicular traffic off of established roads, digging foxholes, bivouacking or establishing other fixed positions, girdling trees with wire, burying cable, firing artillery within 600 feet of the cavity trees, and using anything that produces excessive disturbance (e.g. smoke generators, noise simulators, etc).

To stimulate RCW population growth and at the same time reduce training restrictions associated with RCW conservation, the 1999 RCW Plan authorized Camp Lejeune to designate half of new recruitment clusters (either naturally or artificially formed) as control clusters (marked and protected by the historic protection described above) and half as research clusters (not marked as described above; subject to typical military training within the cluster). This provision of the 1999 RCW Plan allowed the installation to build in an experimental research program to study the impacts of military training activities on the RCW. For the study, 22 recruitment clusters were artificially created; 11 controls and 11 research sites. Additionally, 16 new clusters naturally formed through budding and pioneering were integrated into the study. The 2005 update states:

“There is no indication in this preliminary analysis of large effects of military training activities on reproduction of red-cockaded woodpeckers. The trend was toward better performance in research clusters for some aspects of reproduction (proportion of recruitment clusters occupied, number of young fledged per successful first nest), and for others there was no clear trend (proportion of occupied recruitment clusters containing potential breeding groups; proportion of groups that attempted nesting). There was a trend toward poorer overall productivity in research clusters, but this difference did not hold in the last year of the study, and the differences observed were small. The only negative impact of reduced training restrictions in research clusters that may exist is increased nest failure, which could be caused by disturbance at nests. This does not have a noticeable impact on overall productivity however.”

The intent of the 1999 RCW Plan was to encourage growth in portions of the Base that were not high priority training zones. In accordance with the Service's November 30, 1999 biological opinion, Camp Lejeune was authorized to unmark three existing clusters in the Combat Town Management Area for inclusion in the military training study. Additionally, the 1999 RCW Plan

directed creation of new recruitment clusters to occur in the more sparsely populated areas (e.g., portions of Verona and the Northeast area; “low-priority training zones”).

Cluster Management

Twenty-two recruitment clusters were constructed following adoption of the 1999 RCW Plan and categorized: 11 control clusters and 11 research clusters. Each was comprised of four artificial cavities created using the drilling technique (Copeyon 1990). Additionally, Camp Lejeune adopted more rigorous standards for ensuring sufficient numbers of cavities are available within each cluster (e.g., pre-1997 breeding season, three good cavities, two of which are not enlarged, per cluster; now, four unenlarged, good cavities per cluster). Therefore, cavities were provisioned in many of the budded and pioneered clusters as well. The 2005 report states:

“...During the current study cavity excavation balanced cavity loss. The number of active, unrestricted, natural cavities increased from 92 in 1997 to 148 in 2004. However, the woodpecker population increased during this period as well, and the number of natural cavities per group did not increase: it was 2.04 in 1997 and 2.06 in 2004... The total number of cavities per group increased from just over 3 in 1997 to just over 4 by 1999, at which level it remained. This increase in total cavities was due to an increase in the number of artificial cavities from 1.2 in 1997 to 2 per group from 2000 on... This pattern clearly reflects the change in cavity management criterion.”

In summary, the primary factors affecting the species environment in the AA include forest management, military training, and cluster management. Lengthened timber rotations in pine stands have allowed the necessary foraging and nesting substrate to mature, enabling Camp Lejeune to foster RCW population growth into areas of the installation that previously had much lower population densities. Prescribed burning has been appropriately applied on the landscape to maintain the desired habitat characteristics within occupied habitat as well as to restore habitat in management areas where midstory presence likely discouraged habitat use by woodpeckers. Where population expansion occurred within high priority training zones (HPTZs), the 1999 RCW Plan enabled Camp Lejeune to investigate the aspects of RCW biology that might be the most vulnerable to training activities. These investigations are still ongoing. Since the study design calls for one half of the newly formed clusters in training areas to be designated as research clusters, population growth has had half the impact on the military training mission thus far than it would without the plan. The process of forming new recruitment clusters through provisioning drilled cavities has had a beneficial affect on the number of potential breeding pairs. Group size and overall survival of individuals have been supported by cavity management conducted in newly formed and “cavity-limited” clusters.

Implementation of the INRMP is expected to further enhance these beneficial effects on RCWs and their habitat within the AA. The collaborative efforts by the land management authorities on Camp Lejeune to maintain appropriately distributed, potential foraging habitat within the AA are expected to have a long-term, positive influence on the species. These factors have implications for RCWs within the AA as well as for the survival and recovery of the Mid-Atlantic Coastal Plain Recovery Unit, which will be analyzed in the next section of the Biological Opinion.

EFFECTS OF THE ACTION

Factors to be considered

In the 1999 RCW Management Plan, Camp Lejeune, in consultation with the Service calculated the installation's Mission Compatible Recovery Goal (MCRG) to be 173 active clusters. In developing Camp Lejeune's revised RCW Management Plan which is a component of the new INRMP, the MCRG remains unchanged. Under the revised INRMP, the installation would undertake activities to maintain and enhance habitat (i.e., foraging habitat, cavity trees, and potential cavity trees) within occupied RCW territories as well as foraging partitions designated to support recruitment clusters. Management will be guided by the Recovery Standard, as expressed in the RCW Recovery Plan. Specifically, Camp Lejeune will conduct forest management practices that will change or maintain forest structure in a form resembling "good quality foraging habitat:" a. There are 18 or more stems/acre of pines that are > 60 years in age and 14 inches diameter-at-breast-height (DBH). Minimum basal area for these pines is 20 ft²/acre. Recommended minimum rotation ages apply to all land managed as foraging habitat. b. Basal area of pines 10 – 14 inches DBH is between 0 and 40 ft²/acre. c. Basal area of pines < 10 inches DBH is below 10 ft²/acre and below 20 stems/acre. d. Basal area of all pines > 10 inches DBH is at least 40 ft²/acre. That is the minimum basal area for pines in categories (a) and (b) above is 40 ft²/acre). e. Groundcovers of native bunchgrass and/or other native, fire-tolerant, fire dependent herbs total 40 percent or more of ground and midstory plants and are dense enough to carry growing season fire at least once every five years. f. No hardwood midstory exists, or if a hardwood midstory is present it is sparse and less than 7 feet in height. g. Canopy hardwoods are absent or less than 10 percent of the number of canopy trees in longleaf forests and less than 30 percent of the number of canopy trees in loblolly and shortleaf forests. Xeric and sub-xeric oak inclusions that are naturally existing and likely to have been present prior to fire suppression may be retained but are not counted in the total area dedicated to foraging habitat. h. All of this habitat is within 0.5 miles of the center of the cluster, and preferably, 50 percent or more is within 0.25 miles of the cluster center. i. Foraging habitat is not separated by more than 200 feet of non-foraging areas. Non-foraging areas include (1) any predominantly hardwood forest, (2) pine stands less than 30 years in age, (3) cleared land such as agricultural lands or recently clearcut areas, (4) paved roadways, (5) utility rights of way, and (6) bodies of water.

The 1999 RCW Plan directed new recruitment cluster formation to be focused in sections of the installation identified as low priority training zones, leaving natural cluster formation (budding or pioneering) as the primary way in which new clusters would be produced in HPTZs. In the new INRMP, controlling growth of the woodpecker population within the HPTZs would no longer be a main objective. The proposed INRMP revision would promote creation of new recruitment clusters within areas designated as "High-Use Training Areas" in the revised INRMP. An increasing proportion of newly formed clusters will be unmarked and will be subject to take associated with typical military training activities. For example, at 75 active clusters, 35% would be unmarked. At 150 active clusters, the installation would be authorized to have 65% unmarked. All clusters may be unmarked when the population reaches 173 active clusters.

Camp Lejeune will continue to intensively monitor all RCW clusters for effects of military training impacts. The monitoring strategy prescribed in the revised INRMP will ensure that clusters will be tracked after training restrictions are removed. Camp Lejeune may reinstate

some training restrictions as necessary to protect certain clusters if they are subject to extensive impacts.

Proximity of the action: Forest management activities (e.g. stand thinnings, longleaf pine restoration, prescribed burning, etc.) may occur within any existing clusters, foraging partitions, proposed new recruitment clusters and interstitial stands between management areas. Military training will occur throughout all management areas, partitions, and interstitial foraging habitat as well as within varying proportion of new clusters that bud, pioneer or are artificially created within 16 training areas identified in the INRMP, totaling about 14,042 acres of suitable and potentially suitable habitat.

Distribution: The installation contains 86 active and inactive RCW clusters distributed through seven RCW management areas. These management areas comprise 37,337 acres of pine-dominated forest on Camp Lejeune. Forest management intended to benefit RCW conservation would occur through out this acreage. Training activities would occur within any new clusters that form within the HUTAs, which will represent about 14,042 acres of suitable and potentially suitable habitat.

Timing: All forestry activities with the potential to disrupt woodpecker nesting within clusters will be scheduled before or after the RCW nesting season. Habitat improvement activities (e.g., mechanical hardwood control) within clusters will also be restricted during the nesting season, unless such activity during the nesting season is necessary for the continued survival of the RCW group. Prescribed burning within clusters may occur within the nesting season. Normal training activities may occur within unmarked clusters during any season.

Nature of the effect: The INRMP would promote long-term management of existing RCW groups and lays out the installation's strategy for maintaining or increasing RCW population growth rates. Forest management will integrate guidance contained in the RCW Recovery Plan (Recovery Standard) and will include partition level timber management, adaptive prescribed burning models, reforestation techniques that minimize impacts to native ground cover, and scientifically-directed conversion of offset pine species to longleaf pine.

All RCW clusters subject to training restrictions will continue to be marked in accordance with Camp Lejeune's current marking system (e.g., "...marked with... perimeter trees [painted] with white bands approximately one foot wide, four to six feet from the base of the tree. Warning signs 12 inches X 12 inches...posted at reasonable intervals facing the outside of clusters along roads, firebreaks, and other likely entry points into clusters" (U. S. Marine Corps 2006). However, training restrictions within the marked areas will be relaxed to conform to the Army-wide Guidelines (USACERL 1997). Military training will be evaluated in proximity to unmarked clusters to determine any significant effects these activities may have on the species. The revised INRMP would promote RCW conservation, including new formation of clusters within HUTAs, though new clusters that are created in these areas after the INRMP is implemented will be unmarked.

Duration: The revised INRMP is intended to direct natural resource management, including forestry and RCW habitat management for five years. However, pursuit of the objectives identified in the revised INRMP is anticipated to be long term in nature, with implementation occurring over a number of years. Forestry practices commenced or implemented during the

period in which this INRMP is effective may not be completed within the next five years. Such activities may be carried on in future INRMP revisions or modified as necessary in consultation with the Service. Camp Lejeune would continue its population monitoring under this plan. In addition, a research and monitoring program would be conducted to quantify the effects of training on RCWs and to determine the appropriate level of training and activity restrictions necessary to realize the objectives of this plan. The results of monitoring and research would provide considerable information concerning the success of management and protective measures proposed in this plan. This information in turn would be used interactively to guide future management and protective measures across the installation.

Since RCW management technology and Camp Lejeune training requirements may change over the life of this plan, both agencies (Camp Lejeune and the Service) recognize that modifications to the plan, based on reevaluation of management strategies, their effectiveness, and the status of research clusters, may be required. As indicated in the plan, both agencies would work together in a cooperative framework to implement such changes, as they arise, to meet RCW recovery efforts and national defense training requirements. As proposed, the Service would meet annually with Camp Lejeune to fine-tune technical aspects of the plan, discuss research findings and new technologies in RCW management and military training, and to introduce new natural resource managers working on implementation of the plan. A formal review meeting would take place every five years for the purpose of examining the major tenets of the plan.

Analyses for the effects of the action

The Service considered the beneficial effects and the direct and indirect adverse effects of implementing the revised INRMP on RCWs. Direct effects encompass the direct and immediate effects of the project on the species. Indirect effects are caused by or result from the proposed action, occur later in time, and are reasonably certain to occur. The impacts discussed below are the result of direct and indirect effects of the proposed action. The Service has determined that there are no interrelated or interdependent actions apart from the action under consideration.

Beneficial effects: Overall, the effects of the revised INRMP's implementation are anticipated to be beneficial for the RCW. The plan would retain the originally projected MCRG of 173 active clusters (currently the installation contains 86 active clusters). Recruitment clusters will be created within the HUTAs including areas that were designated in the 1999 RCW Plan as High Priority Training Areas. This will allow the installation to more easily expand local subpopulations, thereby maintaining a growth rate close to or exceeding the desired rate for recovery populations expressed in the RCW Recovery Plan (5%/year).

The revised INRMP will direct forest management to focus on the need for timber stands to be assessed at the RCW foraging habitat partition-level in addition to the historical compartment-level. Although foraging partitions and forest management compartments overlap each other, they were generated for different purposes. Compartments are created to delineate groups of timber stands into silviculturally manageable units. Foraging partitions are used to identify the most likely distribution of suitable and potentially suitable foraging habitat that might be used by a group of RCWs residing in a given territory. Historically, Camp Lejeune's forest management compartments have been treated on a 10-year cycle. The new focus of the revised INRMP will enable Camp Lejeune to treat partitions in urgent need of management such as those likely to be occupied by RCWs in the short term, to be addressed outside of the 10-year prescription cycle.

In implementing the INRMP, Camp Lejeune proposes to mechanically control hardwoods on 600 acres annually within suitable and potentially suitable RCW foraging and nesting habitat on the installation. This practice will allow Camp Lejeune to convert pine stands with dense, tall midstory components into suitable habitat in a relatively short amount of time. Additionally, once mechanical control is done, prescribed fire can be applied safely in areas where the risk of crown fires would otherwise be too great.

Prescribed burning will continue to be the primary technique for maintaining midstory control in RCW foraging and nesting habitat. To maintain and improve the current training environment, and while also working towards the RCW recovery goal, Camp Lejeune's annual prescribed burning objective will be 20,000 to 25,000 acres per year during the five-year period covered by the revised INRMP.

Hardwood presence that would otherwise be unlikely to be controlled by prescribed burning within partitions and clusters will be managed through employment of mechanical methods (e.g. feller buncher or hydro axe/mower); manual methods (e.g. chainsaw, brush hooks, etc); herbicides (applied by injection, hypo-hatchet, hand sprayer, etc); or a combination of these methods. Midstory will be implemented within at least ten acres of each cluster, including a 50-foot radius of all active and inactive cavity trees. No more than 10 % of the canopy trees will be comprised of hardwoods in treated locations. The revised INRMP will prioritize hardwood midstory management in the following order: 1) active clusters, 2) inactive clusters and provisioned recruitment clusters, 3) future recruitment stands, and 4) foraging habitat.

Direct effects: Approximately 14,042 acres of forested land will be managed for RCW habitat in the HUTAs. New RCW clusters that form in the HUTAs will not be marked. Typical training activities (e.g., see list of authorized and prohibited activities contained in Table 1) would be allowed within clusters and within 50 feet of active cavity trees for unmarked clusters. Additionally, restrictions on training activities will be removed from an increasing proportion of clusters as the RCW population grows.

Although no known active clusters or territories are contained within the GSRA, forest management could provide suitable habitat which may become occupied by RCWs at some point in the future. The BA states that the GSRA contains about 23,111 acres of woodland forested in southern yellow pines that could potentially support at least 50 active clusters. Any new clusters that form in the GSRA may be affected by military training, facilities development and forest management practices.

One immediate effect of growing season fire is the destruction of nests. However, for species associated with southeastern pine habitats, the benefits of prescribed burning far outweigh the occasional loss of nests (USFWS 2003a). Camp Lejeune

Indirect effects

Prescribed burning can indirectly affect RCWs by killing and/or injuring cavity trees, either making them immediately, or eventually rendering them, unsuitable for RCWs. Controlled burns also could result in crown fires, killing pine trees that comprise foraging habitat within RCW partitions.

There are situations when following the requirement to provide foraging habitat at the recommended levels may indirectly adversely affect RCW, over the short-term, by conflicting with other management activities deemed necessary to benefit the RCW over the long-term. Those situations include thinning pine stands, reducing southern pine beetle risk, encouraging advanced regeneration, improving quality of foraging habitat, and restoring off-site species to longleaf pine. Potential adverse affects on RCWs, caused by going too far below the foraging habitat standards when implementing actions to address one of the situations discussed above, will be avoided by adhering to the standard for managed stability guidelines described in Appendix 5 of the Recovery Plan (USFWS 2003a).

New clusters that develop or are provisioned in the HUTAs will be free from restrictions on training associated with RCW conservation. Additionally, the revised INRMP includes a strategy by which Camp Lejeune will remove training restrictions on an increasing proportion of active clusters as the number of active clusters increases. As training restrictions are lifted, there is the potential for habitat degradation within clusters due to greater impact from vehicles and from prolonged occupation. Heavier impacts within clusters may lead to reduced density of desired groundcover, which may reduce the ability of that site to carry fire, which in turn may favor undesirable shrubs and hardwoods.

The list of allowed and prohibited activities within marked clusters would be modified to allow a greater range of activities within the cluster to take place. Because only the cavity trees will be buffered within protected sites there is the potential for increased soil compaction, rutting, and root damage around non-cavity trees, which may lead to reduced survival of the non-cavity trees within the cluster. This reduced survival rate may have an impact on the future cavity trees available to a cluster. Finally, the increased disturbance may lead to reduced survival of longleaf pine seedlings within the cluster site, further limiting potential future cavity trees.

Species Response to the Proposed Action

As of April 2006, the AA contained 96 RCW clusters, 86 of which were active. All currently existing territories would be affected by prescribed burning and forest management activities. Adoption of the revised list of authorized training activities that apply within marked clusters would affect all marked clusters (n = 65; 1,361.6 acres). Currently existing clusters contained within the HUTAs would likely experience the greatest effect (if any) from changes in the types of activities that would be permitted within marked clusters (n = 35) since the proposed designation of the HUTAs is to benefit ground training.

The proposed project is intended to benefit the RCW on Camp Lejeune by enhancing RCW habitat quality to conform to the Recovery Standard, with the intention of attaining a MCRG which is essential to the recovery of the species. The strategies of removing training restrictions as the population reaches the established milestones, and promoting population growth within high-use training areas through the establishment of unmarked clusters, are intended to remove a disincentive to such growth in areas that have high RCW habitat potential but are also highly valued locations for ground training.

Camp Lejeune determined its Mission Compatible Goal by considering the acreage and distribution of suitable pine and pine/hardwood stands, military training, operational, and

infrastructural requirements, and biological needs of the red-cockaded woodpecker in the Atlantic Coastal Plain population. The MCRG, 173 active clusters, was adopted in the 1999 RCW Plan and remains the standard the installation intends to achieve through implementation of the revised INRMP.

Overall, implementation of the revised INRMP should facilitate Camp Lejeune's attainment of the MCRG. Provisioning planned recruitment clusters, combined with any new natural occurrences of budded and pioneered clusters are expected to sustain population growth on the installation. Based on the average population growth rate of Camp Lejeune's RCW population, as many as 45 new groups could be formed by the year 2011. As many as 19 new active clusters could form within the HUTAs during the next five years. Recent monitoring of training impacts within the Camp Lejeune training areas involving 22 recruitment clusters and 14 naturally budded or pioneered clusters over four years (Walters et al 2005) found little difference between occupation of marked, protected clusters and unmarked clusters. The research conducted during the four year study didn't detect any large effect of military training on RCW reproduction. There is a potential for nest failure associated with disturbance at nests to occur, but the study suggested this would not affect overall productivity.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, Tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

Actions adjacent to Camp Lejeune, such as resource extraction operations, urban development, and associated activities, will all continue to reduce and degrade available habitat, creating island populations of RCWs on Federal land. Conversely, Camp Lejeune's continued role in community-related conservation partnerships such as the Onslow Bight may help reduce the likelihood for this to occur. Currently, there is no State or private land within the action area considered in this consultation. Consequently, the Service did not identify any State or private activities that are reasonably certain to occur within the action area that would constitute cumulative effects.

CONCLUSION

After reviewing the current status of the RCW, the environmental baseline for the action area, the effects of implementing the revised INRMP, the effects of the minimization measures offered in the BA and the cumulative effects, it is the Service's biological opinion that the revised INRMP, as proposed, is not likely to jeopardize the continued existence of the RCW. No critical habitat has been designated for the RCW, therefore none will be affected.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulations pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly

impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, carrying out an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to, and not intended as part of, the agency action is not considered to be a prohibited taking under the Act, provided that such taking is in compliance with the terms and conditions of this incidental take statement.

The measures described below are non-discretionary, and must be undertaken by Camp Lejeune so that they become binding conditions of any grant or permit issued to Camp Lejeune, as appropriate for the exemption in section 7(o)(2) to apply. Camp Lejeune has a continuing duty to regulate the activity covered by this incidental take statement. If Camp Lejeune (1) fails to assume and implement the terms and conditions or (2) fails to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permits or grant documents, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, Camp Lejeune must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement. [50 CFR §402.14(1)(3)]

AMOUNT OR EXTENT OF TAKE ANTICIPATED

In meeting the provisions for incidental take in Section 7(b)(4) of the Act, the Service has reviewed the best available information relevant to this proposed action. Based on this review, which included discussions with Camp Lejeune staff, the Service believes that implementation of the revised INRMP may result in the following levels of incidental take for the five-year period 2007 through 2011:

(1) six groups in the cantonment area; note that these groups currently do not exist. This take would be in the form of harass, e.g., change in group status (i.e., potential breeding group to solitary male) or reductions in reproductive output as a result of military training activities, or harm, e.g., loss of the group related to degradation or loss of nesting or foraging, due to mission-related construction activities that occur in the cantonment area.

(2) five groups in the GSRA; note that these groups currently do not exist. This take would be in the form of harass, e.g., change in group status (i.e., potential breeding group to solitary male) or reductions in reproductive output as a result of military training activities, or harm, e.g., loss of the group related to degradation or loss of nesting or foraging due to mission-related construction activities that occur in the GSRA.

Additionally, the Service believes that the following levels of incidental take may result annually:

(3) up to 10% of the total number of new groups formed naturally or artificially (i.e., via recruitment clusters) in HUTAs: i.e., a maximum of two groups (10% of 19) during the 5-year period; note that these groups currently do not exist. This take would be in the form of: (a) harass, e.g., change in clusters status (i.e., active to inactive), change in group status (i.e., potential breeding group to solitary male), or reduction in reproductive output, as a result of military training activities, or (b) harm, e.g., destruction of a cavity tree due to damage from

military training activities.

(4) up to 10% of the total number of clusters de-marked in accordance with the installation's attainment of population milestones; i.e., a maximum of five (~10% of 45) during the five-year period. This take would be in the form of: (a) harass, e.g., change in clusters status (i.e., active to inactive), change in group status (i.e., potential breeding group to solitary male), or reduction in reproductive output, as a result of military training activities, or (2) harm, e.g., destruction of a cavity tree due to damage from military training activities.

(5) Two active cavity trees may be lost to harm, e.g., destruction of a cavity tree due to damage from prescribed burning or wildland fire management.

In summary, the Service anticipates incidental take for up to 18 RCW groups (six-cantonment, five- GSRA, two-HUTA, five-de-marked) during the five-year period of this INRMP revision. No loss of active clusters due to fire management is anticipated.

The Service acknowledges the possibility that management, research, and monitoring activities for the RCW could result in a low incidence of take. Most of these activities would be undertaken by Camp Lejeune staff or academic researchers who would be fully covered under Section 10(a)(1)(A) permits, which are the subject of separate actions. The loss of RCW cavity trees as a result of prescribed burning is an exception, however. The Service believes that with the proper precautions, the likelihood of actually causing a lethal take of RCWs through prescribed burning is very low. In fact, prescribed burning is necessary in most cases to avoid the loss of RCW groups due to habitat degradation. Since take was specifically requested by Camp Lejeune for prescribed burning activities, the Service has estimated that this take would not exceed the loss of two active cavity trees over the five years following implementation of the revised INRMP. No other sources of incidental take are anticipated during the five years the revised INRMP is implemented.

EFFECT OF THE TAKE

The potential taking of RCWs within unmarked clusters will not reduce the number of currently existing active clusters on Camp Lejeune. Management, research, and monitoring activities for the RCW on Camp Lejeune are necessary for the maintenance and expansion of the RCW population. Incidental take of the RCW from these activities is anticipated to be very low and would be offset by their beneficial affects. In the accompanying biological opinion, the Service determined that the above-estimated level of anticipated take is not likely to result in jeopardy to the species.

REASONABLE AND PRUDENT MEASURES

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize the impacts of incidental take of RCWs.

1. Avoid damaging, destroying, or felling pine trees in size and age classes that serve as foraging or potential nesting substrate within unmarked clusters and minimize tree loss in unmarked clusters, except as prescribed silviculturally to enhance RCW habitat.

2. Inspect and monitor all unmarked (including de-marked) clusters and collect demographic information relative to RCWs and military training activities pursuant to the proposed monitoring program.
3. Whenever prescribed burning will take place in the vicinity of active RCW clusters or recruitment clusters, Camp Lejeune personnel will take appropriate measures to protect cavity trees prior to general ignition of the burn unit. Motorized and heavy equipment use in RCW clusters will be minimized to the greatest extent possible during burning operations.
4. Following prescribed burning activities, Camp Lejeune will inspect all active RCW clusters. If any RCW cavity trees are found to be damaged to the point that they can no longer be used, Camp Lejeune will replace that tree by creating an artificial cavity in close proximity as soon as qualified personnel can be mobilized and on the site.
5. Prior to construction within the cantonment areas and GSRA, conduct surveys of suitable habitat for the presence of RCWs.

TERMS AND CONDITIONS

In order to be exempt from the prohibitions of section 9 of the Act, Camp Lejeune must comply with the following terms and conditions, which implement the reasonable and prudent measures, described above and outline required /monitoring requirements. These terms and conditions are non-discretionary.

1. [RPM (1)] Ensure, via all required environmental training programs at Camp Lejeune, that specific emphasis is placed on the importance of protecting all natural and artificial RCW cavity trees.
2. [RPM (2)] A report form (supplied by the Service), containing the results of all monitoring and reporting requirements will be provided to the Service by January 31 of each year. This report will be provided to the Service's Raleigh Field Office, Southeast Regional Office, and RCW Recovery Coordinator at the Clemson Field Office:

U.S. Fish and Wildlife Service
Raleigh Field Office
Post Office Box 33726
Raleigh, North Carolina 27636-3726

U.S. Fish and Wildlife Service
Division of Endangered Species
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3. [RPM (3)] For all active RCW clusters and recruitment clusters, Camp Lejeune personnel will utilize raking or other means to remove all live and dead fuel for a distance of 10 feet from active cavity trees in order to protect them prior to prescribed burning. Other measures including back burning around cavity trees will be utilized as necessary in advance of the general ignition.

4. [RPM(4)] Post burn monitoring will take place in all active RCW clusters following prescribed burning activities. If any cavity trees are damaged to the point that they can no longer be used, Camp Lejeune will replace that tree by creating an artificial cavity in close proximity as soon as qualified personnel can be mobilized and on the site. Every effort will be put forth to keep mobilization time to less than 48 hours.
5. [RPM(5)] The taking of any currently existing clusters, if discovered by surveys on GSRA, will require further Section 7 consultation prior to any activities which could affect them.

The Service believes that in the five years following plan implementation, no more than 18 RCW groups will be incidentally taken as a result of the proposed action. This includes five potential future clusters that may be naturally formed within the GSRA and six that may occur in the housing and main cantonment area. The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action. If, during the course of the action, this level of incidental take is exceeded, such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided. The Federal agency must immediately provide an explanation of the causes of the taking and review with the Service the need for possible modification of the reasonable and prudent measures.

Upon locating a dead, injured, or sick individual of an endangered or threatened species, initial notification must be made to the Clemson Field Office. Additional notification must be made to the Raleigh, North Carolina, Ecological Services Field Office. Care should be taken in handling sick or injured individuals and in the preservation of specimens in the best possible state for later analysis of cause of death or injury. All procedural and reporting requirements as outlined in the Service's region-wide biological opinion on monitoring and management (Service 2003b) will be followed.

These reasonable and prudent measures, together with their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action. The Service believes that no RCWs will be incidentally taken. If, during the course of the action, this level of incidental take is exceeded, such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided. The Federal agency must immediately provide an explanation of the causes of the taking, and review with the Service the need for possible modification of the reasonable and prudent measures.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. The recommendations provided here relate to the proposed action only and do not necessarily represent complete fulfillment of the agency's Section 7(a)(1) responsibility for the species.

1. Prior to unmarking currently marked clusters, document the present condition of native grass and forb groundcover within the marked areas where the greatest amount of training access is anticipated as well as within marked clusters where the highest levels of ground disturbance are expected. This process could involve: (a) development of a standardized method of describing the quality, quantity and distribution of native grass and forb groundcovers that are associated with the good quality habitat for the RCW, and/or (b) establishment and documentation of permanent photo plots, focusing on the state of ground cover within clusters.
3. As vegetation management practices such as prescribed burning are undertaken in habitat containing known rough-leaved loosestrife and golden sedge populations, monitor those populations to develop an integrated vegetation management effort that maximizes the benefit to all federally-listed species.

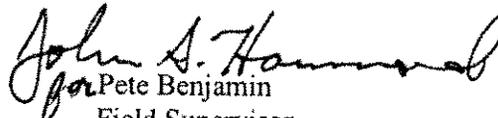
In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, the Service requests notification of implementation of any conservation recommendation.

REINITIATION NOTICE

This concludes formal consultation on the action outlined in the May 16, 2006, request. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Camp Lejeune involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species not considered in this opinion; or, (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operation causing such take must cease pending reinitiation of consultation.

The Service greatly appreciates the cooperation of Marine Corps Base, Camp Lejeune during this consultation. We have assigned our log number Service FWS Log # 2006-I-0182 to this consultation; please refer to it in any future correspondence concerning this project. If you or your staff have any questions concerning this BO, please contact Mr. John Hammond of the Raleigh Field Office at (919) 856.4520 extension 28, or via email at john_hammond@fws.gov.

Sincerely,


for Pete Benjamin
Field Supervisor

cc: FWS, Atlanta, GA (ES/TE)
Ralph Costa, FWS, Clemson, SC

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Glossary of Terms

Active cavity	A completed cavity or start exhibiting fresh pine resin associated with cavity maintenance, cavity construction, or resin well excavation by red-cockaded woodpeckers.
Active cavity tree	Any tree containing one or more active cavities.
Active cluster	A cluster containing one or more active cavity trees.
Augmentation	Increasing the size of a population by translocating individuals between populations.
Basal area	The area of a horizontal cross section of a tree's stem, generally measured at breast height.
Breeding dispersal	Movement of individuals between consecutive breeding locations.
Budding	One of two processes of new group formation in red-cockaded woodpeckers (see also pioneering), referring to the splitting of one territory into two.
Canopy	The uppermost layer of foliage in a forest or forest stand.
Captured cluster	A cluster that does not support its own group of red-cockaded woodpeckers, but contains active cavity trees in use or kept active by birds from a neighboring cluster.
Clearcut	An area in which all trees have been removed in one cutting.
Cluster	The aggregation of cavity trees previously and currently used and

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defended by a group of woodpeckers, or this same aggregation of cavity trees *and* a 61 m (200 ft) wide buffer of continuous forest. Here, the second definition is used. For management purposes, the minimum area encompassing the cluster is 4 ha (10 ac). Use of the term "cluster" is preferred over colony because colony implies more than one nest (as in colonial breeder).

Cluster, active	See active cluster.
Cluster, captured	See captured cluster.
Coastal Plain	In the United States, an ecoregion or physiographic province located near the Atlantic Ocean or Gulf of Mexico.
Cooperative breeding	A breeding system in which one or more adults assist a breeding pair in rearing of young. These extra adults, called helpers, delay their own dispersal and reproduction and are generally related to the offspring of the breeding pair.
Dispersal	Movement of individuals from natal to first breeding location (natal dispersal), or between consecutive breeding locations (breeding dispersal).
Ecoregion	A system of classification based on physiography.
Effective population size	The size of the ideal, hypothetical population in which all individuals mate randomly and all contribute equally to reproduction. Variation in reproductive success and other processes in a real population affect how many genes are conserved in subsequent generations. The concept of effective population size is used to control for the effects of such processes when discussing genetic conservation.
Environmental stochasticity	Random changes in environmental conditions and their effects on populations.
Even-aged management	A silvicultural method designed primarily for timber production, in which all trees in a stand are of one age/size class. The forest is regulated by developing equal areas in each age/size class.
Extirpation	Loss of a population or all populations within a specified region.
Flatwoods	Mesic pine communities on the Gulf and Atlantic Coastal Plains with a well-developed woody shrub or midstory layer.

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Floater	An adult bird not associated with a breeding group.
Forb	A herbaceous plant that has broad leaves; not a grass.
Fragmentation	Habitat loss that results in isolated patches of remaining habitat.
Gene flow	The movement of genetic material among populations or within a population.
Genetic drift	Random sampling of genetic resources within a population from one generation to the next. In populations of finite size, this sampling will always result in loss of variation. In populations of large size, such loss may be offset by new variation arising through mutation.
Genetic stochasticity	Random changes in gene frequencies.
Group	The social unit in red-cockaded woodpeckers, consisting of a breeding pair with one or more helpers, a breeding pair without helpers, or a solitary male.
Habitat selection	Use of a resource above what is expected based on the availability of that resource.
Heartwood	The inner, un-living, inactive core of a tree.
Helper	An adult that delays its own reproduction to assist in the rearing of another breeding pair's young. Typically, helpers are related to the breeding pairs that they assist.
Herbs	Grasses and forbs.
Herbaceous	Non-woody.
Heterozygosity	Genetic diversity within an individual or population, as measured by the proportion of loci containing two different alleles.
Home range	The area supporting the daily activities of an animal, generally throughout the year.
Homozygosity	Genetic similarity within an individual or population, as measured by the proportion of loci containing two identical alleles.

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Immigration	Movement of one or more individuals into a population.
Inbreeding	Mating between relatives.
Inbreeding depression	Loss of fitness due to the increase in homozygosity that results from inbreeding.
Increasing population trend, recommended rate of	Five percent increase in active clusters from one year to the next.
Kleptoparasitism	Theft by one species of resources procured by another species, resulting in positive effects for the parasite and negative effects for the species being parasitized. Generally this term is applied to theft of food, but has recently been expanded to include theft of spatial resources.
Local adaptation	Traits conferring higher fitness in a local environment.
Metapopulation	A set of interacting populations.
Midstory	A layer of foliage intermediate in height between canopy and groundcover, litter layer, or soil surface.
Mission Compatible Goal	A military installation's known capacity to integrate RCW management with on-going/planned mission requirements, determined in consultation with the Service.
Mitigation	Reduction of negative impacts.
Mutation	A heritable change in a DNA molecule.
Natal dispersal	Movement of individuals from their place of birth to their first breeding location.
Partition	The geographic area, potentially extending out to a one half-mile radius from the center of a cluster, in which habitat is managed to support an RCW group. A partition boundary will not reach out to a half-mile where it abuts the partition of another cluster with an epicenter less than one mile from the first cluster.
Pioneering	One of two processes of new group formation in red-cockaded woodpeckers (see also budding), by which a group colonizes previously unoccupied areas. Because of the difficulty of cavity excavation, this process occurs at very low frequencies.
Plate	On a cavity tree, the area surrounding the cavity entrance where bark has been removed by red-cockaded woodpeckers. Newly completed

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	cavities may not exhibit a well-developed plate.
Pocosin	A wetland dominated by a dense cover of evergreen and deciduous shrubs.
Population	A group of individuals of the same species occupying a given area. Methods of specifying such an area may differ according to purpose. A common specification is the area within which gene flow is sufficient to avoid genetic differentiation.
Population augmentation	Translocation between populations to increase population size.
Population dynamics	Properties of a population such as trend and regulation of population size.
Population trend	See increasing population trend, decreasing population trend, and stable population trend.
Potential breeding group	An adult female and adult male that occupy the same cluster, whether or not they are accompanied by a helper, attempt to nest, or successfully fledge young.
Predation	The acquisition of food by killing and eating another organism.
Prescribed burning	Fire applied to the landscape to meet specific management objectives.
Primary cavity nester	Species that nest in cavities they created.
Primary core population	A population identified in recovery criteria that will hold at least 350 potential breeding groups at the time of and after delisting. Defined by biological boundaries.
Recovery	Species viability.
Recovery population	One of a set of populations designated as necessary for the recovery of the species.
Recovery Standard	A set of guidelines to direct forest management within foraging partitions for the conservation and recovery of the RCW. Implementing these guidelines should not only ensure that RCW populations remain stable but should result in increased population viability.
Recovery unit	One of a set of geographical areas, delineated according to ecoregions,

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	that likely represent broad-scale geographic and genetic variation in red-cockaded woodpeckers. Viable populations in each recovery unit, to the fullest extent that available habitat allows, are considered essential to the recovery of the species.
Recruitment	The addition of individuals into a breeding population through reproduction and/or immigration and attainment of a breeding position.
Recruitment cluster	A cluster of artificial cavities in suitable nesting habitat, located close to existing groups.
Regeneration	A silvicultural method of simultaneously harvesting and establishing reproduction in a stand of trees.
Regulation	A process of implementing silvicultural techniques to establish equal areas of tree size classes, to sustain a given level of timber production over time.
Reintroduction	Translocation of individuals from a captive or wild population to previously occupied, but currently unoccupied habitat.
Resinosis	A process through which injured sapwood in a pine tree becomes saturated with hardened resin, reducing and eventually preventing loss of resin.
Resin well	A wound in a pine tree's cambium, created and maintained by red-cockaded woodpeckers, for the purpose of resin production.
Restrictors	Metal plates used to prevent or repair enlargement of cavity entrances.
Rotation	In even-aged management of forests, the number of years between regeneration events.
Sandhills	Xeric and sub-xeric longleaf pine communities on deep sandy soils. Also, the ecoregion encompassing the Fall-line Sandhills communities, between the mid- and south-Atlantic Coastal Plains and Piedmont.
Sapwood	The outer, active layer of tissue in a tree, lying just inside the cambium.
Savanna	A mesic and seasonally wet pine community, often transitional between xeric pine systems and wetlands, characterized by diverse grass and forb groundcovers.

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Secondary cavity nester	Species that inhabit cavities they did not create.
Secondary core population	A population identified in recovery criteria that will hold at least 250 potential breeding groups at the time of and after delisting. Defined by biological boundaries.
Seed-tree	A method of timber regeneration in which most trees in a site are cut, and tree seedlings become established under remnant large trees. Remnant large trees are retained at lower densities than under the shelterwood method.
Selection cutting	A method of timber regeneration in which single trees or patches of trees (0.8 ha or less, 2 ac or less) are cut.
Shelterwood	A method of timber regeneration in which many, but not all trees in a site are cut, and tree seedlings become established under remnant large trees. Remnant large trees are retained at higher densities than under the seed-tree method.
Silviculture	The theory and practice of controlling the establishment, composition, structure, and growth of forests to achieve management objectives. Silviculture was developed primarily for the purpose of timber production, but can be used for other purposes including biological conservation.
Snag	A standing, dead tree.
Solitary male	An unpaired male that is the sole resident of a cluster.
Stable population	A population that exhibits neither an increasing or decreasing population trend.
Stand	A silvicultural term for an area of trees that is or has been treated as a single management unit.
Standard for Managed Stability	Guidelines for forest management that will result in the conservation of the bare minimum foraging and nesting resources required for sustaining an active cluster. Adherence to these guidelines would prevent a direct "take" of RCWs (as defined by section 9 of the ESA), but does not address the long term sustenance and recovery of RCW populations.
Start	An incomplete cavity.
Strategic recruitment	Placement of recruitment clusters in locations strategically chosen to

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	enhance the spatial arrangement of breeding groups. Breeding groups aggregated in space rather than isolated are beneficial to population dynamics and viability.
Stochasticity	Random events.
Support population	All known populations not designated as a primary or secondary core are designated support populations. Support populations (other than essential supports) are defined by ownership rather than biological boundaries. There are three classifications for support populations: 1. Essential support populations are those populations, identified in recovery criteria, that represent unique or important habitat types that cannot support a larger, core population. They are located on federal and state lands and two private properties. 2. Significant support populations are populations, not identified in recovery criteria, that contain and/or have a population goal of 10 or more active clusters. They are located on federal and state lands and on private lands enrolled in agreements with the U.S. Fish and Wildlife Service. 3. Important support populations are populations, not identified in recovery criteria, that contain and have a population goal of less than 10 active clusters. They are located on federal and state lands and on private lands enrolled in agreements with the U.S. Fish and Wildlife Service.
Take	As defined by the Endangered Species Act, take means to "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct" (Section 3.18 of the Act). Habitat destruction and alteration are considered forms of take, following a Supreme Court ruling on this issue (<i>Sweet Home vs. Babbitt</i>).
Taxonomy	Hierarchical classification system for all life forms.
Territory	A region within an animal's home range that is defended from conspecifics.
Thinning	A silvicultural treatment removing some trees in a stand to reduce tree density.
Translocation	The artificial movement of wild organisms between or within populations to achieve management objectives. Originally, translocation referred to the movement of animals from captive to wild populations, but the term has been expanded to include movements (by artificial means) within and between wild populations.
Two-aged management	A silvicultural method designed primarily for timber production, in which trees of two age/size classes are present in the same stand. The forest is regulated by developing equal areas in each age/size class.
Uneven-aged management	A silvicultural method designed primarily for timber production, in which trees of at least three age classes are present in the same stand. Stands are regulated by size class structure or volume.
Viability	The ability of a population or species to persist over time.

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