

APPENDICES

APPENDIX 1. Procedures for listing, delisting and reclassifying Endangered, Threatened and Species of Special Concern.

Rule 68A-27.0012, Florida Administrative Code (F.A.C.)

- (1) Petition to list, delist, or reclassify a species in Rules 68A-27.003, 68A-27.004 or 68A-27.005, F.A.C.
 - (a) Persons wishing to add, delete or reclassify species in Rules 68A-27.003, 68A-27.004 or 68A-27.005, F.A.C., shall submit a written petition to the Commission.
 1. Petitions shall be clearly identified as such, and must contain the following in order to be considered complete:
 - a. The rule to which the species is proposed to be added, removed from or reclassified to,
 - b. The name, address and signature of the petitioner, and
 - c. Sufficient information on the biology and distribution of the species to warrant investigation of its status using the criteria contained in definitions of endangered, threatened or species of special concern in Rule 68A-1.004, F.A.C.
 - (b) Incomplete petitions will be returned to the petitioner with insufficiencies clearly noted in writing. Corrected petitions may be resubmitted for consideration.
 - (c) Complete petitions will be evaluated in accordance with the provisions in subsection (2).
 - (d) If, in the opinion of the Executive Director, immediate inclusion of a species in Rule 68A-27.003(1), F.A.C., is essential to prevent imminent extinction, such listing may be effected on a temporary basis not to exceed 240 days. Such emergency listings shall be approved by the Commission at the next scheduled meeting. The Commission shall conduct the evaluations prescribed in (2) and (3) of this subsection to determine the appropriate final classification of the species.
- (2) Review of petitions to determine biological status; Phase 1.
 - (a) The Commission shall establish a deadline for completion of the biological review of each complete petition.
 - (b) The Commission shall provide notice by mail to parties who request such notification and shall publish in the Florida Administrative Weekly a solicitation of information on the biological status of the petitioned species. Written comments regarding biological status shall be accepted by the Commission for a period of no less than 45 days following public notice.
 - (c) The Commission shall summarize information provided in the petition, information obtained from the public and other available biological data on status of the petitioned species into a preliminary biological status report. The preliminary biological status report shall contain a recommended classification for the petitioned species consistent with the available biological data and based on the criteria established in 68A-1.004, F.A.C.
 - (d) The Commission shall designate a biological review panel with a minimum of three scientists with demonstrated knowledge and expertise pertaining to species conservation and management. This panel shall independently evaluate information compiled on the

- petitioned species' biological status relative to its proposed classification in Rules 68A-27.003, 68A-27.004 or 68A-27.005, F.A.C.
- (e) The biological status report and the information referenced in subparagraph (c) shall be provided to members of the panel of scientific experts for the review mandated in (d) of this subsection. Panel members shall have no fewer than 45 days to review the document and provide recommendations to the Commission.
 - (f) The Commission shall consider the final biological status report, biological recommendations from the panel of scientific experts and public testimony regarding biological status in making a final determination whether addition, deletion or reclassification of the petitioned species in Rules 68A-27.003, 68A-27.004 or 68A-27.005, F.A.C., is warranted.
 - (g) If the petitioned species is determined by the Commission to warrant inclusion in Rules 68A-27.003, 68A-27.004 or 68A-27.005, F.A.C., the Commission shall:
 - 1. Specify the appropriate listing category for the species based on biological status.
 - 2. Establish a deadline for completion of Phase 2 for the species as described in subsection (3) below, considering the recommendation of Commission employees and other interested parties.
 - 3. If the species is not already listed in Rules 68A-27.003, 68A-27.004 or 68A-27.005, F.A.C., it shall be added to the list of candidate species in Rule 68A-27.0021, F.A.C., and the protective provisions therein shall apply to the species.
- (3) Development of management plans, regulations, permit requirements for candidate species; Phase 2.
- (a) Within 45 days following designation of a candidate species, the Commission shall provide notice by mail to parties who request such notification and shall publish in the Florida Administrative Weekly a solicitation of information on the conservation needs of the species, and any economic and social factors that should be considered in its management.
 - (b) The Commission shall use information obtained from the public and other available information to develop a draft management plan for each candidate species that addresses:
 - 1. Biological status as determined in Phase 1,
 - 2. Conservation objectives,
 - 3. Recommended management actions,
 - 4. Recommended Commission regulations and incentives,
 - 5. Anticipated economic and social impacts of implementing or not implementing the recommended conservation actions.
 - (c) The Commission shall provide notice by mail to parties who request such notification and shall publish in the Florida Administrative Weekly a notice of the availability of the draft management plan. Written comments regarding conservation recommendations and expected economic and social impacts of implementation of the management plan shall be accepted by the Commission for a period of no less than 45 days following public notice.
 - (d) Final Commission action on the petition shall include:
 - 1. Deletion of the species from 68A-27.0021 if appropriate, and addition to and/or deletion from Rules 68A-27.003, 68A-27.004 or 68A-27.005, F.A.C., in accordance with the determination made in (2) of this subsection.

2. A determination on any proposed regulations in the management plan.

Specific Authority Art. IV, Sec. 9, Fla. Const.

Law Implemented Art. IV, Sec. 9, Fla. Const.

History--New 6-23-99, Formerly 39-27.0012.

APPENDIX 2. Petition to reclassify the red-cockaded woodpecker (*Picoides borealis*) as a Species of Special Concern in Florida.

Introduction

By this petition, the Florida Fish and Wildlife Conservation Commission (FWC) is requested to reclassify the red-cockaded woodpecker (*Picoides borealis*) from a Threatened Species (Rule 68A-27.004, F.A.C.) to a Species of Special Concern (Rule 68A-27.005, F.A.C.) under the provisions established in Rule 68A-27.0012, F.A.C. During the past decade, aggressive management of red-cockaded woodpeckers (RCWs) and their habitat has led to an overall range-wide increase in the species' abundance (James 1995, U.S. Fish and Wildlife Service 2000). An FWC Bureau of Wildlife Diversity Conservation staff evaluation of recent research and survey data indicates that RCWs no longer meet the criteria for listing as a Threatened Species, as defined in Rule 68A-1.004, F.A.C., but may still qualify as a Species of Special Concern. Reclassifying the RCW as a Species of Special Concern will more appropriately reflect the species' status. Continued management and monitoring of RCW populations in Florida will be necessary to prevent the species from reverting to its threatened status.

Biological Information

Under FWC listing criteria in Rule 68A-27.0012, F.A.C. and definitions in Rule 68A-1.004 F.A.C., species are classified on the state list according to their range-wide status. Accordingly, information reported here is gleaned from throughout the range of the RCW.

The habitat requirements of the RCW are both unique and specific: the birds exclusively excavate their nest and roost cavities in old-age (80+ years) live pines within mature, open pine forests with sparse midstory vegetation. Although once the dominant upland vegetation in the southeastern United States (approximately 55 to 92 million acres) (Platt et al. 1988, Ware et al. 1993, U.S. Fish and Wildlife Service 2000), these forests have been reduced to approximately 3% of their former range since European settlement (U.S. Fish and Wildlife Service 2000). Land-use changes related to silviculture, agriculture, and development account for most of this loss. Former or potential RCW habitat also has been degraded or rendered unsuitable in Florida and elsewhere by fire suppression, alteration in frequency or season of burn, excessive thinning, and removal of mature pines. Concomitant with habitat loss and degradation, the distribution of the RCW was substantially altered and populations declined precipitously until the early 1990's. Now found primarily in the coastal plain states of the Southeast, RCWs have been extirpated from New Jersey, Maryland, Pennsylvania, Missouri, Tennessee, and Kentucky (Jackson 1994; R. Costa, U.S. Fish and Wildlife Service, personal communication). The remaining population is highly fragmented and estimated at <3% of the species' pre-settlement abundance (U.S. Fish and Wildlife Service 2000).

The decline in RCW habitat and abundance led the U.S. Fish and Wildlife Service to list the species as endangered in 1970, and in 1974 the RCW was listed as threatened by the State of Florida. Although the amount of RCW habitat has not increased measurably since these listings, the aggressive application of several new management techniques (i.e., artificial cavity construction and translocation of birds) has been quite effective at stabilizing or increasing individual populations in Florida and elsewhere. These management activities, coupled with the

discovery of “new” RCW populations on previously unsurveyed lands, have yielded an overall increase in RCW abundance over the past 10 years (James 1995, U.S. Fish and Wildlife Service 2000). Currently, the range-wide population of RCWs is estimated at 12,500 individuals (U.S. Fish and Wildlife Service 2000), but only the public lands component of that estimate is based on recent and rigorous survey information. Considering public lands only, RCWs occur on 98 federal and state properties, which collectively support an estimated 10,000 birds (2,800 to 3,600 potential breeding groups) (U.S. Fish and Wildlife Service 2000; Ralph Costa, U.S. Fish and Wildlife Service, personal communication). Despite these encouraging numbers, it is important to note that most of these RCW populations are small and isolated, or exist in poor quality habitat; only 13 public properties support >275 birds (100 potential breeding groups) and only 21 support >135 birds (50 potential breeding groups) (U.S. Fish and Wildlife Service 2000; Ralph Costa, U.S. Fish and Wildlife Service, personal communication).

State of Florida listing criteria for Threatened Species require that one of the following general conditions be met: (1) the species has undergone a population decline of 50% over the past three generations, (2) the species is expected to undergo a 50% decline over the next three generations, (3) the extent of occurrence is less than 2,000 square miles, (4) the area occupied is less than 200 square miles, (5) the population numbers less than 2,500 individuals, or (5) a quantitative analysis shows the species has a 20% or higher probability of extinction within five generations. Based on the data summarized above, FWC staff contends the RCW meets none of these criteria, under the assumption current management efforts are continued into the future. FWC staff believe a rigorous analysis of available data during the preparation of the status report for this species will show that it meets one or more of the criteria for listing as a Species of Special Concern, though it is possible the RCW might warrant removal from the state list altogether. However, as this increase is dependent upon continued management of RCWs and their habitat, and because the species’ distribution remains highly fragmented, this reclassification should be accompanied by a comprehensive management plan that outlines how Florida will contribute to the range-wide recovery of the RCW and which safeguards against the species reverting to its former threatened status.

Literature Cited

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Petitioner Information

Bradley J. Gruver, Ph.D.
Florida Fish and Wildlife Conservation Commission
620 South Meridian Street
Tallahassee, FL 32399-1600
(850) 488-3831, SunCom 278-3831
gruverb@gfc.state.fl.us

Signature: Bradley J. Gruver

Date: 30 July 2001

APPENDIX 3. Definitions of the Florida Fish and Wildlife Conservation Commission relative to listed species.

Rule 68A-1.004, Florida Administrative Code (F.A.C.)

The following definitions are for the purpose of carrying out the provisions of the rules of the Fish and Wildlife Conservation Commission relating to wild animal life and freshwater aquatic life. As used herein, the singular includes the plural. The following shall be construed respectively to mean:

- (18) Candidate species — A species, subspecies, or isolated population of a species or subspecies, which has been determined by the Commission to warrant listing under Rules 68A-27.003, 68A-27.004 or 68A-27.005, F.A.C., but for which actual listing in the aforementioned rules is pending development of a management plan.
- (25) Direct take — Intentionally pursuing, hunting, capturing, killing, or destroying fish or wildlife or the nests, eggs, homes or dens of fish or wildlife.
- (26) Endangered species — As designated by the Commission, a species, subspecies, or isolated population of a species or subspecies which is so few or depleted in number or so restricted in range or habitat due to any man-made or natural factors that it is in imminent danger of extinction as determined by (a), (b), (c), (d) or (e) below:
 - (a) Population reduction in the form of either:
 - 1. An observed, estimated, inferred or suspected reduction of at least 80% over the previous ten years or three generations, whichever is longer, based on, and specifying, any of the following:
 - a. Direct observation
 - b. An index of abundance appropriate for the species
 - c. A decline in area of occupancy, extent of occurrence or quality of habitat
 - d. Actual or potential levels of exploitation
 - e. The effects of introduced species, hybridization, pathogens, pollutants, competitors or parasites
 - 2. A reduction of at least 80%, projected or suspected to be met within the next ten years or three generations, whichever is longer, based on, and specifying, any of 1.b., 1.c., 1.d. or 1.e. above.
 - (b) Extent of occurrence estimated to be less than 40 square miles or area of occupancy estimated to be less than 4 square miles, and estimates indicating any two of the following:
 - 1. Severity fragmented or known to exist at only a single location.
 - 2. Continuing decline, observed, inferred or projected, in any of the following:
 - a. Extent of occurrence
 - b. Area of occupancy
 - c. Area, extent and/or quality of habitat
 - d. Number of locations or subpopulations
 - e. Number of mature individuals
 - 3. Extreme fluctuations in any of the following:

- a. Extent of occurrence
 - b. Area of occupancy
 - c. Number of locations or subpopulations
 - d. Number of mature individuals
- (c) Population estimated to number fewer than 250 mature individuals and either:
1. An estimated continuing decline of at least 25% within three years or one generation, whichever is longer, or
 2. A continuing decline, observed, projected or inferred, in numbers of mature individuals and population structure in the form of either:
 - a. Severe fragmentation (that is, no subpopulation estimated to contain more than 50 mature individuals).
 - b. All individuals are in a single subpopulation.
- (d) Population estimated to number less than 50 mature individuals.
- (e) Quantitative analysis showing the probability of extinction in the wild is at least 50% within ten years or three generations, whichever is longer.
- (73) Species of special concern — As designated by the Commission, a species, subspecies, or isolated population of a species or subspecies which is facing a moderate risk of extinction in the future, as determined by (a), (b), (c), (d) or (e) below:
- (a) Population reduction in the form of either:
1. An observed, estimated, inferred or suspected reduction of at least 20% over the last ten years or three generations, whichever is longer, based on, and specifying, any of the following:
 - a. Direct observation
 - b. An index of abundance appropriate for the species
 - c. A decline in area of occupancy, extent of occurrence and/or quality of habitat
 - d. Actual or potential levels of exploitation
 - e. The effects of introduced species, hybridization, pathogens, pollutants, competitors or parasites
 2. A reduction of at least 20%, projected or suspected to be met within the next ten years or three generations, whichever is longer, based on, and specifying, any of 1.b., 1.c., 1.d. or 1.e. above.
- (b) Extent of occurrence estimated to be less than 7,700 square miles or area of occupancy estimated to be less than 770 square miles, and estimates indicating any two of the following:
1. Severely fragmented or known to exist at only a single location.
 2. Continuing decline, observed, inferred or projected, in any of the following:
 - a. Extent of occurrence
 - b. Area of occupancy
 - c. Area, extent and/or quality of habitat
 - d. Number of locations or subpopulations
 - e. Number of mature individuals
 3. Extreme fluctuations in any of the following:
 - a. Extent of occurrence
 - b. Area of occupancy
 - c. Number of locations or subpopulations
- d. Number of mature individuals

- (c) Population estimated to number fewer than 10,000 mature individuals and either:
 - 1. An estimated continuing decline of at least 10% within ten years or three generations, whichever is longer; or
 - 2. A continuing decline, observed, projected, or inferred, in numbers of mature individuals and population structure in the form of either:
 - a. Severely fragmented (i.e., no subpopulation estimated to contain more than 1,000 mature individuals).
 - b. All individuals are in a single subpopulation.
 - (d) Population very small or restricted in the form of either of the following:
 - 1. Population estimated to number fewer than 1,000 mature individuals
 - 2. Population is characterized by an acute restriction in its area of occupancy (less than 40 square miles) or in the number of locations (fewer than 5)
 - (e) Quantitative analysis showing the probability of extinction in the wild is at least 10% within 100 years.
- (77) Threatened species — As designated by the Commission, a species, subspecies, or isolated population of a species or subspecies which is facing a very high risk of extinction in the future, as determined by (a), (b), (c), (d) or (e) below:
- (a) Population reduction in the form of either of the following:
 - 1. An observed, estimated, inferred, or suspected reduction of at least 50% over the last ten years or three generations, whichever is longer, based on, and specifying, any of the following:
 - a. Direct observation
 - b. An index of abundance appropriate for the species
 - c. A decline in area of occupancy, extent of occurrence and/or quality of habitat
 - d. Actual or potential levels of exploitation
 - e. The effects of introduced species, hybridization, pathogens, pollutants, competitors or parasites
 - 2. A reduction of at least 50%, projected or suspected to be met within the next ten years or three generations, whichever is longer, based on, and specifying, any of 1.b., 1.c., 1.d. or 1.e. above.
 - (b) Extent of occurrence estimated to be less than 2,000 square miles or area of occupancy estimated to be less than 200 square miles, and estimates indicating any two of the following:
 - 1. Severely fragmented or known to exist at no more than five locations
 - 2. Continuing decline, observed, inferred or projected, in any of the following:
 - a. Extent of occurrence
 - b. Area of occupancy
 - c. Area, extent and/or quality of habitat
 - d. Number of locations or subpopulations
 - e. Number of mature individuals
 - 3. Extreme fluctuations in any of the following:
 - a. Extent of occurrence
 - b. Area of occupancy
 - c. Number of locations or subpopulations
 - d. Number of mature individuals

- (c) Population estimated to number fewer than 2,500 mature individuals and either:
 - 1. An estimated continuing decline of at least 20% within five years or two generations, whichever is longer; or
 - 2. A continuing decline, observed, projected, or inferred, in numbers of mature individuals and population structure in the form of either:
 - a. Severely fragmented (i.e., no subpopulation estimated to contain more than 250 mature individuals)
 - b. All individuals are in a single subpopulation.
- (d) Population estimated to number fewer than 250 mature individuals.
- (e) Quantitative analysis showing the probability of extinction in the wild is at least 20% within 20 years or five generations, whichever is longer.

APPENDIX 4. Final Biological Status Report for the red-cockaded woodpecker.

(Note: Only the body of the biological status report is included here. A complete copy of the report may be obtained from the Florida Fish and Wildlife Conservation Commission, Division of Wildlife, Bureau of wildlife Diversity Conservation, 620 South Meridian St., Tallahassee, Florida 32399-1600 [phone 850-488-3831]).

INTRODUCTION

In June 2001, Florida Fish and Wildlife Conservation Commission (FWC) staff conducted a preliminary status review of the red-cockaded woodpecker (*Picoides borealis*). The review was not based on a perceived change in the status of the red-cockaded woodpecker, but rather was undertaken as a precursor to the development of a species management plan according to the procedural requirements of Florida's 2-phase listing process (Rule 68A-27.0012 Florida Administrative Code [F.A.C.], Appendix 1). The results of the preliminary status review prompted FWC staff to prepare a petition to reclassify the red-cockaded woodpecker as a species of special concern (Rule 68A-27.005 F.A.C.). The species is currently on the state list of threatened species (Rule 68A-27.004 F.A.C.). At their September 2001 meeting, the agency's Commissioners determined the petition was sufficient and directed staff to undertake a comprehensive assessment of the red-cockaded woodpecker's biological status pursuant to the criteria and definitions embodied in Rule 68A-1.004 F.A.C. (Appendix 2). In order to warrant state listing as an endangered species, threatened species, or species of special concern, the red-cockaded woodpecker, on a range-wide scale, must meet at least 1 of the 5 criteria in 68A-1.004 F.A.C. Herein we present information concerning the status of the red-cockaded woodpecker in relation to those criteria.

BIOLOGICAL INFORMATION

Taxonomic Classification

Red-cockaded woodpeckers (*Picoides borealis*) are members of the class Aves, order Piciformes, and family Picidae.

Life History and Habitat

The red-cockaded woodpecker is a small bird about the size of a northern cardinal (*Richmondia cardinalis*, 7.5–8.5 inches in length). The species is identified by its black cap and nape, black and white barred back, white underparts, and large white cheek patches. The red cockade, which is rarely visible and only present on adult males, consists of a small streak of red feathers above each cheek patch.

The red-cockaded woodpecker is a fire-dependent species that inhabits open, mature pine forests with sparse midstory vegetation. The species is unique in its use of old growth, living pines for cavity excavation. Although longleaf pine (*Pinus palustris*) is preferred when available, cavities also are constructed in slash (*P. elliotii*), loblolly (*P. taeda*), shortleaf (*P. echinata*), pond (*P. serotina*), pitch (*P. rigida*), and Virginia (*P. virginiana*) pines. Cavity trees

typically are over 80 years old and often infected with *Phellinus pini*, a fungus that decays the heartwood and facilitates cavity excavation. Cavity construction time varies from several months to several years, but once completed a cavity may be used for several decades (Conner and Rudolph 1995).

Adults are territorial cooperative breeders, and a breeding group consists of the breeding pair and 0-4 adult “helpers” (usually male, and the progeny of 1 or both breeding adults). Typically each group member roosts alone in a cavity, and the aggregate of roost trees and surplus cavity trees inhabited by a group is called an active cluster. Range-wide, group size averages 2.5 adults per active cluster (U.S. Fish and Wildlife Service, unpublished data). The age of first breeding varies between the sexes but is typically 3 years or less (Reed et al. 1993; Bowman et al. 1998; R. DeLotelle, DeLotelle and Gutherie, Inc., personal communication). We calculated generation time (average age of breeders) using Vortex 8.41 (Miller and Lacy 1999) to be 6.5 years for males and 5 years for females. The nesting season extends from April through June and females lay an average of 3-4 eggs in the breeding male’s roost cavity. All birds in a group will assist with egg incubation and the brooding of nestlings during the day. Young fledge on or near day 26 and either remain in the breeding group as helpers or disperse before the next breeding season.

Red-cockaded woodpeckers feed primarily on bark-dwelling arthropods (e.g., beetles, roaches, ants, etc.) in pine-dominated habitats. Although pine plantations and/or younger pines may be used, open pine habitats with an abundance of older, larger trees are preferred (Bowman et al. 1998, U.S. Fish and Wildlife Service 2000). Good quality foraging habitat also has a low density of small and medium pines, few hardwoods, and a groundcover of forbs and bunchgrasses (U.S. Fish and Wildlife Service 2000). Home range size varies considerably and appears to be inversely related to habitat quality. The smallest average home range size reported was 116 acres in southwest Georgia (Engstrom and Sanders 1997) and the largest was 492 acres in south-central Florida (Bowman et al. 1998). Despite this variability, on a range-wide basis, 200 acres generally is designated for public lands as the minimum amount of habitat needed to support a group of red-cockaded woodpeckers on all but the highest quality sites (U.S. Fish and Wildlife Service 2000).

Distribution

The red-cockaded woodpecker occurs in the Piedmont and Coastal Plain of the southeastern United States. In Florida, it is found from the Panhandle throughout the Peninsula to northern Monroe County. Throughout its range, the species’ distribution is highly fragmented and restricted to areas where suitable habitat occurs. Many populations are relatively small (fewer than 100 active clusters) and/or isolated. Given the historical distribution of their habitat, it is likely that red-cockaded woodpeckers were both common and widespread in the southeastern United States prior to European settlement. The species’ life history traits (i.e., a territorial, cooperative breeder with short dispersal distances) and preliminary genetic data (Stangel et al. 1992, Haig et al. 1994, Daniels and Walters 2000) suggest that population health and viability were maintained by a continuous distribution.

BIOLOGICAL STATUS ASSESSMENT

Available data on the range-wide red-cockaded woodpecker population were evaluated relative to each of the 5 criteria for state listing under Rule 68A-1.004 F.A.C. (Appendix 2). Many of these data were derived from assessments and analyses completed by the federal red-cockaded woodpecker recovery team as part of the current recovery plan revision process (U.S. Fish and Wildlife Service 2000; U.S. Fish and Wildlife Service, unpublished data). The criteria reflect various warning signals that indicate whether or not a species is at risk, including range-wide population reductions; a small distribution area combined with a fragmented, declining, or widely fluctuating population; a small population number in combination with a population decline; an extremely small population; or extinction risk levels within specified time frames. In order to qualify for state listing as either endangered, threatened, or species of special concern, the red-cockaded woodpecker must be shown to meet at least 1 of the 5 criteria.

Criterion A: Population Reduction

This criterion requires the assessment of an observed, estimated, inferred, or suspected population reduction exhibited by the range-wide red-cockaded woodpecker population over either the previous or the next 10 years or 3 generations, whichever is longer. To meet this criterion for listing as endangered, threatened, or species of special concern, the population reduction percentage must be at least 80%, 50%, or 20%, respectively. We use 20 years as the relevant time interval for this assessment based on our calculation of 6.5 years as the generation time for male red-cockaded woodpeckers ($6.5 \times 3 = 19.5$, rounded up to 20 years).

Previous Trend.—Although red-cockaded woodpeckers were afforded federal protection as an endangered species in 1970, their numbers have not increased substantially in the ensuing 30 years. The species' decline is directly related to its unique habitat requirements—mature, fire-maintained pine forests with sparse midstory vegetation. Although once the dominant upland vegetation in the southeastern United States (approximately 55 to 92 million acres) (Platt et al. 1988, Ware et al. 1993, U.S. Fish and Wildlife Service 2000), these forests have been reduced to an estimated 3% of their former range (U.S. Fish and Wildlife Service 2000). In Florida alone, approximately 90% (6.8 million acres) of the longleaf pine habitat on commercial forests (i.e., private and public lands capable of industrial timber production) was lost between 1936 and 1995 (Kautz 1998), and approximately 50% of slash pine flatwoods in South Florida were lost by 1970 (B. Hartman, FWC, personal communication). Land use changes related to silviculture, agriculture, and development account for most of this loss. Former or potential red-cockaded woodpecker habitat also has been degraded or rendered unsuitable due to fire suppression, alteration in frequency or season of burn, excessive thinning, and removal of mature pines. Smaller group sizes and lower productivity are other deleterious consequences of fire suppression (James et al. 1997, Hardesty et al. 1997). Concomitant with habitat loss and degradation, habitat fragmentation has contributed to the species' decline. The ensuing isolation, either within or among populations, can lead to declines or extirpations at the local level (Crowder et al. 1998, Letcher et al. 1998, Walters et al. In Press). Thus, even under optimum habitat conditions, some red-cockaded woodpecker populations are at risk.

Unfortunately, the ability to quantify red-cockaded woodpecker population trends during the past 20 years is confounded by the extent and accuracy of available survey data. Preliminary surveys conducted in the 1970s and 1980s were incomplete, inconsistent, and biased toward federal lands, and thus underestimated the total population. Surveys during the past decade have been more thorough and comprehensive and have led to the discovery of existing but unknown populations and/or clusters on previously unsurveyed or more intensively surveyed properties. Consequently, recent population estimates are more accurate, but they cannot be compared with earlier estimates without giving a false impression of a range-wide population increase.

Despite these limitations, some inferences regarding previous population trends are possible. Between 1970 and the early 1980s all monitored populations except 1 declined in size (U.S. Fish and Wildlife Service 2000). The decline continued throughout the 1980s, when there was at least a 23% reduction in the range-wide population (James 1995). Although this estimate was undoubtedly low (James 1995), the decline could not be more precisely quantified due to the aforementioned problems with the survey data. During the 1990s this trend began to slow, and in some cases reverse, due to the aggressive application of several new management techniques, primarily on public lands. Under the proper habitat conditions, artificial cavity construction and translocation of birds have been quite effective at reversing declines and stabilizing or increasing local populations (U.S. Fish and Wildlife Service 2000). However, in the absence of aggressive management, there was no evidence to suggest that red-cockaded woodpecker numbers would have naturally stabilized or increased during the past 10 years. With respect to the relevant time interval considered here, this information, coarse as it is, suggests that the range-wide population of red-cockaded woodpeckers declined by at least 20% during the past 20 years, despite the gains made in the past decade. Although it is generally accepted that the decline actually was greater than 20%, there is no evidence that it exceeded 50%. Therefore, we conservatively conclude that the species meets this criterion for listing as a species of special concern.

Future Trend.— Recent population models based on red-cockaded woodpecker data from North Carolina indicate that under optimum habitat conditions extinction probability is related to both the size and spatial configuration of a population (Letcher et al. 1998, Walters et al. In Press). Using a 100-year simulation model, Letcher et al. (1998) determined that, except when territories were maximally aggregated, smaller populations (100 territories or less) went extinct, whereas larger populations (at least 250 territories) had a relatively high (80%) probability of survival regardless of distribution. Between these 2 extremes, the probability of extinction varied considerably as a factor of the number and distribution of territories. For example, a population with 100 tightly aggregated territories was more stable than a population with 250 widely distributed territories. Walters et al. (In Press) refined the Letcher et al. (1998) model by considering environmental, as well as demographic stochasticity in their analysis. Their model further demonstrated the importance of maximal territory aggregation to the long-term persistence of smaller populations.

Using the results of the Letcher et al. (1998) population model reported above, we projected the likelihood of persistence over the next 100 years for the 121 red-cockaded woodpecker populations that existed on public lands (99 properties) and private lands with formal conservation agreements (22 properties) in 2000 (U.S. Fish and Wildlife Service,

unpublished data). We based our projections on the worst-case scenario tested in their analysis because we believed it best reflected the current preponderance of small, fragmented populations throughout the species' range (U.S. Fish and Wildlife Service, unpublished data). Accordingly, we assumed populations comprised of fewer than 100 clusters would become extirpated over this time interval, that 60% of populations between 100 and 200 clusters would become extirpated, and that all populations larger than 200 clusters would remain at current population levels. We computed the linear regression equation for this projected rate of decline, and then predicted population levels for the time interval relevant to this criterion. Our analysis indicated a high likelihood that 23% of the current range-wide red-cockaded woodpecker population would be extirpated over the next 20 years. When we performed a similar analysis based on the Walters et al. (In Press) model, the predicted decline was 11%.

As evidenced by the reductions that occurred between the early 1980s and 1990, it is conceivable that the range-wide red-cockaded woodpecker population could decline by at least 23% over the next 20 years. Approximately 1,296 active clusters currently occur on private lands (U.S. Fish and Wildlife Service, unpublished data) where the pressure to convert old-growth pine forests to other uses is greatest. Approximately 45% of these clusters are on properties where some type of conservation agreement is in place (U.S. Fish and Wildlife Service, unpublished data); however, because landowner participation is mostly voluntary, the clusters protected by these agreements are not necessarily secure. Furthermore, the decline and local extirpation of numerous populations on private properties have been well documented over the last 20 years (U.S. Fish and Wildlife Service 2000). Given historic and recent rates of habitat loss, it is not unreasonable to expect that most, if not all, mature pine habitat on private lands large enough to support a red-cockaded woodpecker population could disappear within the next 20 years. In addition, if existing management efforts were reduced on public lands, there undoubtedly would be a loss of active clusters and/or populations due to a decline in the species' area of occupancy, extent of occurrence, or quality of habitat. Finally, because both Letcher et al. (1995) and Walters et al. (In Press) assumed optimum habitat conditions in their analyses, the population declines we calculated from their models must be regarded as best-case scenarios given that poor habitat quality is a common problem on many properties where red-cockaded woodpeckers occur. Taking all this into consideration, we believe it is likely that the range-wide population of red-cockaded woodpeckers could undergo a decline of at least 20% over the next 20 years and conclude that the species warrants listing as a species of special concern under this criterion.

Criterion B: Extent of Occurrence and /or Area of Occupancy

This criterion requires an estimate of the red-cockaded woodpecker's extent of occurrence (i.e., total range) and area occupied (i.e., area within the total range where the species actually occurs). These 2 parameters may differ considerably for species that have a fragmented distribution. To meet this criterion for listing as endangered, threatened, or species of special concern, the extent of occurrence must be less than 40 square miles, 2,000 square miles, or 7,700 square miles, respectively, or the area of occupancy must be less than 4 square miles, 200 square miles, or 770 square miles, respectively. The criterion also includes an assessment of the species' distribution (i.e., severely fragmented or a limited number of locations) and a determination of whether or not the species is experiencing declines and/or fluctuations in extent

of occurrence, area occupied, habitat quality, number of locations, or number of mature individuals.

Extent of Occurrence.—The historical range of the red-cockaded woodpecker closely reflected that of the old-growth pine forests in the southeastern United States, which prior to European settlement may have exceeded 200 million acres (U.S. Fish and Wildlife Service 2000). The species has been extirpated from 6 of the 17 states where it previously occurred (Hooper et al. 1980; Jackson 1994; U.S. Fish and Wildlife Service, unpublished data). Notably, all of these states were on the edge of the species' historical range (Missouri, Maryland, New Jersey, Pennsylvania, Tennessee, and Kentucky). Current range size was calculated by using ArcView GIS software to draw a convex polygon around the outer perimeter of the species' known range, which yielded an estimate of 403,990 square miles. Even after considering the potential inaccuracy of this method, it is clear that the red-cockaded woodpecker does not meet this criterion for any of the listing categories.

Area of Occupancy.— An evaluation of area of occupancy must take into account the current distribution of the red-cockaded woodpecker. Individual populations are typically isolated from each other and the range-wide distribution is highly fragmented. The largest remaining populations occur in the Atlantic and Gulf coastal regions, primarily on public lands, but these regions also support numerous smaller populations. Using Florida as an example, 2 of the largest red-cockaded woodpecker populations are located in the Panhandle—the Apalachicola Ranger District of the Apalachicola National Forest (486 active clusters) and Eglin Air Force Base (301 active clusters) (U.S. Fish and Wildlife Service, unpublished data). Both of these properties are large (458 and 724 square miles, respectively) and contain large, contiguous tracts of high-quality habitat. In contrast, only 1 of the 21 other public properties in Florida with red-cockaded woodpeckers supports more than 100 active clusters (U.S. Fish and Wildlife Service, unpublished data). Furthermore, these properties exhibit a considerable amount of variability in the quantity and quality of available habitat regardless of their size. This scenario is not unique to Florida and is a byproduct of the distribution of public lands, property size, and previous land-management practices. Smaller properties obviously are limited in the number of birds they can support regardless of their habitat quality, whereas larger properties may support relatively few birds due to the current condition of the landscape.

Area of occupancy was calculated by multiplying the current estimate of active red-cockaded woodpecker clusters (5,627) by 3 estimates of home range size: the average minimum (116 acres), the minimum standard for public lands (200 acres), and the average maximum (492 acres). Although all 3 calculated values (1,020 square miles, 1,758 square miles, and 4,326 square miles, respectively) exceeded the standard for listing at any level under this criterion, these results must be tempered with the knowledge that the area occupied by red-cockaded woodpeckers has a fragmented distribution wherein habitat quality varies considerably.

Criterion C: Population Size and Trend

This criterion combines an estimate of range-wide population size (in terms of the number of mature individuals) with an estimate of the population trend over the next 10 years, or 3 generations, whichever is longer. We use 20 years as the relevant time interval for this

assessment. To meet this criterion for listing as endangered, threatened, or species of special concern, the number of mature individuals must be less than 250, 2,500, or 10,000, respectively, with an estimated population decline of at least 25%, 20%, or 10%, respectively. This criterion also includes an assessment of the species' distribution (i.e., severely fragmented or limited to a single location).

In 2000, the range-wide population of red-cockaded woodpeckers was estimated at 5,627 active clusters, or 14,068 mature individuals based on an average of 2.5 adults per active cluster (U.S. Fish and Wildlife Service, unpublished data). Although at least a 20% decline is likely over the next 20 years (see Criterion A), the species' range-wide population size precludes it from meeting this criterion for listing at any level.

It is important to note, however, that although the species does not meet this criterion, only the public lands component of this estimate is based on recent and rigorous survey information. Considering public lands only, red-cockaded woodpeckers occur on 99 federal and state properties, which collectively support approximately 4,331 active clusters, or 10,827 mature individuals (U.S. Fish and Wildlife Service, unpublished data). Thus, the number of mature individuals under public domain is only slightly greater than the population size required for listing as a species of special concern. This information, coupled with the species' fragmented distribution and the possibility of a negative population trend in the future, suggests that listing the red-cockaded woodpecker as a species of special concern under this criterion may be warranted.

Criterion D: Number of Mature Individuals

This criterion requires an estimate of the number of mature individuals in the range-wide population to determine if the population is extremely small or restricted. To meet this criterion for listing as endangered, threatened, or species of special concern, the range-wide population estimate for the species must be no more than 50, 250, or 1,000 mature individuals, respectively.

In 2000, the range-wide population of red-cockaded woodpeckers was estimated at 14,068 mature individuals, based on an estimated 5,627 active clusters and a mean group size of 2.5 adults per active cluster (U.S. Fish and Wildlife Service, unpublished data). Therefore, the red-cockaded woodpecker does not meet this criterion for any of the listing categories.

Criterion E: Quantitative Analyses

This criterion requires an estimate of the probability of a species' extinction in the wild within a particular timeframe. In order to be listed as endangered, threatened, or species of special concern, that probability would have to be at least 50% within the next 3 generations (20 years), 20% within the next 5 generations (33 years), or 10% within the next 100 years, respectively.

Although the probability of range-wide extinction has not been calculated for the red-cockaded woodpecker, inferences derived from existing models for individual populations (see Criterion A) provide a means of evaluating the species' status relative to this criterion.

Currently, most red-cockaded woodpecker populations are relatively small and isolated. Of the 99 public properties where the species occurs, only 13 support more than 100 active clusters (U.S. Fish and Wildlife Service, unpublished data). Furthermore, these properties are scattered throughout the southeastern United States, and within each property the distribution of active clusters tends to be more fragmented than clumped. Given the less than optimal habitat conditions on many public properties, these data suggest that at least 87% of all red-cockaded woodpecker populations on public lands may be vulnerable to extirpation over the next 100 years (Letcher et al. 1998, Walters et al. In Press).

These findings, coupled with the potential extirpation of 1,296 active clusters on private lands, suggest that the continual loss of smaller populations could be an important factor in the range-wide extinction of the species. Additionally, recent gains in red-cockaded woodpecker abundance are primarily related to the aggressive management of the species on public lands. If these management activities were to cease or diminish, many smaller and/or isolated populations eventually would be extirpated. However, the likelihood of extinction is buffered by the presence of 4 populations of greater than 250 clusters each on public lands scattered across the range of the species. Existing red-cockaded woodpecker population models suggest these populations, with continued sound management, should be highly resistant to extirpation (Walters et al. In press). Even though these large populations are subject to catastrophic events, the likelihood that all or even most would be affected simultaneously by the same disaster is very slight. Thus, although this criterion cannot be strictly evaluated due to the lack of a range-wide population viability model, available data suggest the species is not at high risk of extinction as long as current large public land populations are secure.

BIOLOGICAL REVIEW PANEL

At its September 2001 meeting, the FWC Commissioners appointed a biological review panel to evaluate the preliminary biological status report, supporting scientific information, and staff recommendation to reclassify the red-cockaded woodpecker as a species of special concern. The panel consisted of 5 members who currently serve as the chairmen and co-chairmen (or their designees if the chair or co-chair were FWC employees) of the Florida Committee on Rare and Endangered Plants and Animals special committees on mammals, fishes, amphibians and reptiles, invertebrates, and birds. Only 1 of the 2 co-chairs of the bird subcommittee was included on the panel. Each of the panel members was asked to independently evaluate the scientific appropriateness of the recommended listing action in light of the classification criteria in Rule 68A-1.004, F.A.C. and the information available for consideration.

Four panel members responded and provided written comments. One panel member endorsed the recommended reclassification of red-cockaded woodpeckers without reservation stating that the preliminary biological status report was, “extremely thorough, well documented, and well written,” and that the justification for the proposed reclassification was based upon sound scientific research. Another panel member stated that although the recommended action was technically supported by available scientific information, a number of other, related concerns led him toward not endorsing the recommended listing action, whereas a third panel member recommended that the listing action be postponed. Collectively, the issues raised by these latter 2 panel members were: (1) the potential inappropriateness of the listing classification

criteria contained in Rule 68A-1.004 F.A.C.; (2) the discrepancy between the federal and proposed state classification of the species; (3) the fear that downlisting would falsely convey an improvement in the species' status and thereby reduce funding and management priorities on state and private lands; (4) the need for additional demographic data specific to individual populations and/or regions in Florida; (5) the necessity for continued intensive management in order to maintain recent population increases; (6) the need for concomitant development of a management plan for red-cockaded woodpeckers; (7) the analysis of population trend over the past 20 years was incorrect because it was based on insufficient and/or biased data; and (8) the need to incorporate the potential for environmental stochasticity and catastrophic events such as hurricanes into population models. A fourth panel member stated that the recommended listing action was not supported by the information available, but rather based upon, "a combination of biased selection of data and semantics." This panel member clearly stated his philosophical opposition to any proposed state listing classification that differs from the federal listing status. None of the biological review panel members provided new or additional biological data for consideration. Copies of the comments from the biological review panel members are included in Appendix 4.

FWC staff carefully reviewed the biological panel comments. Concerns expressed by panel members pertaining to the appropriateness of state listing criteria in Rule 68A-1.004 F.A.C. and philosophic opposition to differing state and federal listing classifications are addressed separately in Appendix 3. Rule 68A-27.0012 F.A.C. requires the completion of a species management plan prior to final listing actions, and issues related to necessary future management actions will be addressed therein and subject to additional public review prior to any change in listing classification for the red-cockaded woodpecker.

We agreed with the comments regarding our assessment of population trends over the past 20 years and re-evaluated the data using a more conservative approach. However, results continued to fall below the 50% decline threshold for threatened species, and thus did not alter the outcome regarding previous population trends under Criterion A.

FWC staff was able to revise the status assessment utilizing a new population model (Walters et al. In Press) provided to us during the comment period that does incorporate environmental stochasticity, but the results did not change the outcome relative to the listing criteria. To our knowledge there are no population models for red-cockaded woodpeckers that factor catastrophic events into the analysis; therefore, the effect that hurricanes might have on our population predictions cannot be determined. However, based on the history of the red-cockaded woodpecker population on the Francis Marion National Forest following Hurricane Hugo, we know that existing management techniques can be quite effective at minimizing losses related to hurricanes within a relatively short period of time (Hooper et al. 1990, Watson et al. 1995). Furthermore, given the distribution of the largest coastal populations of red-cockaded woodpeckers, it is unlikely that they all would be impacted by a major hurricane at the same time.

Therefore, in the absence of new or additional biological information regarding the range-wide population status of the species, FWC staff did not alter the recommendation to reclassify the red-cockaded woodpecker as a species of special concern.

PUBLIC COMMENTS ON BIOLOGICAL STATUS

On September 28, 2001, a request for written comments on the biological status of the red-cockaded woodpecker was published in the Florida Administrative Weekly (Volume 27, Number 39:4564). The deadline for receipt of comments was 5:00 PM on November 13th, 2001. During the specified time period, we received 16 written comments: 7 were from the academic/scientific community, 5 were from government agencies, and 4 were from environmental/conservation groups. All of the comments expressed some level of concern or criticism regarding the appropriateness of the criteria used to evaluate the biological status of the red-cockaded woodpecker. As previously discussed, those comments are addressed in Appendix 3. Copies of the 16 written comments are included in Appendix 5.

Comments relevant to the biological status of the species focused on 3 main points: (1) our analysis of population trend over the past 20 years was incorrect because it was based on insufficient and/or biased data, (2) the model we used to predict future population trends was inadequate because it did not include catastrophic events such as hurricanes, and (3) our assessment did not adequately emphasize the dependent relationship between the red-cockaded woodpecker and the southern pine ecosystem.

The first 2 points also were raised by members of the biological review panel, and our responses are provided in the Biological Review Panel section. With respect to the third point, we believe that the importance of the southern pine forests to the red-cockaded woodpecker was appropriately addressed relative to the state listing criteria. A more thorough description of optimum habitat and its maintenance was not applicable to this assessment, but will be included in the species' management plan.

CONCLUSIONS

Assessment of the range-wide red-cockaded woodpecker population relative to Florida's listing criteria indicates that the species meets Criterion A as a species of special concern based on a population decline of at least 20% over the past 20 years, and a projected population decline of at least 20% over the next 20 years. The potential for a future negative population trend, combined with the more conservative yet accurate population estimate of 10,827 mature individuals on public lands, further suggests that the species nearly meets the species of special concern threshold under Criterion C. Consequently, FWC staff recommends that the red-cockaded woodpecker be reclassified as a species of special concern in Florida (Appendix 6).

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APPENDIX 5. Reviewers of the red-cockaded woodpecker Biological Status Report and Draft Management Plan.

PRELIMINARY BIOLOGICAL STATUS REPORT

Biological Review Panel

Dr. Mark A. Deyrup, Archbold Biological Station, P.O. Box 2057, Lake Placid, Florida 33862

Dr. Carter Gilbert, 620 NW 40th Terrace, Gainesville, Florida 32607

Dr. Dale Jackson, Florida Natural Areas Inventory, 1018 Thomasville Rd., Suite 200-C,
Tallahassee, Florida 32303

Mr. Brian Toland, Toland Environmental Consulting, 4545 Rivermist Drive, Melbourne, Florida
32935

Other Individuals and Groups that Requested Copies and/or Submitted Comments

Mr. Matthew J. Aresco, Department of Biological Science, The Florida State University,
Tallahassee, Florida 32306

Mr. W. Wilson Baker, 1422 Crestview Ave., Tallahassee, Florida 32303

Ms. Robin Boughton, Goethe State Forest, 8250 SE County Road 336, Dunnellon, Florida 34431

Dr. Reed Bowman, Archbold Biological Station, P.O. Box 2057, Lake Placid, Florida 33862

Mr. Jim Cox, Florida Ornithological Society and Tall Timbers Research Station, 13093 Henry
Beadel Dr., Tallahassee, Florida 32312

Mr. Pete David, South Florida Water Management District, 3301 Gun Club Rd., West Palm
Beach, Florida 33406

Ms. Cynthia K. Dohner, U.S. Fish and Wildlife Service, 1875 Century Blvd., Atlanta, Georgia
30345

Mr. Vic Doig, Division of Wildlife, Florida Fish and Wildlife Conservation Commission, 9550
NW 160th St., Trenton, Florida 32693

Dr. Todd Engstrom, Tall Timbers Research Station, 13093 Henry Beadel Dr., Tallahassee,
Florida 32312

Ms. Judy Hancock, Sierra Club-Florida Chapter, P.O. Box 2436, Lake City, Florida 32056

Mr. Bradley J. Hartman, Office of Environmental Services, Florida Fish and Wildlife Conservation Commission, 620 S. Meridian St., Tallahassee, Florida 32399

Mr. Charles A. Hess, Department of Biological Science, The Florida State University, Tallahassee, Florida 32306

Mr. Charles A. Hess, 114 Lake Ellen Circle, Crawfordville, Florida 32327

Dr. Jerome A. Jackson, Florida Gulf Coast University, 10501 FGCU Blvd. South, Ft. Myers, Florida 33965

Dr. Frances C. James, Department of Biological Science, The Florida State University, Tallahassee, Florida 32306

Dr. Peter Merritt, Florida Ornithological Society, 8558 SE Sharon St., Hobe Sound, Florida 33455

Dr. Peter Merritt, Treasure Coast Regional Planning Council, 301 E. Ocean Blvd., Suite 300, Stuart, Florida 34994

Mr. Jim Ozier, Georgia Department of Natural Resources, 116 Rum Creek Dr., Forsyth, Georgia 31029

Dr. Rich Paul, Audubon of Florida, 410 Ware Blvd., #702, Tampa, Florida 33619

Mr. Paul Richards, Department of Biological Science, The Florida State University, Tallahassee, Florida 32306

Mr. Matthew S. Schrader, Department of Biological Science, The Florida State University, Tallahassee, Florida 32306

Dr. Eric Walters, Department of Biological Science, The Florida State University, Tallahassee, Florida 32306

Dr. Jeffrey R. Walters, Virginia Polytechnic Institute and State University, Department of Biology, Blacksburg, Virginia 24061

DRAFT MANAGEMENT PLAN

Individuals and Groups that Requested Copies and/or Submitted Comments

Mr. Jim Cox, 13093 Henry Beadel Dr., Tallahassee, Florida 32312

Ms. Cynthia K. Dohner, U.S. Fish and Wildlife Service, 1875 Century Blvd., Suite 200, Atlanta, Georgia 30345

Mr. Phil Gomicki, Florida Forestry Association, P.O. Box 1696, Tallahassee, FL 32302

Mr. Paris E. “Skip” Griep, National Forests in Florida, 325 John Knox Rd., Suite F-100,
Tallahassee, FL 32303

Mr. Charles A. Hess, 114 Lake Ellen Circle, Crawfordville, Florida 32327

Dr. Jerome A. Jackson, Florida Gulf Coast University, 10501 FGCU Blvd. South, Ft. Myers,
Florida 33965

Dr. Rich Paul, Audubon of Florida, 410 Ware Blvd., #702, Tampa, Florida 33619

APPENDIX 6. Derivation of the conservation objective for the red-cockaded woodpecker.

The conservation objective proposed in this management plan is **to secure and maintain at least 1,349 potential breeding groups (1,686 active clusters) of red-cockaded woodpeckers in Florida by the year 2020 and beyond.** FWC staff arrived at this objective after carefully considering 2 main factors: (1) the distribution and status of the Florida population in 2000 and (2) the FWC listing criteria for a Species of Special Concern. These factors and the process used to develop the conservation objective are discussed in detail below.

1. **Florida Distribution and Status.** In 2000, the Florida range of the red-cockaded woodpecker was approximately 46,100 square miles. (This number was calculated by using Arcview GIS software to draw a convex polygon around the outer perimeter of the species' known range in Florida). The species occurred in the Panhandle and throughout the Peninsula to northern Monroe County, but its distribution was highly fragmented and restricted to areas where suitable habitat remained (Figure 1). Thirty-four properties were known to support at least 1,404 active clusters (1,123 potential breeding groups) (Table 1). The number of active clusters per property ranged from 1 to 486 (1 to 389 potential breeding groups), but only 4 properties (12%) supported more than 50 active clusters (40 potential breeding groups). Although property ownership favored state lands (53%), federal lands supported the most active clusters (77%) (Table 1). In 2000, 4 federal properties in northern Florida accounted for 70% of the Florida population -- the Osceola National Forest, Eglin Air Force Base, and the Apalachicola and Wakulla Ranger Districts of the Apalachicola National Forest (Table 1). Thus, despite the species' widespread distribution in Florida, numerically the population was biased towards a few, federal properties in the northern part of the state.
2. **FWC Listing Criteria.** To be designated a Species of Special Concern, a species only needs to qualify for listing under 1 of the 5 designated criteria (Appendix 3). However, to be removed from the Species of Special Concern list, a species must meet the requirements for delisting under all 5 criteria. In 2000, the range-wide population of red-cockaded woodpeckers was estimated at 5,627 active clusters (4,502 potential breeding groups) and 14,068 adults (based on an average of 2.5 adults per active cluster, U.S. Fish and Wildlife Service 2003). Florida represented 25% of the range-wide population, with an estimated 1,404 active clusters (1,123 potential breeding groups) and 3,510 adults (Tables 1-2). Based on the premise that Florida will continue to represent at least 25% of the range-wide population, FWC staff reviewed the 2000 population data for Florida relative to the listing criteria for a Species of Special Concern. The purpose of this exercise was to determine Florida's minimum population requirements for delisting under each criterion (Table 2). (Generation time under Criteria A and C was based on 6.5 years, which is the estimated generation time for male red-cockaded woodpeckers [FWC, unpublished data].)
 - a. **Criterion A: A range-wide population reduction of less than 20% over the next 20 years (i.e., 3 generations).** To qualify for delisting under this criterion, Florida would need to maintain at least 81% of the 2000 population through the year 2020 and beyond. This equates to 1,137 active clusters (910 potential

- breeding groups) or a maximum rate of decline of 13 active clusters (11 potential breeding groups) per year.
- b. **Criterion B: A range-wide extent of occurrence and range-wide area of occupancy of at least 7,700 and 770 square miles, respectively.** To qualify for delisting under this criterion, the range of the Florida population would need to be 1,925 square miles or larger (25% of 7,700 square miles). Florida also would need to maintain at least 1,072 active clusters (858 potential breeding groups). (This number was derived by dividing 193 square miles [25% of 770 square miles] by the average minimum home range size reported for the red-cockaded woodpecker [0.18 square miles, Engstrom and Sanders 1997]).
 - c. **Criterion C: At least 10,000 mature individuals in the range-wide population and less than a 10% decline over the next 20 years (i.e., 3 generations).** In 2000, there were an estimated 14,068 adults in the range-wide population. Assuming that the range-wide population will remain above 10,000 adults, Florida would need to maintain at least 91% of its 2000 population through the year 2020 to qualify for delisting under this criterion. This equates to 1,277 active clusters (1,022 potential breeding groups) or a maximum rate of decline of 6 active clusters (5 potential breeding groups) per year.
 - d. **Criterion D: At least 1,000 mature individuals in the range-wide population.** To qualify for delisting under this criterion, there would need to be at least 250 adult red-cockaded woodpeckers (25% of 1,000) in the Florida population.
 - e. **Criterion E: A less than 10% probability of extinction in the wild within 100 years.** Although the probability of range-wide extinction has not been calculated for the red-cockaded woodpecker, recent 100-year simulation models for individual populations have revealed the importance of population size and spatial configuration to long-term viability (Letcher et al. 1998, Walters et al. 2002). Collectively, these models predict that under optimum habitat conditions populations with at least 40 and possibly as few as 25 territories can persist when territories are tightly aggregated in space, whereas populations with 250 or more territories can persist regardless of territory configuration. Between these 2 extremes, persistence varies considerably as a factor of the number, density, and distribution of territories. For example, a population with 50 tightly clumped territories will be more stable than a population with 100 widely distributed territories. Long-term viability also is affected by immigration. In general, an immigration rate of 1 to 10 migrants per generation is considered sufficient to protect against genetic drift (Mills and Allendorf 1996). Based on an estimated generation time of 6.5 years for male red-cockaded woodpeckers (FWC, unpublished data), this equates to a rate of 0.15 to 1.5 migrants per year. Furthermore, a rate of at least 2 migrants per year is considered necessary to protect against inbreeding depression, especially in populations with less than 50 potential breeding groups (Daniels et al. 2000, U.S. Fish and Wildlife Service 2003).

From a numerical standpoint, if the Florida population remained stable for the next 20 years, the minimum delisting requirements for a Species of Special Concern would be met under Criteria A through D. In fact, theoretically, the Florida population could decline by 9% to 1,277

active clusters (1,022 potential breeding groups) and still meet the minimum requirements for delisting under Criterion C (Table 2). However, the long-term viability models for individual populations strongly suggest that maintaining the Florida population at or below the 2000 level would be problematic given the species' fragmented distribution and the preponderance of properties with less than 50 active clusters (40 potential breeding groups). Moreover, a stable or declining Florida population would not provide a buffer against losses that might occur elsewhere in the species' range.

Upon consideration of these factors, FWC staff concluded that setting the conservation objective at the 2000 status level or at the minimum delisting size for a Species of Special Concern would not insure achievement of the stated conservation goal for the red-cockaded woodpecker. Instead, FWC staff determined that it would be more appropriate to use a geographic approach to derive the numerical component of the conservation objective. To this end, FWC staff established 6 discrete management units in Florida (Table 1) and identified 17 metapopulations therein (Table 3, Figures 2-7). Management unit boundaries were determined somewhat arbitrarily and designed to ensure a geographically balanced approach to conservation efforts and the continued representation of habitat types and genetic resources. Individual properties and/or populations within management units were assigned to metapopulations based on geographic proximity, existing or previous red-cockaded woodpecker status, and known immigration rates (or lack thereof). FWC staff then developed and applied the guidelines listed below to the targeted management units and metapopulations. The guidelines attempted to address both the numerical and spatial components of long-term viability, and included 2 important assumptions. First, all metapopulations and populations would be managed to achieve optimal habitat conditions and spatial configuration of active clusters, and second, periodic exchange of genetic material would occur within and among metapopulations either through immigration or translocation.

1. **By the year 2020, achieve at least a 20% increase in the Florida population.** This increase is considered necessary to secure a stable or increasing Florida population of red-cockaded woodpeckers and to offset declines that might occur elsewhere in the species' range.
2. **By the year 2020, secure and maintain (a) at least 100 potential breeding groups per management unit, (b) at least 2 metapopulations per management unit, and (c) 40 or more potential breeding groups in at least 1 of the metapopulations in each management unit.** This distribution is necessary to maintain existing habitat types and genetic resources, and to buffer losses related to hurricanes or other catastrophic events. It also will facilitate a statewide approach to conservation efforts and insure that each management unit contains at least 1 metapopulation large enough to persist for 100 years.
3. **By the year 2020, increase metapopulations within management units (a) to at least 10 potential breeding groups if below 10 potential breeding groups in 2000, (b) to at least 25 potential breeding groups or 15% growth (whichever is higher) if above 9 but below 25 potential breeding groups in 2000, (c) to at least 40 potential breeding groups or 15% growth (whichever is higher) if above 24 but below 40 potential breeding groups in 2000, (d) by at least 15% or a net increase of 10 potential**

breeding groups if above 39 but less than 100 potential breeding groups in 2000, and (e) by at least 10% if above 99 potential breeding groups in 2000. These increases are necessary to achieve a 20% increase in the Florida population and to maximize the number of metapopulations capable of long-term persistence.

The application of these guidelines to the targeted management units and metapopulations yielded the conservation objective proposed by FWC staff (Table 3).

APPENDIX 7. Preliminary list of Florida properties from which the red-cockaded woodpecker had been extirpated as of the year 2000.

Property	Ownership	Management Unit	County
Austin Cary Memorial Forest	State	Northern Peninsula	Alachua
Beef Research Unit	State	Northern Peninsula	Alachua
Chinsegut Nature Center Wildlife and Environmental Area	State	North-Central Peninsula	Hernando
Disney Wilderness Preserve	Private	South-Central Peninsula	Osceola, Polk
Dupuis Environmental Area	State	Southern Peninsula	Martin, Palm Beach
Gainesville Municipal Airport	City	Northern Peninsula	Alachua
Jonathan Dickinson State Park	State	Southern Peninsula	Martin, Palm Beach
Morningside Nature Center	City	Northern Peninsula	Alachua
Point Washington State Forest	State	Western Panhandle	Walton
Split Oak Forest Mitigation Park	County	South-Central Peninsula	Orange, Osceola
Sunland Training Center	State	Northern Peninsula	Alachua
Tall Timbers Research Station	Private	Eastern Panhandle	Leon
Topsail Hill Preserve State Park	State	Western Panhandle	Walton
Tosahatchee State Preserve	State	South-Central Peninsula	Brevard, Orange
Venus Flatwoods Preserve	Private	South-Central Peninsula	Highlands

APPENDIX 8. Preliminary list of Florida properties where red-cockaded woodpeckers are known to occur but a baseline survey of potential breeding groups had not been completed or recently conducted as of the year 2000.

Property	Ownership	Management Unit	Metapopulation
Apalachicola Ranger District, Apalachicola National Forest	Federal	Eastern Panhandle	Apalachicola
Bull Creek Wildlife Management Area	State	South-Central Peninsula	Three Lakes
Central Florida Reception Center, South Unit	State	South-Central Peninsula	Big Econ
Citrus Tract, Withlacoochee State Forest	State	North-Central Peninsula	Withlacoochee
Escape Ranch	Private	South-Central Peninsula	Three Lakes
Lathrop Bayou	Federal, Private	Western Panhandle	None
Private Lands (Collier Co.)	Private	Southern Peninsula	Big Cypress
Private Lands (Glades Co.)	Private	South-Central Peninsula	Fisheating Creek
Private Lands (Osceola Co.)	Private	South-Central Peninsula	Three Lakes
Triple N Ranch Wildlife Management Area	State	South-Central Peninsula	Three Lakes
Wakulla Ranger District, Apalachicola National Forest	Federal	Eastern Panhandle	Apalachicola

APPENDIX 9. Preliminary list of Florida properties where red-cockaded woodpeckers are not known to occur but suitable habitat may have existed as of the year 2000.

Property	Ownership	Management Unit	County
Cary State Forest	State	Northern Peninsula	Duval, Nassau
Pine Log State Forest	State	Western Panhandle	Bay, Washington
Raiford Wildlife Management Area	State	Northern Peninsula	Bradford, Union
Seminole State Forest	State	North-Central Peninsula	Lake
Twin Rivers State Forest	State	Northern Peninsula	Hamilton, Madison, Suwannee
Yucca Pens Unit, Babcock/Webb Wildlife Management Area	State	Southern Peninsula	Charlotte, Lee

APPENDIX 10. Federal recovery standard for managing red-cockaded woodpecker foraging habitat on public lands (U.S. Fish and Wildlife Service 2003).

1. Area Provided by Site Productivity.
 - a. In systems of medium to high site productivity (site index 60 or more, for the dominant pine species), provide each group of woodpeckers 49 ha (120 ac) of good quality habitat as defined below. A specific exception to this area requirement is made for longleaf and shortleaf (*Pinus echinata*) habitat types under group selection silviculture. [See the federal recovery plan (U.S. Fish and Wildlife Service 2003) for details.]
 - b. In systems of low site productivity (site index below 60, for the dominant pine species), provide each group of woodpeckers 80 to 120 ha (200 to 300 ac) of good quality habitat as defined below. [Note: The federal recovery plan recognizes that some aspects of the following definition of good quality habitat may not be achievable on extremely dry or wet sites and encourages the development of site-specific guidelines when appropriate.]
2. Definition of Good Quality Foraging Habitat. Good quality foraging habitat has some large old pines, low densities of small and medium pines, sparse or no hardwood midstory, and a bunchgrass and forb groundcover. Good quality habitat has all of the following characteristics:
 - a. There are 45 or more stems/ha (18 or more stems/acre) of pines that are ≥ 60 years in age *and* ≥ 35 cm (14 in) dbh. Minimum basal area for these pines is $4.6 \text{ m}^2/\text{ha}$ ($20 \text{ ft}^2/\text{acre}$). Recommended minimum rotation ages apply to all land managed as foraging habitat [i.e., 120 years for longleaf and shortleaf pine and 100 years for loblolly (*P. taeda*), slash (*P. ellioti*), and pond (*P. serotina*) pine].
 - b. Basal area of pines 25.4-35 cm (10-14 in) dbh is between 0 and $9.2 \text{ m}^2/\text{ha}$ (0 and $40 \text{ ft}^2/\text{acre}$).
 - c. Basal area of pines < 25.4 cm (10 in) dbh is below $2.3 \text{ m}^2/\text{ha}$ ($10 \text{ ft}^2/\text{acre}$) *and* below 50 stems/ha (20 stems/acre).
 - d. Basal area of all pines ≥ 25.4 cm (10 in) dbh is at least $9.2 \text{ m}^2/\text{ha}$ ($40 \text{ ft}^2/\text{acre}$). That is, the minimum basal area for pines in categories (a) and (b) above is $9.2 \text{ m}^2/\text{ha}$ ($40 \text{ ft}^2/\text{acre}$).
 - e. Groundcovers of native bunchgrasses 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 5 years.
 - f. No hardwood midstory exists, or if a hardwood midstory is present it is sparse and less than 2.1 m (7 ft) 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 0.8 km (0.5 mi) of the center of the cluster, and preferably, 50 percent or more is within 0.4 km (0.25 mi) of the cluster center.
- i. Foraging habitat may not be separated by more than 61 m (200 ft) of non-foraging areas. Non-foraging areas include (1) any predominately 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.

APPENDIX 11. Federal stability standard for managing red-cockaded woodpecker foraging habitat on private lands (U.S. Fish and Wildlife Service 2003).

1. Provide each group of red-cockaded woodpeckers a minimum of 689 m² (3000 ft²) of pine basal area, including only pines ≥25.4 cm (10 in) dbh.
2. Provide the above pine basal area on a minimum of 30.4 ha (75 ac).
3. Count only those pine stands in suitable habitat that, for this standard only, has each of the following characteristics:
 - a. Stands that are at least 30 years old and older.
 - b. An average pine basal area of pines ≥25.4 cm (10 in) between 9.2 and 16.1 m²/ha (40 and 70 ft²/ac).
 - c. An average pine basal area of pines <25.4 cm (10 in) less than 4.6 m²/ha (20 ft²/ac).
 - d. No hardwood midstory or if a hardwood midstory is present, it is sparse and less than 2.1 m (7 ft) in height.
 - e. Total stand basal area, including overstory hardwoods, less than 23.0 m²/ha (80 ft²/ac).
 - f. Recommend that all land counted as foraging habitat be within 0.4 km (0.25 mi) of the cluster, and that any stand counted as foraging habitat be within 61 m (200 ft) of another foraging stand or the cluster itself.
 - g. Frequent prescribed burning of foraging habitat, especially during the growing season, is strongly recommended. Development and protection of herbaceous groundcovers facilitates prescribed burning and benefits red-cockaded woodpeckers.

APPENDIX 12. Recommended sample sizes for monitoring active clusters and potential breeding groups (U.S. Fish and Wildlife Service 2003).

Parameter ^a	Metapopulation Size (PBG)				
	<30	30-99	100-249	250-349	≥350
AC	100% per year	100% per year	100% per year	100% every 2 years	Consult with USFWS and FWC
PBG	100% per year	100% per year	50% per year	33% per year	Consult with USFWS and FWC

^aAC = active cluster, PBG = potential breeding group.