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Status of Three Colonies of Red-cockaded Woodpeckers at Pee Dee National Wildlife Refuge, Anson County, N.C.

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Red-cockaded Woodpeckers (*Picoides borealis*) are scarce in the piedmont of the Carolinas. Several piedmont nesting localities have been reported in recent years, including Pee Dee National Wildlife Refuge in Anson County, N.C. (Potter et al. 1980). The purpose of this paper is to provide information on the status of several colonies at Pee Dee National Wildlife Refuge.

Red-cockaded Woodpeckers are or were inhabiting three colonies. Colonies 1 and 3 are near the junction of SR 1634 and 1627. Colony 2 is near refuge headquarters. All three are in mature mesic pine forest with a well-developed understory and midstory dominated by Sweetgum (*Liquidambar styraciflua*), oaks (*Quercus* sp.), hickories (*Carya* sp.), dogwoods (*Cornus* sp.), and Red Maple (*Acer rubrum*). Colonies 1 and 3 are on land with minimal relief; Colony 2 is on undulating land with a maximum relief of 6 m.

Cavity trees in the three colonies are almost all Loblolly Pines (*Pinus taeda*). The only exceptions are one Longleaf Pine (*P. palustris*) in Colony 1 and one Shortleaf Pine (*P. echinata*) in Colony 2. Diameter at breast height, height, and age of the cavity trees were measured by several foresters directing the Youth Conservation Corps summer program and by refuge personnel. No data were collected prior to 1977; age of the trees is updated to the year 1985. Almost all cavity trees were measured for the three variables. The exceptions are a tree that was dead when discovered in Colony 2 and the 243-year-old Longleaf Pine, which died in 1983 in Colony 1. Diameter, height, and age of the cavity trees (Tables 1-3) generally agree with these measurements from throughout the Red-cockaded Woodpecker's range except in southern Florida (see Table 1 in Shapiro 1983).

Compass directions of cavities and start holes were designated into four compass categories: north (316°-45°), south (136°-225°), east (46°-135°), and west (226°-315°).

TABLE 1. Diameter at breast height (in cm) of Red-cockaded Woodpecker cavity trees at Pee Dee N.W.R., Anson County, N.C.

	COLONY 1 (N = 12)	COLONY 2 (N = 43)	COLONY 3 (N = 10)
mean	49.1	43.2	38.3
S.D.	7.5	7.6	5.9
range	34.5-62.7	29.5-59.4	28.4-46.2

TABLE 2. Height (in m) of Red-cockaded Woodpecker cavity trees at Pee Dee N.W.R., Anson County, N.C.

	COLONY 1 (N = 12)	COLONY 2 (N = 43)	COLONY 3 (N = 10)
mean	24.5	22.7	25.0
S.D.	2.3	3.6	3.1
range	18.3-26.8	16.8-33.2	20.1-27.8

TABLE 3. Age in 1985 of Red-cockaded Woodpecker cavity trees at Pee Dee N.W.R., Anson County, N.C.

	COLONY 1 (N = 11)	COLONY 2 (N = 43)	COLONY 3 (N = 10)
mean	104.1	87.9	82.4
S.D.	18.7	14.5	23.5
range	72-123	57-122	50-115

Not all cavities and start holes were measured in cavity trees in the three colonies, but the total number (N = 155) measured is the majority of cavities and start holes present (Table 4). Cavities and start holes were oriented in a predominantly western direction, which is consistent with orientation data found elsewhere in the Red-cockaded Woodpecker's range (Shapiro 1983 and references therein).

A brief history of each colony is given below.

Colony 1. This colony was discovered in the summer of 1973. G.A. Carowan Jr. reported fresh pitch streaks present on 12 October 1974, but he found no birds. Refuge personnel found only old pitch streaks in late spring of 1979 and believed the colony was abandoned. No evidence of activity was reported from 1980 to 1984. There are 12 cavity trees in this colony.

Colony 2. This colony was discovered in 1977. Refuge personnel found a pair nesting in 1979 (tree 25) and in a different tree in 1980 and 1981 (tree 1). These nest trees are close together (64 m apart). Adults were observed entering the nest cavities to feed calling young. Both nest cavities face southwest and are 12.2 m high. Estimates of adults present each year were five from 1979 to 1981. From 1982 to 1984, no adults nested, and the number of birds declined to three by 1984. In 1982 and 1983, fresh plates and resin wells were found at cavities (trees 1, 23, and 43), but no fresh work was found in 1984 except for start holes at three other trees. There are 44 cavity trees in this colony.

Presently, all the cavities in tree 1 have been enlarged by Pileated Woodpeckers (*Drycopus pileatus*). The cavity in tree 25 is no longer active for it has been enlarged by Pileated Woodpeckers. Cavities in trees 23 and 43 had not been enlarged through 1984. Tree 19, with two fairly recent start holes at 7.7 and 15 m, was used by breeding Northern Flickers (*Colaptes auratus*) in 1979 and possibly afterwards. Flickers also

TABLE 4. Compass directions of cavities and start holes in Red-cockaded Woodpecker trees at Pee Dee N.W.R., Anson County, N.C.

	N	S	E	W	TOTAL
Colony 1	12	11	6	36	65
Colony 2	19	6	9	34	68
Colony 3	<u>5</u>	<u>5</u>	<u>7</u>	<u>5</u>	<u>22</u>
Total	36	22	22	75	155
Percent	23	14	14	48	

nested in an enlarged old Red-cockaded Woodpecker cavity in tree 3 in 1983, and Wood Duck (*Aix sponsa*) eggshells were found at the base of the same tree. Six more roost trees, used in 1978 and 1979, are no longer active.

It is conjecture whether or not more than one clan formerly occupied the area of Colony 2. The number of cavity trees (44) and their grouping in relation to habitat, relief, distance, and total area suggest two clans may have formerly been present. Research methods capable of delimiting contiguous colonies are beyond the scope of the present study.

Colony 3. This cavity was discovered on 15 May 1978 when refuge personnel saw one Red-cockaded Woodpecker and found one cavity tree. They found a nest in tree 2 in 1979, found nesting activity but no specific nest in 1980, and found a nest in tree 1 in 1981. These cavity trees are close together (41.5 m apart). Adults were observed entering the nest cavities to feed calling young both years. The nest cavity in tree 1 faces south and in tree 2 faces east. Both nest cavities are 7.7 m high. Estimates of adults present each year were four from 1979 to 1981. From 1982 to 1984, no adults nested, and the number of birds declined to 2 by 1984. Fresh plates and resin wells were found at cavities in trees 1 and 10 in 1983 and 1984. Tree 2 is no longer active, for the former nest cavity and all other cavities or start holes have been enlarged by Pileated Woodpeckers. The same enlargement has also occurred at trees 4 and 6, the only other likely future cavity trees. Trees 1 and 6 were used as roosts through at least 1981. There are 10 cavity trees in this colony.

The YCC cleared brush and hardwoods from the immediate vicinity of each cavity tree in all three colonies during several years from 1977 to 1982. In addition, Colonies 2 and 3 were burned in 1978 and 1981 to control hardwoods. This clearing and burning has not deterred Pileated Woodpeckers and Red-bellied Woodpeckers (*Melanerpes carolinus*), as well as other species, from continuing to enlarge Red-cockaded Woodpecker cavities and start holes. Of 61 cavity trees checked, Pileated Woodpeckers have enlarged 35 (57%). Six other cavity trees enlarged by other woodpeckers account for a total of 67% enlarged by woodpeckers. All 12 cavity trees in abandoned Colony 1 have been enlarged by woodpeckers, 11 by Pileated Woodpeckers. Half of the cavity trees in Colony 3 and 61% in Colony 2 have been enlarged by woodpeckers. At both of the two active colonies, enlargement continues to occur on several of the few remaining

trees suitable for nesting, including former nest trees. This encroachment by Pileateds and other woodpeckers has often been associated with cavity trees that are near bottomland habitats. Colony 2 is adjacent to hardwood stream-river bottoms, and both Colonies 2 and 3 are surrounded by mature mesic forest.

Many mature pines, primarily Loblolly, occur at each of the three colonies, and have dbh, height, and age characteristics similar to those of the cavity trees (Tables 1-3). Small cleared areas around cavity trees have not prevented competition by Pileateds and other woodpeckers, and these species have usurped Red-cockaded Woodpecker use at many cavity trees. Consequently, all hardwood brush, sawtimber, and pulpwood were removed in 1984 at all three colonies. In addition, pine sawtimber and pulpwood were removed in 1984, and the basal area of pine was reduced to 21.4 to 24.4 m² as recommended in the Red-cockaded Woodpecker Recovery Plan. Future plans entail continued control of hardwoods by removal and by summer burning (after mid-July). It is hoped that proper management of habitat for the Red-cockaded Woodpecker will alleviate woodpecker competition at cavity trees and allow reuse of pines or use of new pine trees by the few remaining Red-cockaded Woodpeckers.

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Heterospecific Vocal Mimicry by Blue-gray Gnatcatchers

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Bent (1949) quoted Pickens who stated that the Blue-gray Gnatcatcher (*Poliophtila caerulea*) has "decided powers of mimicry," imitates in "almost whispering tones," and may be called the "Little Mockingbird." Fehon (1955) stated "Gnatcatchers are good mimics and the notes of ten other species were recognized." Root (1969) did not state that the Blue-gray Gnatcatcher mimics but mentioned its territorial song, which is sometimes whispered, included "long rambling series of warbles, whistles, and calls which are commonly assumed to function as the Gnatcatcher's song." Root noted this whispered song is associated with courtship activities. Kroodsmma and Baylis (1982) did not list the Blue-gray Gnatcatcher as a heterospecific vocal mimic in their comprehensive