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INTERCOLONY MOVEMENTS OF RED-COCKADED WOODPECKERS IN SOUTH CAROLINA

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Abstract.—Movements of individuals within a marked population of Red-cockaded Woodpeckers (*Picoides borealis*) were monitored from 1977 through 1984 in South Carolina. Intercolony movements included dispersal and subsequent resighting or recapture of 11 individuals, including some pairs. Movements were associated with reduced availability of roost cavities, many of which were occupied by southern flying squirrels (*Glaucomys volans*), or followed precipitous removal of the understory within colony sites or both.

MOVIMIENTO ENTRE COLONIAS DE *PICOIDES BOREALIS* EN CAROLINA DEL SUR

Sinopsis.—Desde el 1977 al 1984 se monitoreó el movimiento entre colonias de individuos de *Picoides borealis* pertenecientes a una población estudiada en Carolina del Sur. Los movimientos entre colonias incluyeron la dispersión y el subsiguiente avistamiento o recaptura de 11 individuos, incluyendo parejas. Se asoció el patrón de conducta al reducido número de cavidades apropiadas para pernoctar (la mayoría de las cuales estaban ocupadas por ardillas [*Glaucomys volans*]), remoción abrupta de la vegetación en el suelo del bosque o una combinación de ambos factores.

While the Red-cockaded Woodpecker (*Picoides borealis*) is considered sedentary, its home range often exceeds 80 ha (Delotelle et al. 1983, Hooper et al. 1982, Nesbitt et al. 1978, Nesbitt et al. 1983, pers. observ.). This endangered species is one of the most social woodpeckers, living in family units called "clans" and using groups of cavity trees referred to as "colonies" (Jackson and Thompson 1971). It is a cooperative breeder, with no more than one breeding pair per clan. Young females typically disperse by late winter or early spring following their natal year (Jackson 1987).

Movements out of the clan's home range include individuals that roost in one colony, but belong to another, usually adjacent colony (Hooper and Lennartz 1983, pers. observ.). Movement among colonies is poorly documented, but knowledge of such movements is important to understanding the population dynamics of this endangered species. In this paper

I describe movements of marked birds and factors that seemed to precipitate those movements.

STUDY AREA AND METHODS

This study was carried out on the Savannah River Plant (SRP) in Aiken, Barnwell, and Allendale counties, South Carolina, between 1977 and 1984. The SRP is a 777 km² U.S. Department of Energy facility that included about 38,851 ha of pine forests managed on a 60-yr rotation and 4943 ha managed on an 80-yr rotation in 1977 (U.S.D.A. Forest Service 1977). Prior to the SRP construction in the 1950s, much of the land was agricultural. Most pine forests at SRP have their origin in massive plantings of loblolly (*Pinus taeda*), longleaf (*P. palustris*), and slash (*P. elliottii*) pine. Most of the then existing older stands and older remnant trees have since been clearcut and the sites planted in pine plantations or used for non-forest purposes. The forests on the SRP are managed by the U.S. Forest Service.

Red-cockaded Woodpeckers were present in remnant mature pine stands in the 1950s (Norris 1963), although no effort was made to census the population until 1977 when Robert McFarlane, Joe Skorupa, U.S. Forest Service personnel, and I identified 16 active colonies (Fig. 1). I monitored those colonies between 1977 and 1984, documenting a decline in population to two colonies with breeding pairs and three colonies with lone males in 1984.

Between 1977 and 1983, I color-banded 14 male and 15 female nestling and 12 male and six female adult Red-cockaded Woodpeckers at SRP. Status of the colonies and colony affiliations of banded birds were determined on 367 visits to colonies made on quarterly to monthly intervals during this period. Intercolony movements were documented by recapture and/or multiple sightings of color-banded birds. Birds were recaptured on the roost or in mist nets at approximately 1–2-yr intervals in order to replace faded or pine-gum-covered color bands. Each bird was seen subsequent to capture or recapture in the colony of capture or recapture, suggesting that the captures did not cause dispersal.

RESULTS AND DISCUSSION

Six males and five females were sighted or recaptured in colonies other than the colony in which they were banded (Table 1). Of these, four were banded as adult females, three as adult males, two as nestling females, and two as nestling males. Distances moved between colonies ranged from 1 to 30 km. Three birds, one male and two females, were recorded in three colonies each. Another male was recorded in five different colonies. Although dispersal of young females from natal colonies is normal (Jackson 1987), individual histories document factors that may have precipitated other intercolony movements.

Case 1.—In 1978, male “Blue” was a fledgling of a pair occupying Colony 3 (Fig. 1), where the breeding male occupied the only active cavity tree and the breeding female occupied a cavity in a dead pine. The fledgling

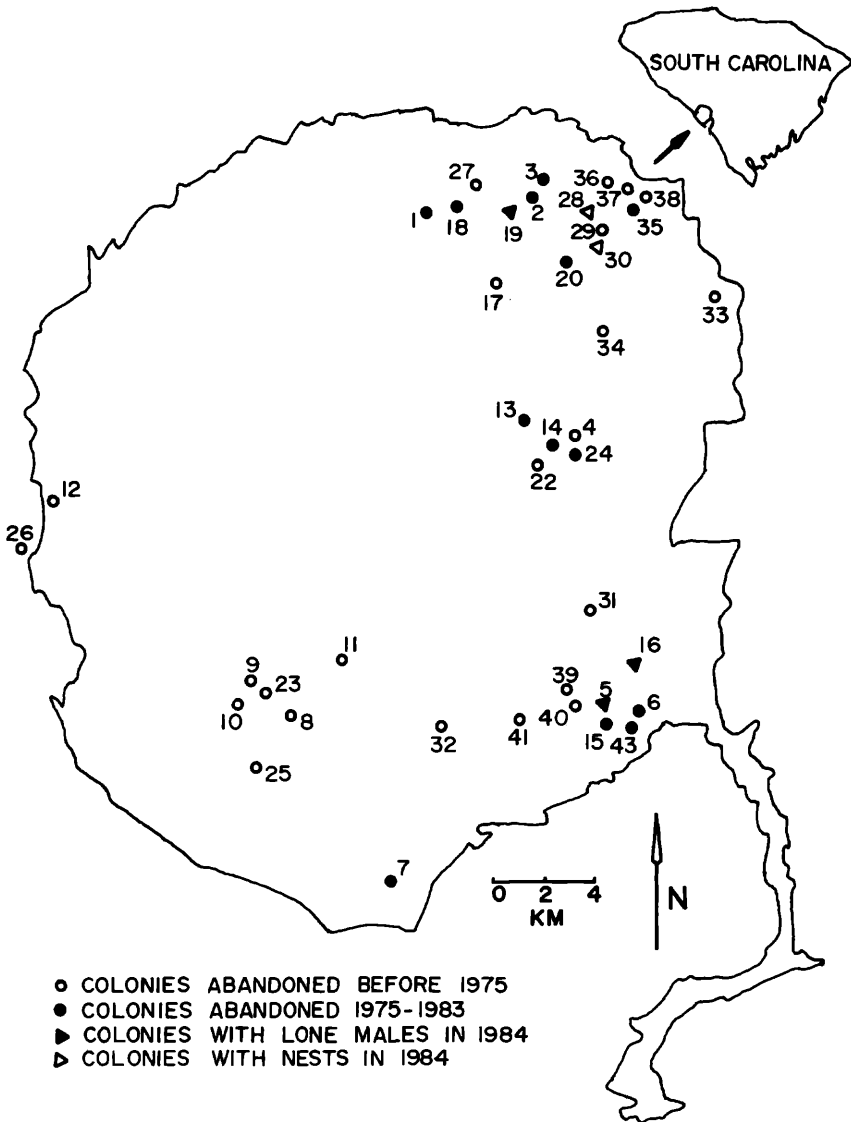


FIGURE 1. Red-cockaded Woodpecker colony distribution and status at the Savannah River Plant, South Carolina, 1975-1984.

remained with his parents, roosting in another cavity in the dead tree, until at least 8 Sep. 1978. By 9 Oct., however, Blue was gone from Colony 3. He was next seen on 25 Nov. 1978 foraging with the clan occupying Colony 2, but roosting in a cavity in Colony 19. That arrangement continued through May 1979. By June 1979, however, Blue was roosting

TABLE 1. Movements of banded Red-cockaded Woodpeckers among colonies at the Savannah River Plant, South Carolina, 1977-1984.

Color ID	Sex	Age when banded ^a	Colony from	Colony to	Season of movement ^b	Distance moved (km)
Yellow	F	A	2	20	W	3.0
Green	M	A	7	3	?	30.1
Lt. blue	F	A	19	2	SpSuFW	1.3
Blue	M	N	2	19	SpSuFW	1.3
			3	19	F	1.6
			19	2	Sp	1.3
			2	19	Sp	1.3
			19	30	Sp	3.2
			30	28	Sp	1.0
Orange	M	N	7	30	F	28.0
			30	28	Sp	1.0
Red	F	N	20	30	?	1.9
			30	28	?	1.0
Lt. green	F	N	20	19	?	3.2
Purple	M	A	19	2	W	1.3
Pink	F	A	28	35	?	3.4
			35	2	?	4.8
Dk. green	F	A	19	2	W	1.3
Blue/green	M	A	35	30	?	3.2

^a A = adult; N = nestling.

^b W = Jan.-Mar.; Sp = Apr.-Jun.; Su = Jul.-Sep.; F = Oct.-Dec.

in the breeding female's cavity in Colony 2, and she was roosting in the open. Blue helped with incubation and feeding of the young in Colony 2 in 1979. While two young fledged, both disappeared by the end of July. The breeding pair and Blue remained together until at least 22 May 1980, when the pair was last seen. At that time southern flying squirrels (*Glaucomys volans*) occupied two of the four usable cavities in the colony and were seen at all four cavities.

Blue remained alone in Colony 2 through February 1981. On 14 Mar. 1981, he was seen near Colony 19. Two days later I found him in Colony 30, copulating with the resident female, "Red." The resident male of Colony 30 ("Orange," see Case 2) had disappeared in the fall of 1980 following extensive clearing of understory vegetation in the colony. A very hot prescribed burn on 14 Mar. 1981 resulted in many pines being badly burned into the canopy—including Orange's roost tree. Blue and his new mate abandoned Colony 30 and were next seen with a nest and young in Colony 28 on 21 May 1981. They nested there each year through 1984, but disappeared from that site following extensive removal of understory vegetation.

Case 2.—Male Orange was fledged in Colony 7 in May 1979. He disappeared in the fall of 1979 and was next seen with a nest and young in Colony 30 on 21 May 1980. His mate, "Red" (see Case 1), had fledged in Colony 20 in 1979 and had disappeared from there in December 1979. The male had dispersed approximately 28 km.

Case 3.—Female “Pink” was banded as the breeding female in Colony 28 in Mar. 1981. Between 14 Mar. and May 1981, Forest Service crews drastically altered the habitat within Colony 28 by cutting all understory hardwoods. Pink and her mate disappeared during or immediately following the habitat alteration. Pink was next seen with a new, unbanded mate and a nest with young in Colony 35, on 21 May 1981. In late 1981, Forest Service crews visited that colony and removed all understory bushes and trees. Both Pink and her mate disappeared. Pink was last seen on 8 Mar. 1982, when she was observed going to roost in Colony 2.

Case 4.—Male “Blue/Green” was the son of Pink and her unbanded mate in Colony 35 (Case 3). Although Pink and her mate disappeared following removal of understory in Colony 35, Blue/Green remained through May 1982. Blue/Green then disappeared and was next seen 19 Feb. 1983 as he was going to roost in Colony 30. He remained as the lone bird in Colony 30 until the spring of 1984, when he was joined by an unbanded female. They successfully nested in 1984.

Other cases.—Each of the other intercolony movements observed involved movements to and from adjacent colonies. Flying squirrels were present in each of the colonies involved and occupied cavities that had been used as roost sites. Other species (Red-bellied Woodpeckers, *Melanerpes carolinus*; Great Crested Flycatchers, *Myiarchus crinitus*) occasionally (for intervals of 1–3 mo) used an inactive cavity as a nest or roost site. Only four of 16 active colonies included as many as three active cavities at any one time. Additional cavities present were incomplete, enlarged by Pileated Woodpeckers (*Dryocopus pileatus*), or in dead trees. This scarcity of cavities and the excavation of only three new cavities among 16 active colonies in eight years reflect the paucity of older pines needed by the birds for cavity excavation (Jackson et al. 1979). Cavity scarcity almost certainly heightened competition for roost sites within clans and among species. Such competition may have resulted in an unusual amount of intercolony movement. “Light Blue,” for example, was repeatedly and alternately seen in both Colony 2 and Colony 19. Once Light Blue was seen to “race” another Red-cockaded to a cavity at roost time, only to lose, whereupon it left the colony area to roost elsewhere.

By 1980, most of the Red-cockaded Woodpecker colonies on the SRP had not been burned for 10 or more years, and the developing hardwood understory was threatening the continued active status of many colonies. These are birds of mature, open pine forests, and the birds are known to abandon cavity trees and colony sites when the understory reaches cavity height (Jackson 1987). Recognizing the threat, the U.S. Forest Service decided to mechanically clear the understory and did so at each site beginning in 1980. The understory removal operations were quick and drastic, involving the use of chain saws to leave virtually no bushes or understory trees within colony areas.

In addition to the movements of birds described here, five Red-cockaded Woodpecker colonies at SRP (Colonies 2, 7, 20, 35, and 43) were aban-

done by the birds during 1981–1982 following removal of all understory trees and bushes. At least one adult bird disappeared or moved to another colony from each of the remaining five colonies on the SRP following understory removal.

Four birds that abandoned colonies following drastic management took up residence at colonies where such management had already been accomplished and where other birds had left: (1) The pair from Colony 28 disappeared following management, but the female showed up at Colony 35. (2) The pair from Colony 30 went to Colony 28 when the understory of 30 was cut. And (3) a juvenile male left Colony 35 when it was managed and ended up at Colony 30.

No amount of observation could prove any single factor as being causative for the movements documented here. Indeed, many factors probably were involved. A scarcity of cavities and the presence of flying squirrels at all colonies set the stage and may have precipitated some movements. Human activities almost certainly influenced others.

Of 15 adult Red-cockaded Woodpeckers known at 10 colony sites in 1980–1981 prior to cutting of understory within colonies, only three lone males remained in the same colony as long as 3 mo following clearing, and six adults were not seen after the clearing. It is possible that timing of the understory clearing might have influenced the birds, since some was done during the nesting season. Noise of the chain saws may have been a factor (Jackson 1983). However, the changes, while resulting in a habitat that might seem optimal for the species, may have been too abrupt and too extensive. Although an excessive hardwood understory is detrimental to Red-cockaded Woodpeckers, some hardwood understory may be important in providing diversity and increased stability in the arthropod fauna that the birds depend on for food. Since some birds moved to colonies that had already been subjected to understory removal, such habitats were acceptable, although perhaps not optimal.

The birds had survived in colonies where the hardwoods were growing up. While abandonment due to hardwood encroachment may have been an ultimate fate, I believe that management to turn the habitat trend around should have been more conservative and done over a period of a few months to a few years. In short, I suggest that although the habitat may not have been optimal, the birds had a niche gestalt for the place where they were living. When the change was abrupt, they abandoned.

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