the young were approximately 7–8 weeks old at 4 undisturbed heronries and 1 disturbed heronry. Though we realize fledging rate should have been measured at more disturbed sites, it is worth mentioning that the fledging rate at the Wheeler heronry (disturbed) was 2.2 young per nest ($n = 21$), one of the lowest figures obtained at any of the heronries.

Nest occupancy, defined as active nests in relation to total number of nests, was significantly higher in undisturbed areas. In the disturbed areas 67% ($n = 162$) were active; 93% ($n = 573$) were active in undisturbed areas ($\chi^2 = 79.8$, $p < 0.005$). Within a disturbed heronry the probable effect of human disturbance on nest occupancy could be quantified. For example, the average distance from the nearest point of disturbance to active and nonactive nests in the Wheeler heronry (Table 1) was 148 m ($n = 21$) for inactive nests and 219 m ($n = 33$) for active nests ($t = 5.62$, $p < 0.001$). This phenomenon of nesting activity shifting away from the point of disturbance was observed in those heronries with logging operations nearby and such a movement in any direction was unnoticed in undisturbed heronries.

This study was in part financed by a grant from the Portland Audubon Society and a NSF Grant (GY-11420).—David F. Werschkul, *Dept. of Zoology, Miss. State Univ., Mississippi State 39762;* Ellen McMahon, *Oregon Inst. of Marine Biology, Charleston 97420;* and Mary Leitschuh, *Dept. of Biology, Univ. of Oregon, Eugene 97421.* *Accepted 13 October 1975.*

Swimming by Bobwhite chicks.—On 8 June 1975 when driving over an unpaved rural road in Granville County, North Carolina, I saw a female Bobwhite (*Colinus virginianus*) cross the road close in front of me with her brood of 8 recently hatched chicks. On coming to the water-filled ditch at the side of the road the mother bird flew across the ditch, and the chicks followed her by swimming. The ditch was about 0.5 m wide and the water in it a maximum of 8 cm deep.

To further test the swimming ability of Bobwhite chicks, I later placed 2 three-day-old incubator-hatched chicks on the water of a farm pond about 1 m from its shore. The chicks quickly swam to shore, swimming with the head and about ½ of the body above the surface of the water.

I know of no published report of swimming by Bobwhite chicks. However, Stoddard (The Bobwhite Quail its Habits, Preservation and Increase, Charles Scribner's Sons, New York, N. Y., 1931) noted that older Bobwhites swam when placed on a water surface after removal of their flight feathers. Also, Schorger (The Wild Turkey its History and Domestication, Univ. Okla. Press, Norman, 1966) reported Turkey (*Meleagris gallopavo*) poults being able to swim surprisingly well.—Paul A. Stewart, *203 Mooreland Drive, Oxford, NC 27565.* *Accepted 13 July 1976.*

Seasonal variation in foraging territory of Red-cockaded Woodpeckers.—The habitat requirements of the endangered Red-cockaded Woodpecker (*Dendrocopos borealis*) must be known in order to implement effective forest management practices for the preservation of this species. The few published estimates of territory size for this woodpecker are of 2 types. Estimates derived by dividing the size of a discrete area by the number of clans occupying that area can provide information on their minimum requirements if it is assumed that (a) all of the habitat is suitable, and (b) the birds are present at maximum density. This technique has produced estimates of 26.7 and 67.7 ha per clan in 2 Texas forests (Lay and Russell, Auk 87:781–786, 1970) and 86.2 ha per clan in South Carolina (Beckett, EBBA News 37:3–7, 1974).

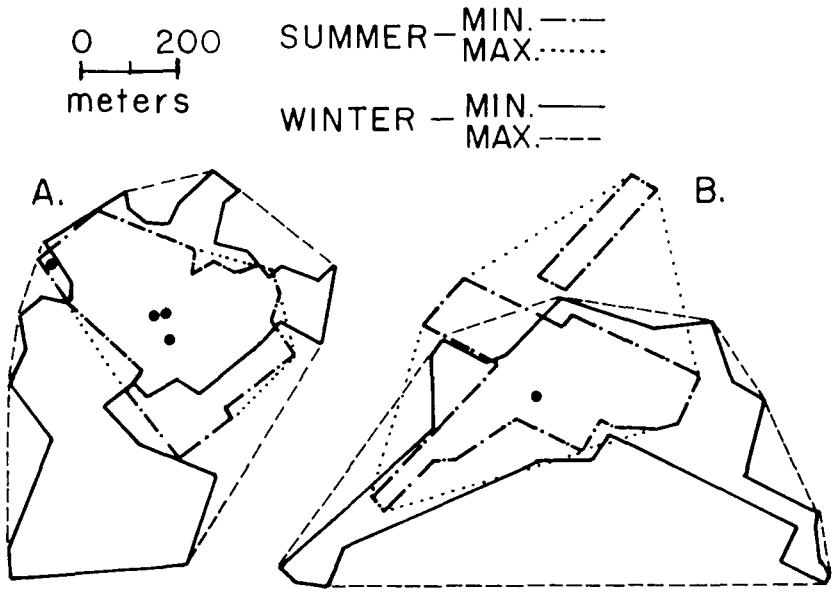

FIG. 1. Seasonal variation in foraging territories of Red-cockaded Woodpeckers.

The second technique is based upon direct observations of foraging by birds of a particular clan (a mated pair, their offspring, and/or associated helpers) and subsequent mapping to determine the area foraged. The obvious variables in this technique are the number of birds in the clan, the type of habitat foraged, and the season of the year when the birds are observed. This technique has produced estimates of 14.4 and 20.0 ha for adult pairs in spring in Florida (Crosby, p. 60–73 *in* R. L. Thompson, ed., The Ecology and Management of the Red-cockaded Woodpecker, Bur. Sport Fish. Wildl. and Tall Timbers Research Sta., Tallahassee, 1971) and 65.6 ha for a clan of 5 adults and 3 juveniles during summer in Florida (Baker, p. 44–59 *in* R. L. Thompson 1971).

We have determined the summer and winter foraging territories for 2 clans of Red-cockaded Woodpeckers on the Savannah River Plant, a 78,000 ha National Environmental Research Park of the U. S. Energy Research and Development Administration near Aiken, South Carolina. The birds were followed for periods of 2–7 h per day and each tree in which they were positively observed to forage was marked. The perimeter of the marked trees was subsequently mapped (Fig. 1) and the enclosed area calculated (Table 1). The maximum area foraged was determined by the polygon connecting the outermost foraging points. The minimum area foraged was determined by the irregular polygon connecting as many perimeter foraging points as practical.

Clan A consisted solely of a mated pair, without helpers, which hatched one chick. This nestling survived at least 19 days but failed to fledge, possibly because nearby logging operations disrupted feeding visits to the nest cavity by the adults. The birds were observed foraging for 36 h in June–July and 32 h in January. The minimum area of 15.8 ha of longleaf pine (*Pinus palustris*) habitat foraged by these birds in summer increased 112.7% to 33.6 ha in winter. The extreme distance across the territory was

TABLE 1

ESTIMATED FORAGING TERRITORIES OF RED-COCKADED WOODPECKERS

	Clan A	Clan B	A–B Δ %
SUMMER			
minimum	15.8 ha	18.3	15.8%
maximum	17.6	35.9	104.0
min–max Δ %	11.4%	96.2	
WINTER			
minimum	33.6 ha	31.4	–7.0%
maximum	48.3	65.8	36.2
min–max Δ %	43.8%	109.8	
TOTAL AREA			
minimum	37.3 ha	36.6	–1.9%
maximum	48.3	80.4	66.5
min–max Δ %	29.5%	119.7	
WINTER EXPANSION			
minimum	112.7%	71.6	
maximum	174.4	83.3	

1.0 km and the furthest point from the occupied cavity trees was 0.7 km. The large winter expansion may have been affected by logging operations which clearcut 8 ha and selectively removed a large number of other mature pines from the territory. The total territory was principally longleaf pine of which 51% was 66 yrs or older, 10% 33 yrs, 22% 23 yrs, and 17% was clearcut between the summer and winter measurements.

Clan B also consisted of a mated pair, without helpers, who successfully fledged 2 nestlings. These birds were observed foraging for 45 h in June–July and 23 h in January. The adults foraged over 16.0 ha while feeding the chicks in the cavity. After fledging, foraging activity shifted somewhat to incorporate more distant pine stands (the disjunct summer minimum unit of Fig. 1B) but the total area foraged increased only 2.3 ha. The 2 juveniles were present in late August but the clan had decreased to 2 birds in January. The habitat occupied by these birds was a seemingly less optimal mixture of small hardwoods and longleaf and loblolly pine (*Pinus taeda*) with 36% loblolly 33 years or older, 60% longleaf 13 yrs, and 4% longleaf saplings. The minimum 18.3 ha foraged in summer increased 71.6% to 31.4 ha in winter. The 2 areas only partially overlapped and the combined annual territory was 36.6 ha. The extreme distance across the territory was 1.3 km and the furthest point from the single cavity tree was 0.8 km.

This study has provided an interesting evaluation of this technique for estimating territory size. A casual glance at the maps tends to substantiate equally casual field appraisal that Clan B required a larger foraging area in the "less optimal" habitat it occupies. Yet scrutiny of the minimum territory data reveals that while Clan B foraged a 15.8% greater area than Clan A in summer, they foraged 7.0% less in winter and 1.9% less total area. When the 16.0 ha foraged by Clan B adults before their nestlings fledged

is compared with the 15.8 ha foraged by Clan A adults, the 1.3% difference here, and the 1.9% difference in total area foraged, must be considered insignificant due to the crudeness of the technique. This tends to substantiate the opinions of other researchers that this species can be found in habitat judged unsuitable, by human standards, while often absent from areas similarly judged as ideal.

It is also of interest to note that neither pair of birds foraged in hardwood trees during peak food abundance in summer. However, 10% of all trees foraged in winter were hardwoods, indicating that the available prey on pine trees during this season may be a limiting factor.

These data clearly indicate that the increased winter foraging requirements of this species must be considered by forest managers attempting to reconcile the dictates of timber production with the conservation measures necessary to insure the future survival of these birds.

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Choice of nest boxes by Starlings.—In 1973 a series of experiments was started to determine the preferences of cavity nesting ducks for nest boxes with various features. The boxes were located in Ontario on Elk Lake (44°44′N 80°20′W) and Long Lake (47°52′N 79°00′W), Timiskaming District, on the Nonquon River (44°06′N 79°00′W), Ontario County and on the Lindsay sewage lagoons (44°20′N 78°46′W), Victoria County. Starlings (*Sturnus vulgaris*) made substantial use of these boxes and their preferences for certain features are clear.

The boxes used were made from 1.27 cm sheeting grade plywood with a rough surface. They were of standard design but there was some variation in the dimensions (generally less than 2%). Internally the boxes were approximately 45 cm high at the back with a sloping roof to a height of 42.5 cm at the front. They were 24 cm from back to front and 21 cm wide. The majority were mounted on trees close to the shore, facing the water, and about 3 m above ground. Branches and shrubs were trimmed so that the boxes were clearly visible from the water.

The first test was a comparison of interior colors. Two boxes were mounted about 60 cm apart on horizontal supports. One of each pair was painted black inside, the other was left unstained. All exteriors were stained light brown. All boxes had oval entrances 10.5 cm wide by 8 cm high, with the lower edge located 31 cm from the bottom of the box.

The second test provided a choice of 3 entrance hole sizes, large (13 × 10 cm), medium (10.5 × 8 cm) and small (7.5 × 6 cm). These boxes were mounted about 45 cm apart on horizontal supports nailed to trees. All boxes were stained gray externally and painted black inside. They were arranged in sets of 3 in a latin square design, with the sets spaced roughly 0.6 to 1.2 km apart.

Jackson and Tate (1974 Wilson Bull. 86:435–449) in a survey of nest box use by Purple Martins (*Progne subis*), House Sparrows (*Passer domesticus*) and Starlings