NOTES ON THE RED-COCKADED WOODPECKER IN TEXAS[1]

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THE survival of the Red-cockaded Woodpecker (*Dendrocopos borealis*) is endangered by its apparent requirement for old, diseased pine trees. This paper is a preliminary report on the species and its habitat in eastern Texas.

We made surveys on three study tracts, beginning in early June 1969, and located 86 trees with cavities cut by Red-cockadeds and with recent gum flow. These three tracts were unusual in having stands with pines more than 100 years old. No other comparable areas are known in the region. One tract was the south 530 acres of the Fairchild State Forest (Figure 1) in Cherokee County, 85 miles west of Louisiana and 165 miles from the coast. This is shortleaf and loblolly pine (*Pinus echinata* and *P. taeda*) with some hardwood midstory.

A second study area was the east 1,338 acres of Compartment 50, Angelina National Forest (Figure 2), near Zavalla, 46 miles from Louisiana and 100 miles inland, in Jasper County. This is cutover longleaf pine (*Pinus palustris*) type that was partly planted to slash pine (*P. elliottii*) about 30 years ago.

We studied a third series of trees in the Sam Houston National Forest near Cleveland in San Jacinto County, 85 miles from Louisiana and 75 miles from the coast. This is loblolly pine with some hardwood midstory. No density observations were made there.

We are pleased to report that this first study of a nongame bird with Texas Federal Aid funds seems to have general support. Perhaps the wildlife resource management program is maturing. We received full cooperation from the staffs of the U. S. Forest Service and the Texas Forest Service, and especially from Henry H. Swank and Don Young.

THE TREE

Red-cockaded Woodpeckers occur in all three kinds of native pines, loblolly, longleaf, and shortleaf. Few of the introduced slash pines are more than 30 years old, so they cannot be considered. The birds excavate holes in living pines for nesting and roosting, and perhaps for other purposes.

Most writers on this species refer to its preference for pines with redheart disease caused by the fungus *Fomes pini*. This is a common pine forest disease that enters trees through scars and broken limbs but rarely

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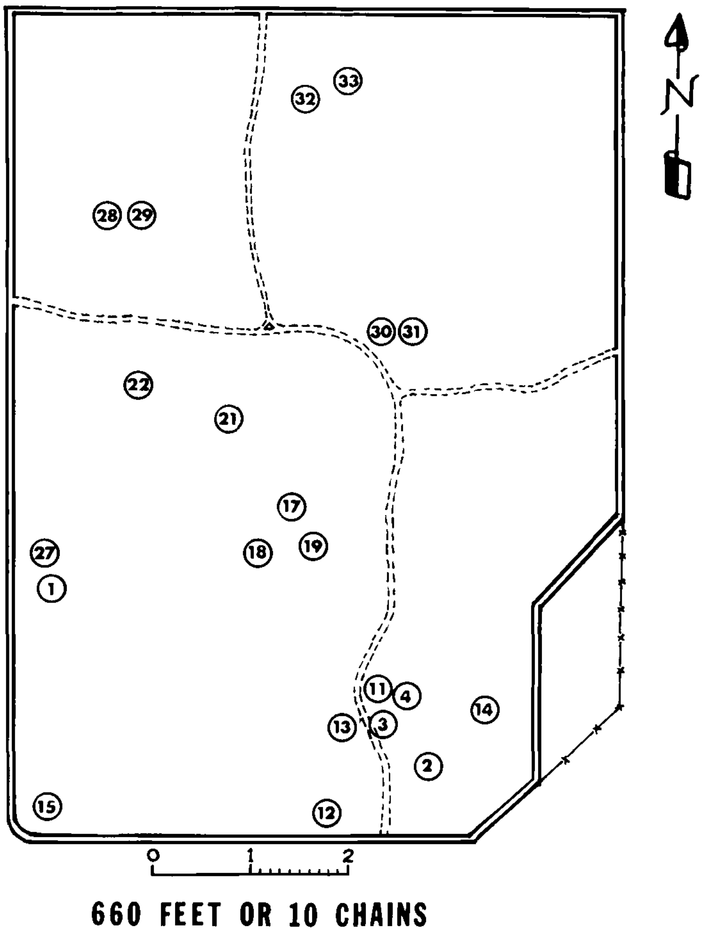

Figure 1. Distribution of trees with holes on 530 acres of Fairchild State Forest.

makes much progress in trees less than 75 years old. The disease softens and gradually consumes the heartwood, and makes for easier excavating. We found one exception—a nest cavity in a sound pine that we later cut and examined. The disease is common in the older stands, and the birds could hardly avoid it if they select the older trees for reason of size, wood density, gum quality, or some other condition.

Tree diameters at 4.5 feet ranged from 8.8–24.6 inches. The means on the three study areas (as shown in Table 1) were 15.8, 17.4, and 18.9 inches. Tree ages, among 60 bored, ranged from 56 to 193 years. The means on the three study areas were 103, 89, and 72 years. Growth rates

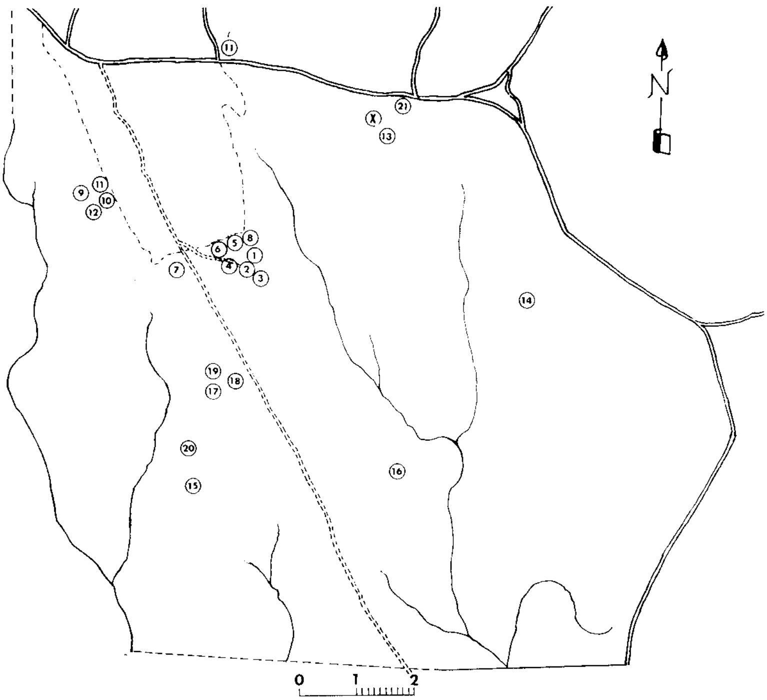

Figure 2. Distribution of trees with holes on 1,338 acres of Angelina National Forest.

ranged from 5–44 rings per last inch. Means were 14.1, 15.3, and 13.1 rings per inch. Growth in log scale for the last 10 years compounded annually was 2.3 per cent for one tract and 2.1 for the other two. No allowance was made for losses from mortality or defect.

Estimates of hole height ranged from 10–55 feet with means of 25, 30, and 35 feet. Three holes not on these tracts were 5, 6, and 9 feet high. Most holes were in the clear bole and not in the crown portion of the tree.

Density of the stand around each tree with a hole was compared with random density samples on two study areas and showed no significant differences by *t*-test. A prism was used to estimate square feet of basal area in overstory and in midstory. The trees used often occur in open stands because of tree size, age, and burning history. We could find no evidence that birds chose them for any aspect of tree stand density. Open glades and savannah-type stands do characterize many of the locations, but this goes with overmature trees, especially if prescribed burning has been practiced.

Several hole trees died during the last year. Causes of mortality were

TABLE 1
TREES USED BY RED-COCKADED WOODPECKERS ON THREE STUDY AREAS

Feature	Angelina	Fairchild	Cleveland
Diameter-number	32	35	19
Range	13.6–22.8	8.8–24.5	12.4–24.6
Mean	15.8	17.4	18.9
Confidence interval	±0.71	±0.91	±0.63
Age-number	24	27	9
Range	64–193	63–110	56–116
Mean	103.5	89.3	71.6
Confidence interval	±14.3	±4.8	±14.1
Rings last inch-number	31	35	15
Range	5–21	6–44	9–23
Mean	14.1	15.3	13.1
Hole height-number	72	52	26
Range	10–53	19–55	17–50
Mean	25.2	35.1	30.0
Basal area-number	22	35	19
Overstory range	30.90	30–130	40–90
Overstory mean	49.5	76.0	64.2
Overstory confidence interval	±7.24	±5.22	—
Midstory range	10–40	0–50	0–80
Midstory mean	8.6	18.3	14.7
Midstory confidence interval	±1.5	±5.6	—
Log scale—Scribner, 1959	214	243	286
Log scale—Scribner, 1969	272	301	357
Compound interest growth rate	2.3	2.1	2.1

lightning, insects, and possibly old age. The role of red-heart is unknown. In any case the birds and their holes appear to be a negligible factor in tree mortality. One hole is known to have been active for 11 years and another for 20. We estimate annual mortality of hole trees to be more than 5 per cent.

The modern concept of pine management in the South is even-age treatment in blocks that are periodically cleared and replanted. Recent statements by the chief forest economist (Guttenberg, J. Forestry, 67: 456, 1969) of the Southern Forest Experiment Station, U. S. Forest Service, clearly reflect the impact of modern forestry on the kind of trees the Red-cockadeds require:

"Barely 7 million acres of overmature timber remain [on large ownerships in the South], almost entirely in natural stands. The current annual rate of harvesting and clearing for regeneration is 1.1 million acres. It seems fair to assume that the largest share of this acreage is overmature timber, and hence that this category will be liquidated within a decade. . . .

"More than four out of five acres controlled by the pulp industry are being regulated to grow pine in 30 years or less; rotations of 20 to 25 years are common. . . . Other forest industries are chiefly interested in growing saw logs, veneer bolts, and poles and piling, yet most of their acreage is being operated under rotations of no longer

TABLE 2
DENSITY OF BIRDS AND HOLE TREES ON TWO STUDY AREAS

Feature	Angelina Forest	Fairchild Forest
Acres in study area	1,338	530
Number of colonies	8	8
Acres per colony	167	66
Estimated summer population	23 ± 4	26 ± 6
Acres per bird minimum	58	20
Mean distance between colonies	2,119 feet	1,643 feet
Confidence interval	± 404 feet	± 213 feet
Range in distance between colony centers	1,188–2,706 feet	1,188–2,376 feet
Number of hole trees	22	21
Acres per hole tree	60.8	25.2

than 40 to 50 years. These goals are in harmony with current silvicultural and economic knowledge of how to produce pulpwood or sawtimber efficiently."

The Red-cockaded's endangered status is reflected by the combined estimates of 2.1 per cent annual growth and 5 per cent mortality rate of the trees it prefers. To survive the species needs a steady ingrowth of older trees whose value to the landowner is declining. As these are harvested they are being replaced by pines that mature for cutting well before age 50.

COLONIAL SPACING AND TERRITORIAL IMPLICATIONS

Territory is any area that a species actively defends against intrusion, generally by others of the same species. It is thought to insure an adequate food supply during a critical period of the year, such as the time when the young are being reared. Our studies have revealed a uniformity in the spacing of the colonies, which may indicate a territorial pattern that exists from year to year.

No colony was found to have more than one nest tree even though three or four adult birds and several other trees with holes may have been present. This has been reported by Ligon (Auk, 87: 255, 1970) who refers to these extra birds as helpers; they generally assist the parents in the care and feeding of the young.

The 1,338 acres surveyed on the Angelina National Forest contained 22 active hole trees (Table 2) or one tree for 60.8 acres. In the Fairchild State Forest we found 21 hole trees in a 530-acre tract, or one tree for 25.2 acres.

These hole trees were generally clumped together into a fairly recognizable group that we refer to as a colony (Figures 1 and 2). These colonies contained one to eight hole trees and were uniformly spaced. The colonies on the Angelina National Forest had a mean distance between their centers of 1,643 feet and a range of 1,188 to 2,706 feet. The colonies on the Fairchild State Forest had a mean distance between their centers of 1,643 feet and a range of 1,188 to 2,376 feet. The minimum distance between colonies (1,188 feet) indicates that each colony requires at least 25 acres; the acres per colony on the two study areas were 66 and 167. Too few data are available to discuss the relation between numbers of birds in a colony and the size of the territory.

The function of the gum flow has been the subject of some speculation. We suggest that it may serve to identify and signal possession of a tree or small territory for the benefit of other Red-cockaded Woodpeckers. It does not deter larger animals from taking over the holes. We have seen flying squirrels (*Glaucomys volans*), fox squirrels (*Sciurus niger*), and Red-bellied Woodpeckers (*Centurus carolinus*) in trees with active gum flow, and we found gum flowing on several trees without holes, each of them close to hole trees, however. Dennis (Catalyst, 2: 12, 1968) and Ligon (op. cit.) also conclude that protection from predation is an inadequate explanation for the gum flow.

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