NATURAL HISTORY MISCELLANEA

Published by

The Chicago Academy of Sciences

Lincoln Park—2001 N. Clark St. Chicago, Illinois 60614 U.S.A.

No. 212 October 15, 1980

Potential Red-Cockaded Woodpecker Habitat in Maryland

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Since the Red-cockaded Woodpecker (*Picoides borealis*) was designated as an endangered species, at least two studies have reported habitat requirements of the species (Thompson and Baker 1971, Crosby 1971). Thompson and Baker (1971) pooled data on 232 Red-cockaded clan sites and 160 support stands from ten states (Table 1). Their study, however, did not consider the fringe habitat of areas such as Tennessee, Kentucky, Oklahoma, southern Florida and Maryland. This has resulted in a lack of information on these areas where geographic features and isolation may have altered the species habitat requirements.

In Maryland, the Red-cockaded Woodpecker is apparently no longer present (Devlin et al. In review). Its true historical status is unknown in the state. Records indicate that individuals, small flocks and one active cavity tree were observed between 1932 and 1958 (Anon. 1959, Meanley 1943, 1974, Stewart 1958). More recent sightings were reported in 1974 and 1976 (Meanley 1978, Willey pers. comm.). These sightings are considered to be of transients. A study was initiated in 1977 in the region of the historical sightings to inventory potential Red-cockaded Woodpecker habitat and determine if the species was present.

STUDY AREA

Nine study sites were chosen on the Lower Eastern Shore of Maryland (Figure 1) based in part on consultations with local foresters, landowners, and Blackwater National Wildlife Refuge personnel, as well as on aerial photographs, and extensive vehicular and foot searches.

Eight areas of potential Red-cockaded Woodpecker habitat were located in southern Dorchester County. The area is typified by

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Table 1. A summary of habitat variables associated with Red-cockaded Woodpecker colonies in all types of pine woods and in loblolly pine woods from Thompson and Baker (1971). Values have been converted to metric. All data is presented as the mean ± standard deviation (range).

	Type of Timber Stand			
	Colony Areas		Surrounding Areas	
Variable	All Types n = 229	Loblolly Pine n = 53	All Types n = 157	Loblolly Pine n = 42
Basal Area (m^2/ha)	12.14 ± 5.04 (1.25 - 32.06)	12.04 ± 4.44 (3.66 - 24.04)	12.81 ± 4.58 (2.29 - 32.09)	13.67 ± 4.77 (4.58 - 24.04)
Pine Stems (#/ha)	131.50 ± 81.31 (6 - 449.54)	104.26 ± 46.90 (14.82 - 251.0)	—	—
Hardwood Stems (#/ha)	9.11 ± 31.22 (0 - 251.94)	15.14 ± 37.00 (0 - 182.78)	— —	— —
Total Stems (#/ha)	140.62 ± 86.40 (6 - 597.47)	119.40 ± 64.91 (148.2 - 360.62)	157.81 ± 78.20 (29.64 - 449.54)	114.73 ± 49.15 (29.64 - 242.10)
Average Tree dbh (cm)	36.58 ± 8.15 (21.33 - 71.12)	40.18 ± 6.27 (24.13 - 54.36)	34.62 ± 7.95 (21.34 - 71.12)	28.29 ± 5.51 (17.97 - 32.16)
Average Tree Height (m)	24.89 ± 5.55 (9.14 - 51.82)	24.09 ± 4.30 (16.15 - 35.05)	22.89 ± 5.68 (10.97 - 37.18)	27.36 ± 3.65 (20.73 - 37.18)
Average Tree Age	81.67 ± 21.64 (30 - 170)	79.04 ± 13.01 (53 - 115)	78.85 ± 19.05 (37 - 133)	77.62 ± 11.13 (54 - 103)

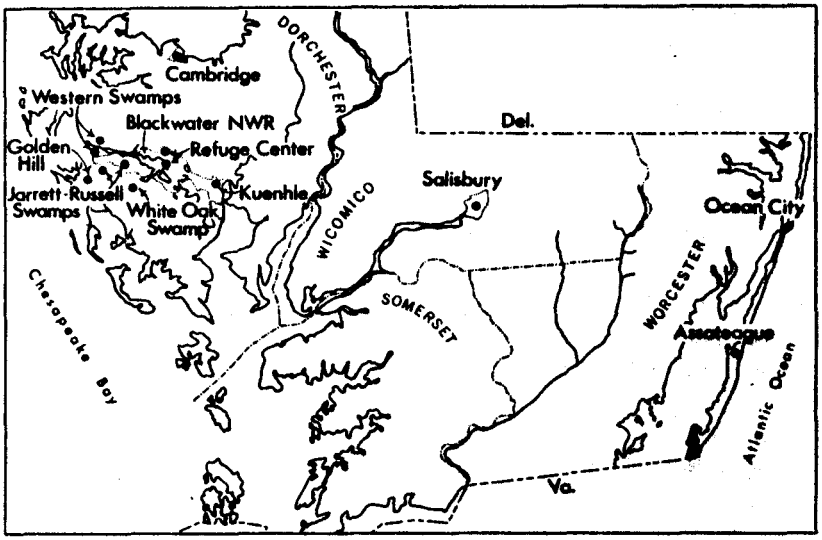


Figure 1. The location of potential habitat for the Red-cockaded Woodpecker in the four counties of Maryland's Lower Eastern Shore.

brackish marshes and lowlands, loblolly pine (*Pinus taeda*), and oak (*Quercus* spp.) forests. All areas were on or within one kilometer of the Blackwater Refuge and were in the vicinity of historical sightings. An additional potential habitat area was identified on Assateague Island National Seashore (Worcester County), where a Red-cockaded Woodpecker fledgling was reported by Meanley (1943). Assateague is a barrier island with scattered stands of loblolly pine.

METHODS

Potential Red-cockaded Woodpecker habitat was defined as "woods of more than 16.2 ha (40 acres), predominantly of pine trees older than 40 years with a relatively low stem density." This definition was based on descriptions of active colonies (Steirly 1957, Sprunt and Chamberlain 1949, Sutton 1967, Mengel 1965, Hopkins and Lynn 1971, Thompson and Baker 1971).

The potential habitat areas were sampled at a rate of one 0.04 ha plot per 20.2 ha for smaller regions and one plot per 60.6 ha for larger sites (greater than 100 ha). The sample plots were circular with a 22.6 m diameter and an area of 0.04 ha. Within each plot, the dbh of all trees greater than 7.6 cm in diameter was measured and recorded by species. Basal areas, stem densities, and average dbh were calculated from these data. Canopy height was determined using a range finder, and canopy closure was estimated along the

north-south and east-west axes of the circular plot using an ocular tube. The same axes were used in estimating shrub density. Two rectangular plots, 1.5 m wide and bisected by the axes were sampled for shrubs 1.5 m high and less than 5.1 cm in dbh (James and Shugart 1970). The largest dbh pine per plot was cored to determine its age. A linear regression of age and dbh was used to estimate the average tree age of the plot.

RESULTS

The nine potential Red-cockaded Woodpecker sites were statistically (Duncan's multiple range test, $\alpha = 0.05$; Student's t-test, $\alpha = 0.05$) reduced to six sites by combining sites which were in close proximity. All further statistical analyses were performed on six sites rather than the original nine sites.

Student's t-test ($\alpha = 0.05$) revealed that the habitats sampled were not different from the extreme reported basal areas. The mean basal areas ranged from 29.7 to 36.7 m^2/ha (Table 2).

The mean stem densities ranged from 409.0 to 1204.8 stems/ha for trees greater than 7.6 cm in dbh (Table 2). The average densities of all areas sampled exceeded the mean density of known Red-cockaded habitat in loblolly pine woods. A Student's t-test ($\alpha = 0.05$) was used to compare the remaining individual densities with the extreme reported density of 597.74 stems/ha. Kuenhle, White Oak Swamp, Western Swamps and Refuge Center were not significantly different from the extreme. The average hardwood stem densities (Table 2) exceeded the extreme reported values (Student's t-test, $\alpha = 0.05$) except for Assateague.

Average canopy heights ranged from 12.5 to 24.6 m (Table 2) and were in the lower range of active colonies. The low canopy heights are probably the result of stunted growth in the brackish lowlands as well as the young age of the woods. The mean canopy closure ranged from 75.0 to 86.1 percent.

Two areas, Assateague Island and White Oak Swamp, had average dbh values that were greater than the reported average for Red-cockaded habitat in loblolly pine woods. The remaining areas were in the lower portion of the reported range.

Estimated stand ages were not statistically different from the average ages of known Red-cockaded habitat (Student's t-test, $\alpha = 0.05$). The stand ages were estimated from samples from all study sites combined using a linear relationship between age (y) and dbh (x), $y = 1.57x - 2.70$; $r = 0.73$. The oldest pine sampled was 110 years old. Trees older than 100 years were found in Jarrett-Russell Swamp and White Oak Swamp. The oldest trees per sample plots ranged from 34 to 110 years.

Shrub densities were high in all areas and heart rot (*Fomes pini*) was visually or internally evidenced in only seven of the sample plots.

Table 2. Study site parameters for six locations sampled for the suitability of Red-cockaded Woodpeckers habitat[1].

Parameter	Jarrett-Russell Swamp	Kuenhle	Refuge Center	Western Swamp	White Oak Swamp	Assateague Island
Area (ha)	337	75	73	96	42	31
Basal Area (m^2/ha^2)	35.0 ± 6.3	36.7 ± 3.8	34.0 ± 4.5	34.4 ± 4.6	34.0 ± 3.8	29.7 ± 10.2
Density (#/ha)	1204.8 ± 425.4	1037.3 ± 83.6	1150.8 ± 193.6	1044.0 ± 445.4	790.0 ± 104.6	409.0 ± 190.0
Non-pine (#/ha)	609.3 ± 226.2	380.4 ± 184.5	414.9 ± 305.1	558.1 ± 97.2	642.2 ± 174.7	133.3 ± 188.4
Canopy Height (m)	19.1 ± 2.9	24.1 ± 1.8	17.0 ± 2.2	19.4 ± 5.8	17.0 ± 4.2	12.5 ± 3.5
Canopy Closure (%)	86.1 ± 4.0	75.0 ± 5.0	78.0 ± 3.5	85.0 ± 3.5	80.0 ± 0.0	80.0 ± 0.0
Shrub Density (#/ha)	1579.6 ± 926.0	3130.3 ± 1401.7	1565.1 ± 1354.7	1565.0 ± 1544.8	2152.1 ± 645.6	5282.4 ± 92.2
Average Pine dbh (cm)	22.6 ± 6.8	27.2 ± 5.8	22.7 ± 2.7	25.7 ± 11.4	29.8 ± 2.9	31.6 ± 2.0
Average Pine Age (yr)	32.5 ± 8.0	39.9 ± 6.3	32.6 ± 4.1	37.6 ± 15.2	44.0 ± 1.8	46.7 ± 0.5
Oldest Pine (yr)	110	87	81	69	103	86
Sample size	9	5	5	4	2	2

[1]means ± S. D.

[2]Basal area is for all stems greater than 7.6 cm.

Discussion and Conclusion

The areas sampled for potential Red-cockaded Woodpecker habitat in Maryland were generally younger, and denser with higher basal areas than areas containing active colonies.

An overall view of the habitat data indicate that Maryland has marginal Red-cockaded Woodpecker habitat. The present condition of the habitat is the result of lumber operations over the last 40 years. The marginal habitat, if left alone, should gradually improve with age.

Some management practices could hasten the process. Selective pine harvest, hardwood removal and controlled burning would reduce stem densities. Possible injections of heart rot into advanced age pines (Conner 1978) would increase the availability of potential Red-Cockaded Woodpecker cavity trees. These practices could be accomplished on Blackwater Refuge property along with management for the Delmarva Fox Squirrel (*Sciurus niger cinerus*) (Gary Taylor, pers. comm.).

Habitat improvements could promote the colonization of Maryland woods by transient Red-cockaded Woodpeckers. The habitat would also be available as a future re-introduction site for the species.

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ACKNOWLEDGEMENTS

Funding for this study was provided by the Maryland Department of Natural Resources, Wildlife Administration, and the U.S. Fish and Wildlife Service through the Maryland Federal Aid to Endangered Species Program Project E-1.