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THE POPULATION STATUS AND HABITAT ECOLOGY OF THE RED-COCKADED WOODPECKER
(Picoides borealis) IN VIRGINIA

Gary L. Miller, Mitchell A. Byrd, Ruth A. Beck

Because of its status as an endangered species and because of the uniqueness of certain aspects of its biology, much attention has been given, in recent years, to the Red-cockaded Woodpecker (Picoides borealis). Studies of the small populations of this species which occupy the periphery of its range in areas where habitat may be only marginally adequate, are an important means of establishing information concerning the geographic and ecological limitations of the species. Such information is necessary to make meaningful management decisions. The purpose of this study is to establish baseline information on the population status and habitat of the Red-cockaded Woodpecker in the northeastern most portion of its range, Southeastern Virginia.

Although historically the range of the Red-cockaded Woodpecker included portions of Ohio, New Jersey, and Maryland, the southeastern portion of the state of Virginia now represents the northern limit of its range (Jackson 1971). Estimates of the size and status of the species population in Virginia are few. The earliest sightings of Red-cockaded Woodpeckers were from Giles county in the southwest (Bailey 1913). Later Murray (1952) termed the species "a scarce resident of the southeastern corner of the state from Richmond south to Brunswick county^y and east" and also reported sightings in Dinwiddie, Chesterfield and Albermarle counties. The most recent observations have been in southeastern Virginia where Steirly (1957) reported clans in Prince George, Sussex and Southampton counties. Steirly placed the northern limit of the species in Virginia in central Prince George County and suggested the possibility of a breeding site as far west as Greensville county.

In their early reports Bailey (1913) and Murray (1952) made no estimate of the size of the population of the species in Virginia but indicated that it was extremely small. Steirly made no estimate of the number of birds utilizing the sites he observed. Jackson (1971) has most recently conservatively estimated the Red-cockaded Woodpecker population in the state to be approximately twenty-one individuals.

The preference of Red-cockaded Woodpeckers for mature pine forest habitat and the propensity of the species for excavating cavities in live mature, pine trees is well documented. Longleaf Pine (Pinus palustris) cavity trees measured in Florida averaged fifty years of age (Crosby 1971). Wood (1975) summarized from the literature the measurements for five commonly used pine tree species (Pinus taeda, P. palustris, P. echinata, P. serotina and P. elliotii) and reported that the mean age of the cavity trees in each species was at least seventy years. A study by Thompson and Baker (1971) in South Carolina also showed a preferential selection of older trees for cavity excavation in these species. Steirly (1957) measured five cavity trees (all P. taeda) in Virginia and found the average age to be just over one hundred years.

In his summary, Wood (1975) reported the average diameter of five of the tree species used for cavity excavation within the range of the Red-cockaded Woodpecker as greater than 15 in. He further indicated that the average heights of these trees were over 65 feet. Longleaf pines measured in Florida (Crosby 1971) showed an average diameter of 14 in. Work by Carter (1974) in North Carolina also indicates that large trees are preferred. Steirly (1957) did not measure the diameter of his sample of five cavity trees in Virginia but the mean height of the Loblolly pines he studied was 77.5 feet.

Several workers have given consideration to the importance of the support stand which surrounds the clan cavity trees to the survival of the population. Preferences in support stand composition appear to be as important as cavity tree preferences in maintaining stability.

Crosby (1971) quantified some attributes of the support stand in several clan sites in Florida in an attempt to estimate critical stand density. Although his results were inconclusive he noted the importance of low understory vegetation. In Oklahoma, understory and midstory heights tended to be low in areas utilized intensively by the Red-cockaded Woodpecker even though understory density was higher in these areas (Wood 1975). Over one half of the clan sites surveyed by Hopkins and Lynn (1971) in South Carolina had very light understory. Steirly (1957) found that support stands in Virginia generally contained a heavy undergrowth.

METHODS

The major portion of this study was conducted between May 1977 and July 1978 in portions of Isle of Wight, Prince George, Surry, Sussex and Southampton counties and the City of Suffolk in Southeastern Virginia. (Figure 1). An effort is being made to continually monitor the Red-cockaded Woodpecker activity in these areas and some information from followup studies in 1979 is included here. The majority of the timber land in the study area is being intensively forested and consists of second growth pine.

To assess the status of the Red-cockaded Woodpecker, a population survey was conducted. Initially, county foresters and timber company personnel in each county were contacted and questioned about locations of Red-cockaded Woodpecker cavity trees. All clan sites thus indicated were visited and the surrounding area searched on foot.

In an effort to estimate the amount of potential suitable habitat in the study area and to discover unknown clan sites, a road search was conducted. All roads which appeared on the most recent topographic maps were covered by car and each forest stand in view of the road was subjectively typed into one of the following groups: 1) Mature Pine: Stands which contained predominantly old pine, (Pine trees were considered old if the bark^k appeared smooth and the crown was rounded and worn); generally the more mature pines were larger in diameter at breast height, 2) Young Pine: those stands which contained few if any old pine and no hardwood; these were usually even aged stands under management, 3) Plantation Pine: Those stands which contained recently planted pines or which had recently been cut and were ready to be planted; 4) Mixed Pine-Hardwood: Those stands which were predominately hardwood but contained a moderate number of large pines, 5) Hardwood: Those stands which contained few if any large pines and were characteristic of low drainage areas.

The majority of the road survey work was done in the winter months when visibility was greatest. Extended observations were conducted during the breeding season and at roost time in winter and summer at all sites found during the road search. These observations provide the estimates of the population size.

The study of the Red-cockaded Woodpecker habitat included an analysis of the cavity and roost trees at each site, and the surrounding support stand at suitable clan sites. Four variables (cavity tree height, diameter and age) were measured on each cavity tree located during the study.

Seventeen Red-cockaded Woodpecker clan sites were suitable for support stand analysis because they showed recent activity and were located in forest stands that had not been recently lumbered.

Forty foot diameter plots were placed linearly within the colony at 40 yard intervals. All trees which were greater than 2 in. in diameter (at breast height) standing within these plots were measured for diameter and recorded as to species. Trees were classified by size into 6 groups: small (2 - 5.99 in.) pines (SPINES) and hardwoods (SHW), medium (6 - 12 in.) pines (MPINES) and hardwoods (MHW) and large (greater than 12 in.) pines (BPINES) and hardwoods (BHW).

RESULTS

POPULATION--Although a reasonably large number of clan sites was discovered during the survey, activity could be detected in only a few cases (Table 1) . Sussex county contained more clan sites (32) than any other county. In 1977, Red-cockaded Woodpeckers were seen in the vicinity of sixteen of these thirty-two sites and more than one bird was spotted at nine of the sixteen. However, in 1978, birds were seen at only nine of the sites and pairs of Red-cockaded Woodpeckers were observed at only three of the nine sites. Nesting activity at active sites in Sussex county was low. In 1977, nesting could be observed in only six of the sixteen active clans, and in 1978 only two sites showed nesting activity. Byrd and Beck discovered two actively nesting clans in the proximity of two abandoned sites in 1979.

Four possible clan sites were found in Surry County in the winter of 1978. No Red-cockaded Woodpeckers were seen at any of these sites during subsequent watches during the breeding season. The cavity trees in at least one site were cut in the summer of 1978. Five sites were located in Isle of Wight County. Red-cockaded Woodpeckers were seen at two of these in 1977 but no nesting activity could be found. No birds were seen in the county in 1978. We were aware of one clan in Prince George County and one in Southampton County. Three birds were seen in Prince George County

in 1977, an active nest could not be located however. No Red-cockaded Woodpeckers have been seen nesting in Isle of Wight, Surry or Prince George Counties in 1979.

POTENTIAL SUITABLE HABITAT--Results from the estimates of timber types indicate a paucity of mature pine habitat (Table 2). Stands of mature pine make up less than 7% of all typed stands and well over one half of all typed stands were considered young pine or plantation pine. Relatively large portions of the surveyed acreage consisted of stands that were considered pine-hardwood or stands that were predominately hardwood. Sussex county contained more mature pine timber than any of the other counties surveyed.

HABITAT--Like elsewhere in their range, in Virginia, Red-cockaded Woodpeckers choose large and old pine trees (mean DBH = 17.1 in., sd = 2.82, n = 90; mean height = 79.24 ft. sd = 15.7, n = 87; mean age = 88.32 years, sd = 14.91, n = 88) for cavity excavation. All but of three of the cavity trees found were Pinus taeda, the others were Pinus echinata.

The analysis of the support stand (Table 3) clearly indicates that the habitat being utilized by the Red-cockaded Woodpecker in Virginia is composed of intensively managed stands of young pine or bottom hardwood areas. Small and medium sized hardwood trees predominated in almost all the support stands measured. On the average about sixty percent (61.1%) of the stems measured in each support stand were hardwood. Generally, the number of large pine trees, which would provide the optimal cavity trees, was small. In only three sites did large pines comprise more than one-third of the total stems measured. Medium sized pine trees were not predominant in any of the support stands.

No direct measure of the understory density was attempted. With few exceptions, however, undergrowth was extremely thick and relatively tall. A good number of the cavity trees located in this study were surrounded by tall undergrowth that often reached to the level of the cavity.

DISCUSSION

Although it is impossible to estimate from this brief study the exact number of Red-cockaded Woodpeckers in Virginia, there is little doubt that the population is extremely low. Maximally, if all known clan sites were now to be active, as many as 95 individual Red-cockaded Woodpeckers would exist in Southeastern Virginia (assuming at least two adult birds per clan for those clans where fewer than two have been seen). It is doubtful, however, that the present population approaches this maximum number since only thirty-four individuals were seen during 1977 and 1978. Currently, we estimate the population to be comprised of not more than fifty Red-cockaded Woodpeckers.

Based on our estimate of the acreage of some general timber types it seems unlikely that there is adequate suitable habitat to support a substantial population of the species in the state. The overwhelming preponderance of young pine and plantation pine in the surveyed area is a good indication of the rather recent surge in timber cutting in Southeastern Virginia. Acreage forested in mature pine is small and fragmented. However, the present low population level of the species is likely not a manifestation of this recent cutting. As evidenced by the substantial amount of hardwood timber found in the surveyed area and the successional status of most of the mature pine stands in Virginia (Steirly 1957) it is questionable whether optimal habitat for Red-cockaded Woodpeckers

ever existed in large quantities in Virginia. The hardwood acreage that predominated historically in Virginia would not have provided as desirable a habitat as the fire climax forests of the southeast which were characterized by mature pine and which have been judged to be the optimal habitat for the species.

Although three of the clans reported active in 1957 by Steirly were observed to be active during the period of this study, the population in Virginia appears to be quite unstable and probably declining. Over fifty-three percent of the clan sites discovered during the initial survey were found to be abandoned, and thirty-five percent of the clans which were active in 1977 were not active in 1978. Furthermore, few of the active clans observed in 1977 and 1978 actually showed nesting activity.

This apparent instability of the Red-cockaded Woodpecker population in Virginia is due in large part to an inadequate nesting and foraging habitat. In many cases, support stands analyzed for composition contained what we feel to be adequate numbers of mature pine trees suitable for cavity excavation, and trees chosen for excavation have age and size attributes similar to those used in other areas of the range of the species. However, some characteristics of the support stand are not favorable. The extreme density and height of the understory vegetation is not typical of the more open habitat described by Crosby (1971) and Hopkins and Lynn (1971) for North and South Carolina respectively and is probably a detriment to efficient foraging and nest protection activities of the birds. Possibly a more important deficiency of the support stand is the general lack of medium sized pine trees, which have been found by Miller (1978) to be the preferred foraging substrate for Red-cockaded Woodpeckers in Virginia.

The nature of the breeding biology of the Red-cockaded Woodpecker

may also contribute to the population instability in Virginia. First year males often do not breed (Ligon 1970), and some clans may not nest each year (Wood 1975, Miller 1978). Even though the hatching rate is moderately high, the fledging success seems to be somewhat below the average for other cavity nesters (Ligon 1970). Additionally, post fledging care can be exceptionally long (Ligon 1970, Miller 1978). These nesting peculiarities in a marginal population such as the one in Virginia undoubtedly cause productivity to be critically low.

We conclude from our work that the Red-cockaded Woodpecker population in Virginia has always been a small peripheral group of birds which occupies a marginally favorable portion of the geographic range of the species.

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RED-COCKADED WOODPECKER STUDY AREA

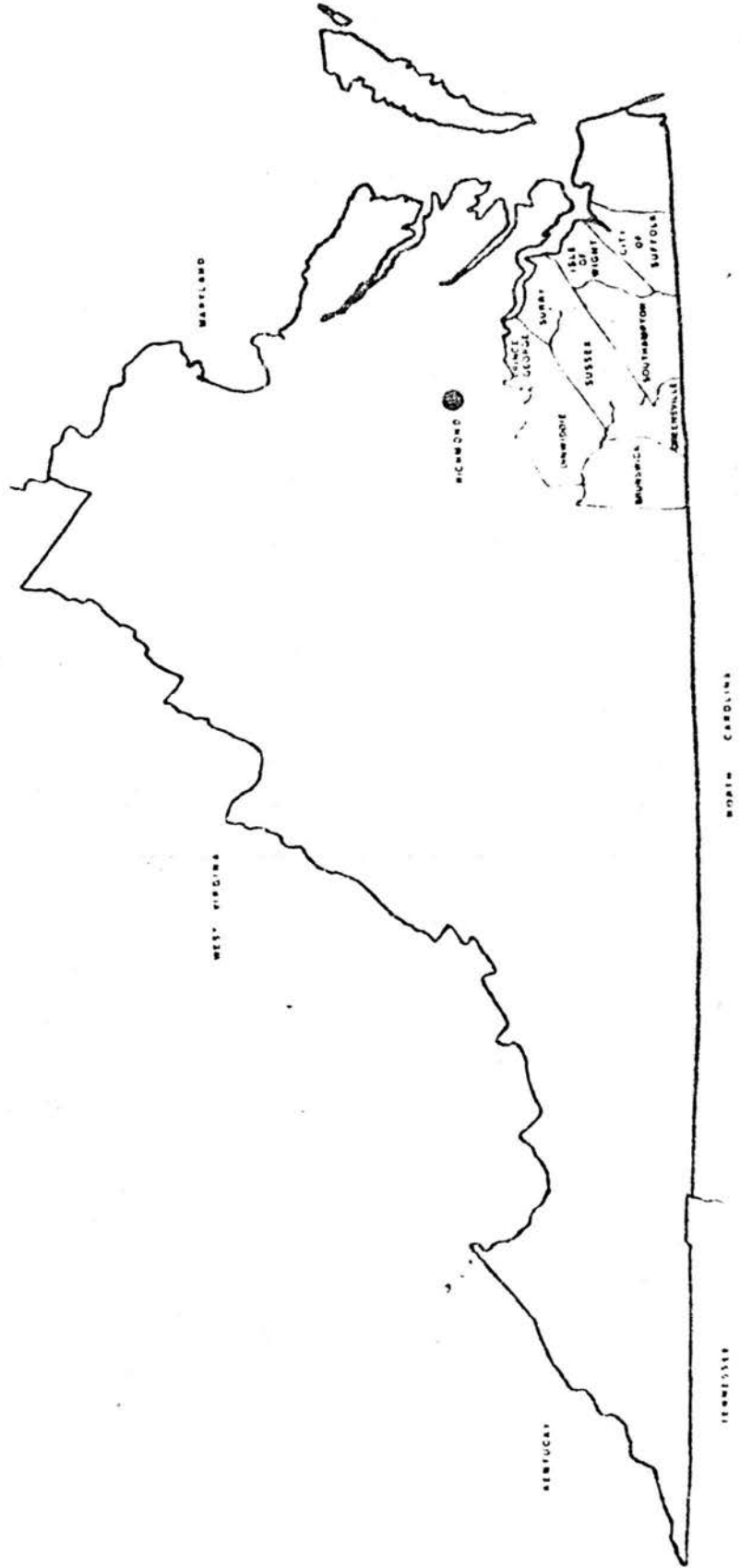


Figure 1: Red-cockaded Study AREA

TABLE 1. Estimate of numbers of Red-cockaded Woodpeckers sighted in Isle of Wight, Prince George, Surry, Sussex and Southampton Counties in 1977, 1978 and 1979.

County	#of Clan sites	1977	1978	1979
Isle of Wight	5	5	0	0
Prince George	1	3	0	3
Surry	4	0	0	0
Sussex	32	29	14	0
Southampton	1	0	0	0

Table 2. Percent of Timber Types in Surveyed Area

	SURRY#	ISLE OF WIGHT+	SOUTHAMPTON	SUSSEX
MATURE PINE	5.06*	4.96	2.84	6.06
YOUNG PINE	54.34	57.80	62.54	67.04
PLANTATION PINE	8.24	4.85	4.07	4.51
MIXED PINE- HARDWOOD	14.31	16.90	11.16	3.44
HARDWOOD	18.10	15.55	19.39	18.93

includes small part of Prince George County

+ includes small part of City of Suffolk

* % of total stands typed

RY OF MACROHABITAT DATA

NO.	SPINES	SHW	MPINES	MHW	BPINES	BHW
1	1.5*	33.3	22.7	9.1	33.3	0.0
2	19.3	48.8	9.6	3.0	19.3	0.0
3	.7	47.8	13.0	4.3	33.3	.7
4	20.7	30.0	5.7	16.1	16.1	11.5
5	4.5	63.3	5.6	5.6	21.0	0.0
6	5.6	62.0	11.1	5.8	19.0	1.6
7	27.2	64.6	1.0	0.0	5.2	0.0
8	8.7	60.0	10.2	2.4	18.9	0.0
9	4.5	62.5	2.7	10.7	12.5	7.1
10	.9	46.5	1.8	18.4	27.2	5.3
11	20.7	28.3	0.0	3.8	45.3	1.9
12	17.4	55.4	4.3	8.7	14.1	0.0
13	0.0	37.0	0.0	24.1	31.5	7.4
14	12.0	59.5	4.8	6.3	15.1	2.4
15	7.5	58.5	14.5	5.0	12.6	2.0
16	14.2	47.7	12.2	9.7	10.3	5.8
17	16.4	58.5	4.4	7.0	12.0	2.0

* % OF TOTAL STEMS MEASURED