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Tree Age and Cavity Initiation By Red-cockaded Woodpeckers

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ABSTRACT—The red-cockaded woodpecker, Picoides borealis, *is an endangered species that has declined in numbers with loss of nesting habitat. This loss is due partly to the increased prevalence of short rotations in southern pine forests. Data from Mississippi and South Carolina indicate that, for cavity initiation, the species needs living trees averaging approximately 75 years old for loblolly pine (*Pinus taeda*), and 95 years old for longleaf pine (*P. palustris*).*

Loss of habitat has been suggested as a major reason for the decline of the red-cockaded woodpecker, once widespread in southern pine forests (Jackson 1971). While some habitat loss can be attributed to restriction of fire and subsequent development of dense hardwood understories, a primary concern is the scarcity of older trees which the birds seem to require for excavation of their nesting and roosting places.

Because timber managers usually find it economically desirable to harvest trees before they reach ages at which the birds begin to make cavities, it would be useful to know the minimum rotation age that will allow for both management and expansion of existing colonies and establishment of new colonies. We present here an analysis of ages of cavity-start trees on the Noxubee National Wildlife Refuge in Mississippi and the Francis Marion National Forest in South Carolina. This information, taken in conjunction with results of other studies, makes it possible to offer tentative suggestions for forest managers.

Methods

Cavity status was determined by climbing to each cavity. Our sample was restricted to trees having starts but not previously completed cavities. All known cavity trees on Noxubee Refuge and all cavity trees within colonies under study on the Francis Marion National Forest were examined. In addition to start trees, Jackson was able to age 27 loblolly pines (on Noxubee Refuge) in which a first cavity had just been completed. Typically the birds take several months to several years to complete a cavity. Once completed, however, a cavity may be used for many years. Trees on the Francis Marion have not been monitored long enough for cavities to be observed from initiation to completion. All trees were bored at breast height, and approximate ages determined by counting growth rings and adding three years for loblolly and pond pine (*Pinus serotina*) and seven years for longleaf pine.

Table 1. Age (in years) of red-cockaded woodpecker cavity-start trees in South Carolina and Mississippi.

State and tree species	Trees	Age		
		Mean	Variance	Range
	Number	*Years*		
Noxubee National Wildlife Refuge, Mississippi				
Loblolly	83	74.4	14.1	40-116
Francis Marion National Forest, South Carolina				
Loblolly	22	77.4	11.4	58-96
Longleaf	34	95.4	20.1	61-131
Pond	4	85.3	32.5	54-119

Results

Loblolly pines with cavity starts averaged about 75 years old in both Mississippi and South Carolina (*table 1*). The four pond pines with cavity starts averaged 85 years old, and the longleaf pines in South Carolina averaged 95 years. *Figure 1* shows the range and pattern of tree ages. There is no significant difference in

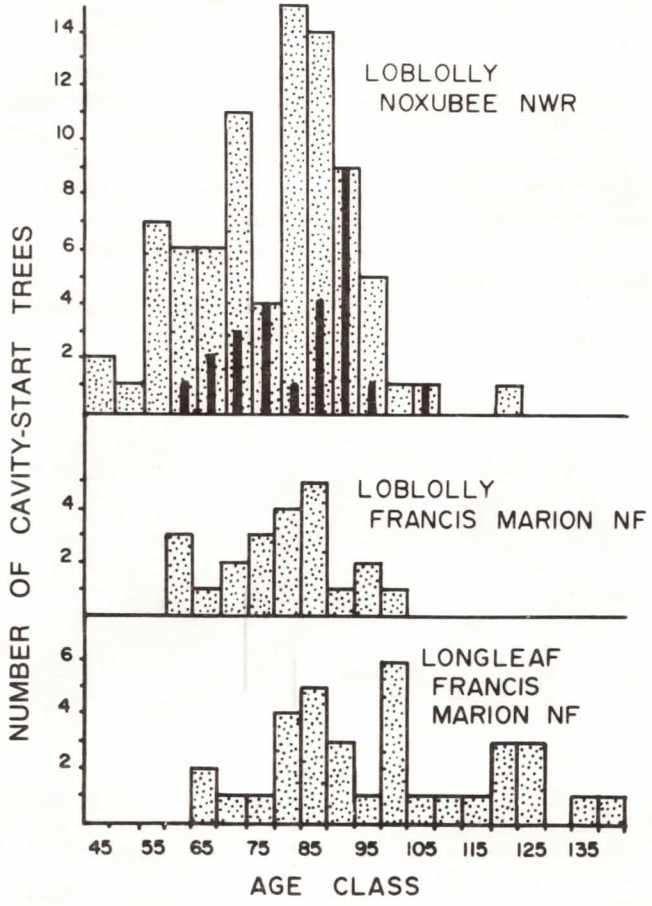

Figure 1. Start-tree ages (stippled bars) and ages, in years, of trees in which red-cockaded woodpeckers had just completed cavities (dark lines).

the mean ages for loblolly pines from Mississippi and South Carolina, but the combined set of loblolly pines averaged significantly younger than longleaf pines ($P<0.05$, t-test). Loblolly pines with newly completed cavities averaged 80.6 years (SD = 11.06, range = 60-103), 6.2 years older than the Mississippi loblolly pines with new starts.

Discussion

The range and frequency distribution of start-tree ages presented here further document that older trees are selected by red-cockaded woodpeckers. The significance of this selection is enhanced when one considers that, on both Noxubee National Wildlife Refuge and Francis Marion National Forest, trees younger than the mean cavity start age are much more abundant than older trees. For example, approximately 80 percent of the loblolly pine stands and 60 percent of the longleaf pine stands on the Francis Marion are less than 50 years old (USDA Forest Service 1977, percentages estimated from fig. 3, p. 24).

Another factor to consider is that cavity starts, particularly in younger trees, may not be completed for many years, if at all. Of 83 start trees aged by Jackson in 1972 and 1973, only 17 had completed cavities in 1977. Reasons for completion of some cavities and not others are not completely understood.

Jackson (1977) presented data indicating that loblolly pine cavity trees (including start trees) on Noxubee National Wildlife Refuge averaged about 76 years. Lay and Russell (1970) found average ages of 103, 89, and 72 years for three areas in Texas. Steirly (1957) reported an average age of 101 years for five cavity trees in Virginia. Baker (1971), in Florida, reported average cavity-tree ages of 83 years for loblolly, 92 for shortleaf (*Pinus echinata*), 87 for longleaf, and 76 for slash (*P. elliottii*). In South Carolina, Hopkins and Lynn (1971) reported average cavity-tree ages of 77.9 for loblolly, 85.3 for longleaf, 90.7 for shortleaf, and 70.0 for pond pine. Other studies have found similarly old trees used by red-cockaded woodpeckers throughout the species' range.

Though they are definitely the exception, some completed cavities are found in very young trees. As an extreme example, a colony under study by Jackson at the Savannah River Plant, Aiken County, South Carolina, has excavated two loblolly pines aged 34 and 37 years, and three longleaf pines aged 44, 54, and 82 years. Clearly, under some conditions red-cockaded woodpeckers can and will use younger trees. Selection of a tree for excavation is a result of a complex set of circumstances; it generally requires the availability of older trees but may be influenced by such things as site characteristics, prevalence of red heart disease (*Phellinus pini*), and individual variations in birds and trees.

Suggestions for Managers

Management of a colony area must provide for trees for immediate and for future use, but the presence of older pines is only one feature of the habitat requirements of this endangered bird—albeit a very critical one. Red-cockaded woodpeckers have frequently been characterized by their preference for relatively open forest. Basal area in active colony sites that Jackson has studied in Mississippi and South Carolina has ranged from approximately 40 to approximately 80 square feet per acre. Maintenance of an open forest generally requires periodic thinning and prescribed burning at about three-year intervals. Red-cockaded woodpeckers forage in pines of all ages and at times make extensive use of hardwoods. A diversity of tree species and ages may be important in assuring a diverse and stable arthropod population as food resources for the birds. Finally, several investigators have demonstrated that the home range of red-cockaded woodpeckers averages 200 acres (e.g., Skorupa and McFarlane 1976, Nesbitt et al. 1978, also Lennartz and Hooper personal observations, Jackson personal observations). When plans are developed for the species, such an area needs to be considered as a management unit. ■

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