success (Bovino and Burtt, Auk 96:628–630, 1979; Quinney and Smith, Can. J. Zool. 58: 1168–1173, 1980). The asynchronous hatch and consequent brood reduction may be a mechanism that enables herons to reproduce successfully in areas with highly variable foraging conditions.

In summary, nestling Great Blue Herons are close to adult size by the time they fledge. Culmen and tarsal growth show much less variation between years than body weight and wing length. Culmen and tarsal lengths are also useful indicators of nestling age. Nestlings that hatch last in their respective clutches grow more slowly and survive less well than those that hatch first, but overall nestling mortality is low on Boot Island.

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Downy Woodpecker sexes select different cavity sites: an experiment using artificial snags.—Primary cavity users such as woodpeckers typically roost and nest in cavities which they have excavated themselves. Secondary cavity users do not dig, but roost and nest in cavities fashioned by other birds (Thomas et al. *in* Wildlife Habitats in Managed Forests, J. W. Thomas, ed., USDA For. Serv. Agric. Handbook No. 553, 1979). This group also readily accepts nest boxes, which has allowed extensive manipulative research into their breeding biology, territoriality, and population regulation (Von Haartman *in* Avian Biology, Vol. 1, D. S. Farner and J. R. King, eds., Academic Press, New York, New York, 1971).

This report introduces artificial snags made of polystyrene as a research tool for manipulating populations of woodpeckers. Habitat selection and phenology of excavation in Downy Woodpeckers (*Picoides pubescens*) using artificial snags will be reported elsewhere (Peterson and Grubb, unpubl.). Here, I address the question, important for future research, whether Downy Woodpeckers as a species have a preferred snag height in which to dig roost cavities.

For primary cavity users, available snags of dead and rotting wood appear to be a resource that limits population density (Short, Wilson Bull. 91:16–28, 1979). Downy Woodpecker sexes have sex-specific foraging niches, presumably in response to limited food resources (Grubb, Condor 77:175–182, 1975; Williams, Am. Midl. Nat. 93:354–367, 1975). Thus, I also attempted to determine whether the sexes might segregate the roost-site resource by showing preference for snags of different height and by digging cavities at different distances from the snag top.

The artificial snags consisted of polystyrene ("bead board") cylinders 22.5 cm in diameter painted dark brown. During Oct.–Dec. 1980, I set out 16 trios of these snags in central Ohio woodlots. I drilled a hole 0.75 m up the middle of each cylinder, then slid it down over a metal fence post driven into the ground, where it was held vertically. Each trio was composed

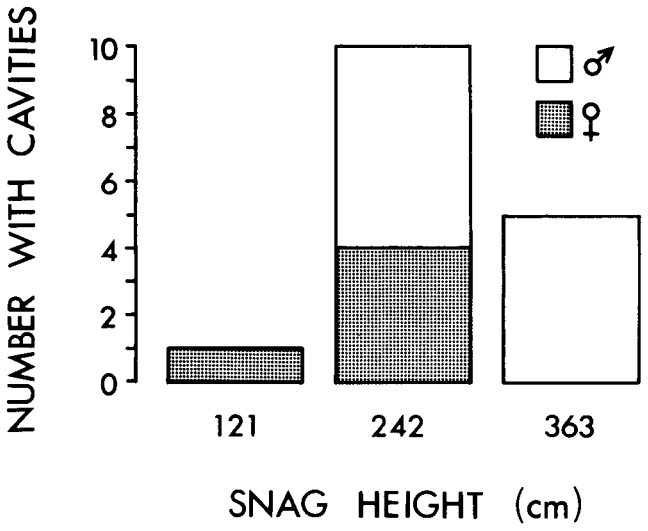

FIG. 1. Heights of artificial snags in which male and female Downy Woodpeckers dug cavities.

of cylinders 121, 242, and 363 cm in length arranged in an equilateral triangle 3 m on a side. Relative positions of snag heights were randomly placed within each triangle. Cylinders were checked daily until I found a completed cavity, defined as an excavation more than 10 cm deep on the vertical axis. I considered a particular bird to have excavated a specific hole if I flushed it from that cavity or noticed it in the immediate vicinity; Downy Woodpeckers defend their cavities (Kilham, Condor 64:126–133, 1962). Five woodlots were used. No two trios of cylinders were closer together than 100 m.

In 10 of 16 cases, Downy Woodpeckers dug cavities in the intermediate (242 cm) snag height (Fig. 1). The bird's choice among the three snag heights differed significantly from random ($\chi^2 = 7.68$, df = 2, $P < 0.05$). Although the sample sizes are small, Fig. 1 suggests that the two sexes preferred snags of different height; females avoided the tallest snag which 45% of the males preferred, and males did not use the shortest snag which attracted one of the females.

The sexes also separated their cavities vertically on the snags; females excavated farther down from the top (Fig. 2). In the 10 cases where both sexes used the same height cylinder (242 cm), allowing a controlled test, the distance from the lower lip of the cavity entrance to the snag top was significantly different ($t = 6.6$, df = 8, $P < 0.001$). The lone female selecting a 121-cm snag dug her cavity near the top (Fig. 2), suggesting there is some minimum excavation height above ground in this species. In one population using natural snags, 1 m was the minimum cavity height recorded (Conner et al., J. Wildl. Manage. 39:144–150, 1975).

Downy Woodpeckers, as a species, seemed to prefer 242-cm cylinders, so artificial snags of about this height might be most effective in future study. Basic aspects of population biology now seem open to manipulation, since excavation substrates of controlled size and composition can be provided in quantity. Artificial trees could also be an important means of restocking primary cavity users on clearcut, selectively cut, and strip-mined land. Wood-

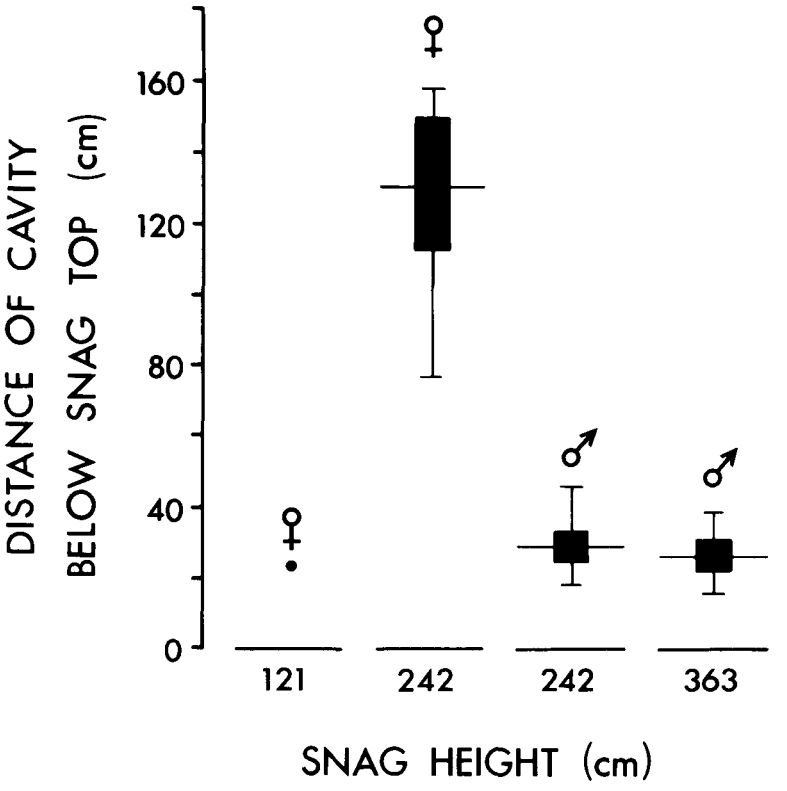

FIG. 2. Distance of cavities dug by male and female Downy Woodpeckers below the top of artificial snags. The horizontal lines are the means, the bars are the standard errors, and the vertical lines are the ranges. Numbers of cavities for each sex are the same as in Fig. 1.

peckers could be attracted to cylinders in such areas, or they could be moved there with their snag after being trapped in it while roosting at night.

These results suggest that Downy Woodpecker sexes segregate along a niche dimension for cavity site. Males preferred taller snags and excavated closer to a snag's top. As snags could be a limiting resource, intersexual roost-site competition may thereby be reduced, allowing the male and female of a pair to remain in close proximity throughout the year.

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