

# FORAGING BEHAVIOR OF THE WHITE-HEADED WOODPECKER IN IDAHO

J. DAVID LIGON

SEVERAL recent papers dealing with feeding ecology of woodpeckers describe sexual differences in foraging behavior. One or more populations of all eight North American species of *Dendrocopos* (*D. villosus*, *D. pubescens*, *D. borealis*, *D. arizonae*, *D. stricklandi*, *D. nuttallii*, *D. scalaris*, and *D. albolarvatus*) are reported to exhibit such differences (Kilham 1965, 1970; Ligon 1968a, 1968b; Jackson 1970; Koch et al. 1970; Short 1971).

I studied foraging White-headed Woodpeckers (*D. albolarvatus*) in western Idaho in 1967 and 1968, fully expecting to record sexual differences in this behavior, as suggested by greater dimorphism in bill length (ca. 10%) than in other measurements (Ridgway 1914 and present study). The White-headed Woodpecker differs from other North American members of the genus in that it appears to subsist largely on vegetable matter, especially seeds of ponderosa pine (*Pinus ponderosa*) (Beal 1911).

## STUDY SITE AND METHODS

White-headed Woodpeckers are "scarce and rather local" in western Idaho (Burleigh 1972: 203). I studied a few birds near Lake Waha, Nez Perce County, Idaho, on four occasions: 20-21 October 1967, 12-14 April, 28-29 June, and 9-10 August 1968. The terrain is composed of gently rolling hills covered largely with open stands of second-growth ponderosa pine (Figure 1), where the woodpeckers foraged almost exclusively.

Methods were similar to those described earlier (Ligon 1968a). I watched individual birds for as long as possible, as suggested by Short (1971: 63), noting foraging behavior and recording with a stopwatch the length of stay on each of five regions of the tree: lower trunk (0-30 feet), upper trunk (30 feet-crown, usually about 60 feet), limbs and branches at any elevation, cones, and clusters of new needles at the terminal portions of the upper branches. I made observations on at least 2 males and 3 females in April, 1 male and 1 female in June, 2 males and 1 female in August, and 2 males and 4 females in October. I made no attempt to approach the woodpeckers closely and have no reason to believe my presence affected their behavior (cf. Short 1971: 63).

## RESULTS

I watched foraging male White-headed Woodpeckers for 226.2 minutes in April, 25.1 minutes in June, and 89.9 minutes in August; females were observed for 236.9 minutes in April, 39.9 minutes in June, and 133.8 minutes in August. The correlation between feeding sites of the sexes was highly significant ( $P = 0.01$ ,  $r = 0.918$ ); i.e. sexual differences were



Figure 1. Ponderosa pine forest near Lake Waha, Nez Perce County, Idaho.

not apparent (see Figure 2). Nor did I detect sex differences in techniques. When foraging on conifer trunks or branches, White-headed Woodpeckers flake and chip bark away with angled strokes rather than striking the wood directly, and they may pry bark loose with the bill. Peering into crevices and cracks often is the most noticeable means of gleaning. These techniques have been commented on by others (see Bent 1939: 100-102). I watched a male probe repeatedly into crevices and cracks with his tongue. The woodpeckers may move up or back down tree trunks, and occasionally they forage at the very bases of trees. On two occasions I saw a male White-headed Woodpecker scratch bark loose with his feet, as has been described for two other pine-inhabiting dendrocopine woodpeckers, *D. borealis* and *D. stricklandi* (Ligon 1968a, 1968b).

When foraging on cones the woodpeckers clung to the sides or even the bottoms as they chipped the cones open and exposed the seeds. Tevis (1953) illustrates cones that White-headed Woodpeckers have torn open.

I twice recorded White-headed Woodpeckers drinking from puddles on the ground. Drinking by *Dendrocopos* woodpeckers is reported uncommonly, thus it is interesting that it has been recorded several times in this species (Van Rossem and Pierce 1915, Grinnell et al. 1930, present study). Frequent drinking possibly is correlated with the high proportion of dry vegetable matter in the diet as compared to other members of the genus.

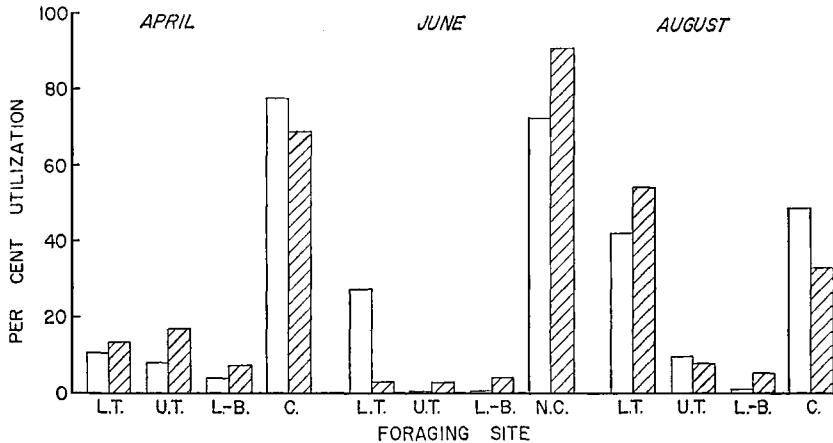


Figure 2. Foraging sites of male and female White-headed Woodpeckers. Males are indicated by unhatched bars, females by hatched bars. L. T. is the trunk below 30 feet, U. T. is trunk above 30 feet, L-B. is limbs and branches, C is cones, and N. C. is terminal needle clusters. See text for number of individuals and minutes of observation.

#### SEASONAL VARIATION IN FORAGING

*April.*—Wintery conditions prevailed during my observations in mid-April, with snow and sleet falling much of the time. I assume that feeding patterns seen were similar to those of winter. The birds foraged almost continuously throughout the day, largely on pine cones. Often an individual remained on a single cone for many minutes.

The woodpeckers generally stayed close to their mates. Frequently both worked on cones in the same tree for extended periods (more than 42 minutes in one instance). Stomachs of two males and two females collected two days later contained an estimated 70–90% pine seeds, which agrees well with the timing data shown in Figure 2.

*June.*—The weather was windy, cool, and overcast on 28 June. The woodpeckers were difficult to locate and to watch for extended periods. I was able to locate only one woodpecker at a time. Possibly incubation was in progress.

The male was recorded on the low trunk 27% of the time observed, whereas the female used this portion only 2.5% of the time. Both foraged mostly on clusters of thick growing needles near the new green cones at the terminal portions of the higher branches of ponderosa pines (Figure 2). The male occasionally pecked forcefully at a new cone. Although I obtained no stomach samples, it appears probable that arthropods obtained from the pine foliage composed most of the diet.

*August.*—The birds often fed very low on pine trunks. Peering, with the eye held close to cracks in the bark, was a conspicuous behavior.

Unlike the situation in June, no bird probed terminal needle clusters. Rather, they often worked at the bases of the green cones and the males in particular also tore open the hard, tightly closed cones and extracted seeds (Figure 2). I obtained several cones immediately after the woodpeckers left them to confirm that unripened seeds had been removed. The female foraged for 11 minutes on a cluster of cones that her mate had visited a few minutes earlier. The males appeared to work cones more vigorously and this female may have been taking advantage of her mate's efforts. Koch et al. (1970) recorded only male White-headed Woodpeckers utilizing whole cones in southern California and suggested that their large bills were related to this activity.

*October.*—My few timing data for October suggest that trunks are an important foraging site. Additional interpretation is not justified.

White-headed and Hairy (*D. villosus*) Woodpeckers were concentrated at a second site near Lake Waha, where an outbreak of scolytid beetles, probably *Dendroctonus ponderosae*, had occurred. Females of both species conspicuously outnumbered males. Up to five Hairy Woodpeckers were present on the trunk of a single tree; all appeared to be females. Only one male Hairy Woodpecker was recorded. A single male White-headed Woodpecker also foraged in this area. I collected three female White-headed Woodpeckers from the tops of pines, well above areas of beetle infestation. Contents of their stomachs confirmed the impression that they were not feeding on the beetles (60–70% pine seeds, no beetles), whereas the Hairy Woodpeckers and the male White-headed Woodpecker had done so (stomach contents of a female Hairy Woodpecker, 100% bark beetles; of a male White-headed Woodpecker, 100% insects, mostly bark beetles).

The concentration of females of both species is of interest. I suggest that most of the females of both species were immature, and thus unmated and nonterritorial. Immature females probably rank lowest in the intraspecific sex and age hierarchy and, as a result, may be most prone to wander and thus to become concentrated where food is plentiful. Other studies of woodpeckers at sites of insect epidemics do not mention a preponderance of females (e.g. Massey and Wygant 1954, Knight 1958).

#### INTERSPECIFIC CONFLICTS

Early spring may be the most critical period in the annual cycle for many resident birds of the region. Seeds of conifers probably are

largely depleted and, as the weather frequently is cold, insects are still uncommon. I witnessed both interspecific and intraspecific conflicts in April. This, plus the almost continuous foraging activity of the woodpeckers, suggest that food is in limited supply at this time and that competition for it occurs. A female White-headed Woodpecker drove a Pigmy Nuthatch (*Sitta pygmaea*) and a Red Crossbill (*Loxia curvirostra*) from pine cones. Both these latter species, together with several others, utilize pine seeds extensively and thus may be competitors of White-headed Woodpeckers for this resource. The most interesting interactions involved a pair of White-headed Woodpeckers and a pair of Hairy Woodpeckers.

The Hairy Woodpeckers foraged near the White-headed Woodpeckers and appeared to use them as a means of locating seed-containing cones. The male Hairy Woodpecker twice supplanted the female White-headed Woodpecker from cones on which the latter had been feeding. The female Hairy Woodpecker also supplanted the female White-headed Woodpecker, but was soon displaced from a cluster of cones by the male White-headed Woodpecker. (Male White-headed Woodpeckers and female Hairy Woodpeckers are of about the same weight in northern California (Grinnell et al. 1930: 257, 261).) Later the female Hairy Woodpecker flew toward the male White-headed Woodpecker in an aggressive manner. When the latter did not retreat the female Hairy Woodpecker became excited, calling and rapidly moving about in the tree before flying away. These two encounters suggest that the male White-headed Woodpecker was dominant to the female Hairy Woodpecker.

#### INTRASPECIFIC CONFLICTS

In April a male White-headed Woodpecker three times drove his mate from cones on which she had been foraging. Twice she immediately made lengthy flights, calling in a highly agitated manner. These observations support the suggestions of Kilham (1965) and Ligon (1968a) that sexual differences in foraging sites might be important in reduction of intrapair antagonism. In this region it is possible that sexual differences could not develop during the winter months, as foods other than pine seeds (e.g. insects) simply are not available then in sufficient quantities.

A male supplanted his mate from the trunks of three conifers in August. Unlike the situation in April, the female did not become excited and fly a long distance; instead she moved quietly away. That the female did not react strongly to being driven from a food source perhaps reflects a greater availability of food at this time.

These observations agree with Ligon's (1968a) suggestion that, as a result of male dominance, female woodpeckers make most adjustments in those species that demonstrate niche partitioning along sexual lines.

#### GEOGRAPHIC AND TEMPORAL VARIATION IN FORAGING BEHAVIOR

Several writers (Kilham 1965; Selander 1965, 1966; Ligon 1968a, 1971; Morse 1972) have pointed out that foraging behavior described for one population may not hold for other populations of that species.

Koch et al. (1970) reported differences in foraging sites of male and female White-headed Woodpeckers in southern California, whereas I found no such differences in Idaho. Climatic differences of the two regions may be indirectly responsible. Idaho winters are long and severe compared to those of southern California, and insects located on or near tree surfaces probably are scarce for much of the year. The foraging data suggest that insects may appear in "flushes," e.g. heavy use by both sexes of terminal clusters of new needles in June. If this were the case, it would make partitioning of the habitat difficult and perhaps mutually unprofitable. The great dependence of both sexes on pine seeds was described earlier. Jackson (1970) pointed out that under certain circumstances the absence of "subniches" would be advantageous, e.g. if an abundant food source is restricted to a single subniche.

In addition the vegetational pattern in Idaho is very simple. A single tree species, ponderosa pine, is the only plant importantly utilized by White-headed Woodpeckers. This homogeneity might not favor subdivision of the habitat by male and female woodpeckers, particularly in combination with the climatic and food supply conditions discussed above.

The southern race of White-headed Woodpecker (*D. a. gravirostris*) Koch et al. (1970) studied is characterized by large bill size in both sexes. Males extensively use the large spiked cone of the Coulter pine (*Pinus coulteri*), whereas females forage almost exclusively (90%) on the lower main trunk (22% for males), which in some other woodpeckers is primarily used by the larger-billed males. Koch et al. (1970) suggested that exploitation of the large cones by males and the trunk by females has provided the selection pressure for large bills in this population.

Temporal differences in foraging behavior also occur, as the data presented here indicate. Jackson (1970) showed this in Downy Woodpeckers (*D. pubescens*) throughout the year in Kansas.

One cannot always predict foraging patterns in a given population of woodpeckers by noting the degree of sexual dimorphism in bill size. Red-cockaded (*D. borealis*) and Downy Woodpeckers are only slightly

sexually dimorphic in bill length, yet males and females may exhibit conspicuous differences in foraging sites (Ligon 1968a, Jackson 1970, Kilham 1970, Willson 1970). In contrast, sexual differences in bill length are pronounced in White-headed Woodpeckers, but I recorded no significant differences in foraging sites in the northeastern portion of their range.

#### ACKNOWLEDGMENTS

A. D. Linder of the Department of Biology, Idaho State University, provided travel funds. R. Kalinoski and S. Husar made helpful comments on the manuscript, and J. R. Koplín tentatively identified the scolytid beetles.

#### SUMMARY

Foraging behavior of White-headed Woodpeckers (*Dendrocopos albolarvatus*) was studied in western Idaho for 2 days in April, June, August, and October. From two to five individuals were watched during each time period. Parallel seasonal shifts in foraging sites of males and females were apparent. No sexual differences in feeding behavior were detected, unlike the situation in many populations of other North American *Dendrocopos* woodpeckers. Possibly this is a result of climatic and vegetational features of the region.

#### LITERATURE CITED

- BEAL, F. E. L. 1911. Food of the woodpeckers of the United States. U. S. Dept. Agr. Biol. Surv. Bull. 37: 1-64.
- BENT, A. C. 1939. Life histories of North American woodpeckers. U. S. Natl. Mus. Bull. 174.
- BURLEIGH, T. D. 1972. Birds of Idaho. Caldwell, Idaho, The Caxton Printers, Ltd.
- GRINNELL, J., J. DIXON, AND J. M. LINSDALE. 1930. Vertebrate natural history of a section of northern California through the Lassen Peak region. Univ. California Publ. Zool. 35: 1-594.
- JACKSON, J. A. 1970. A quantitative study of the foraging ecology of Downy Woodpeckers. Ecology 51: 318-323.
- KILHAM, L. 1965. Differences in feeding behavior of male and female Hairy Woodpeckers. Wilson Bull. 77: 134-145.
- KILHAM, L. 1970. Feeding behavior of Downy Woodpeckers. 1. Preference for paper birches and sexual differences. Auk 87: 544-556.
- KNIGHT, F. B. 1958. The effects of woodpeckers on populations of the Englemann spruce beetle. J. Econ. Entomol. 51: 603-607.
- KOCH, R. F., A. E. COURCHESNE, AND C. T. COLLINS. 1970. Sexual differences in foraging behavior of White-headed Woodpeckers. Bull. Southern California Acad. Sci. 69: 60-64.
- LIGON, J. D. 1968a. Sexual differences in foraging behavior in two species of *Dendrocopos* woodpeckers. Auk 85: 203-215.
- LIGON, J. D. 1968b. Observations on Strickland's Woodpecker, *Dendrocopos stricklandi*. Condor 70: 83-84.

- LIGON, J. D. 1971. Some factors influencing numbers of the Red-cockaded Woodpecker. Pp. 30-43 in Symposium on the ecology and management of the Red-cockaded Woodpecker (R. L. Thompson, Ed.) Bur. Sport Fisheries and Wildlife and Tall Timbers Research Station.
- MASSEY, C. L., AND N. D. WYGANT. 1954. Biology and control of the Englemann spruce beetle in Colorado. U. S. Dept. Agr., Forest Serv. Circ. 944: 1-35.
- MORSE, D. H. 1972. Habitat utilization of the Red-cockaded Woodpecker during the winter. *Auk* 89: 429-435.
- RIDGWAY, R. 1914. The birds of North and Middle America, part 6. U. S. Natl. Mus. Bull. 50.
- SELANDER, R. K. 1965. Sexual dimorphism in relation to foraging behavior in the Hairy Woodpecker. *Wilson Bull.* 77: 416.
- SELANDER, R. K. 1966. Sexual dimorphism and differential niche utilization in birds. *Condor* 68: 113-151.
- SHORT, L. L. 1971. Systematics and behavior of some North American woodpeckers, genus *Picooides* (Aves). *Bull. Amer. Mus. Nat. Hist.* 145: 1-118.
- TEVIS, L., JR. 1953. Effect of vertebrate animals on seed crop of sugar pine. *J. Wildl. Mgmt.* 17: 128-131.
- VAN ROSSEM, A., AND W. M. PIERCE. 1915. Further notes from the San Bernardino Mountains. *Condor* 17: 163-165.
- WILLSON, M. F. 1970. Foraging behavior of some winter birds of deciduous woods. *Condor* 72: 169-174.

*Department of Biology, The University of New Mexico, Albuquerque, New Mexico 87106. Accepted 5 March 1973.*