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# HABITAT USE AND MANAGEMENT OF PILEATED WOODPECKERS IN NORTHEASTERN OREGON

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*Abstract:* We determined home range size and habitats used by pileated woodpeckers (*Dryocopus pileatus*) to provide essential information for proper management of the species in northeastern Oregon. Twenty-three pileated woodpeckers fitted with transmitters were followed for 5–10 months (Jun–Mar) during 1989–90. Mated pairs ($n = 7$) ranged over smaller areas ($\bar{x} = 407$ ha) than birds ($\bar{x} = 597$ ha) whose mates had died ($n = 9$). Habitat use within home ranges was not random. Stands with old growth, grand fir (*Abies grandis*), no logging, and ≥60% canopy closure were used more ($P < 0.01$) than expected, and all other types of stands were used less than expected. From June until March, 56% of the observations of foraging were on downed logs, 38% on dead trees, 18% on live trees, and 6% on stumps. We recommend that management for pileated woodpeckers in northeastern Oregon include increasing density of snags for nesting and foraging, increasing density of downed logs in foraging areas, and increasing management areas from the existing 121 ha to 564 ha of forest. Within these areas, we recommend that 75% be in grand fir forest type, 25% be old growth, and the remainder be mature stands; at least 50% have ≥60% canopy closure; and at least 40% be unlogged with the remainder in mature stands.

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The pileated woodpecker was selected as a management indicator species for older forests by some regions in the U.S. Forest Service because it nests and roosts in large-diameter dead trees or snags (Hoyt 1957, McClelland 1977, Harris 1982, Bull et al. 1992*b*), and is largely dependent on dead wood (standing and down) for foraging (Bull 1987). These habitat components are most common in older forests.

Management for pileated woodpeckers on public lands in the western United States has been based on guidelines that recommend leaving specified densities of snags for nesting and roosting to provide for different population levels of woodpeckers (Thomas et al. 1979, Brown 1985). In addition, 121-ha patches of older forests have been maintained for nesting pairs on National Forests in the Pacific Northwest Region. Neither of these management approaches has been tested, however, to ascertain whether it supports the woodpecker in eastern Oregon.

Research conducted elsewhere suggests that the 121-ha management areas are inadequate in coniferous forests. Radio-tagged pileated woodpeckers in western Oregon had home ranges of 257–1,056 ha (Mellen et al. 1992). In contrast, radio-tagged birds in Missouri used only 53–160 ha during April–August (Renken and Wiggers 1989). However, this research was conducted in deciduous forests that are typically more diverse than coniferous forests, so a comparison of home range sizes is not valid.

We felt it necessary to determine population density of pileated woodpeckers in 9 study areas with different snag densities to test the snag guidelines currently in use, and to test the existing guidelines for 121-ha management areas maintained in old-growth conditions in the Pacific Northwest Region.

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Table 2. Habitat characteristics (averages) within the home ranges and within 4 size classes of home ranges of pileated woodpeckers, northeastern Oregon, 1989–91.

| Characteristic | All pairs | Home range size class (ha) <300 | 300–499 | 500–799 | >800 |
|---|---|---|---|---|---|
| n (home ranges) | 7 | 3 | 6 | 6 | 1 |
| Home range (ha) | 407 | 220 | 370 | 647 | 1,464 |
| Home range (forested ha only) | 364 | 208 | 345 | 566 | 1,324 |
| Forest type series (%)[a] | | | | | |
| Ponderosa pine[b] | 3 | 2 | 2 | 13 | 68 |
| Douglas-fir | 23 | 27 | 19 | 34 | 26 |
| Grand fir | 74 | 71 | 79 | 53 | 5 |
| Successional stage (%)[a] | | | | | |
| Young | 6 | 0 | 5 | 4 | 8 |
| Mature | 70 | 59 | 71 | 67 | 88 |
| Old growth | 24 | 41 | 22 | 29 | 4 |
| Logging activity (%)[a] | | | | | |
| None | 43 | 81 | 38 | 64 | 9 |
| Partial | 49 | 19 | 53 | 34 | 81 |
| Shelterwood | 8 | 0 | 9 | 2 | 10 |
| Canopy closure (%)[a] | | | | | |
| <10% | 8 | 1 | 7 | 4 | 15 |
| 10–59% | 41 | 24 | 43 | 52 | 68 |
| ≥60% | 51 | 75 | 50 | 44 | 17 |

[a] Values are percentage composition of the home ranges.
[b] Best predictor ($R^2 = 0.78$; $P < 0.01$; stepwise multiple regression) of home range size.

Douglas-fir, and western larch snags were preferred ($F = 7.48$; 5, 75 df; $P < 0.01$). Snags ≥38 cm dbh also were preferred ($F = 63.05$; 3, 45 df; $P < 0.01$).

Dead standing trees and logs were particularly important for foraging, yet their use changed over the year (Fig. 3). When we compared foraging strata without snow (≤5 cm) with foraging strata with snow (>5 cm), we noted an increase in use of live trees (17–22%), an increase in use of dead trees (35–55%), a decrease in use of logs (41–18%), and a slight decrease in use of stumps (7–5%).

## DISCUSSION

We believe that home ranges did not overlap a great deal except in situations when birds had lost mates. Birds whose mates had died usually had more overlap and larger home ranges than did pairs. These birds may have expanded their ranges to search for mates, or to forage over larger areas because of poorer habitat.

We were unable to predict size of home range very accurately with the habitat variables. However, the birds did not use habitat within their home ranges at random and selected for stands with old growth, grand fir, no logging, and >60% canopy closure. Similarly, Conner (1980) reported that pileated woodpeckers in Virginia used the oldest stands with the highest basal area and density of stems available for foraging.

The snag densities in the study areas were variable, and while we did not consider some areas (Spring and Wallowa) capable of supporting self-sustaining pileated populations, we felt others (Bear and Syrup) were self-sustaining and capable of acting as sources for other areas because of the high density of pairs (7 and 5 pairs, respectively) and successful reproduction (75% of nesting pairs fledged young). We estimated that 16% of the snags ≥51 cm in Bear and Syrup had resulted from activity of spruce budworm or Douglas-fir beetle, so 16% of the snag density can be subtracted from the total to yield a density without the influence of an insect outbreak. We were unable to judge the ability of the remaining areas to support self-sustaining pileated populations because of only 1 year of observations and very variable reproduction.

Our observations of foraging differed somewhat from observations in the eastern United States. Conner (1980) reported more snags (49%) and live trees (45%) and fewer downed logs (1%) used by pileateds for foraging in Virginia. Con-



Table 3. Characteristics o
available logs and snags th

| Characteristic |
|---|
| Tree species[a] |
| Grand fir |
| Douglas-fir |
| Ponderosa pine |
| Western larch |
| Other[b] |
| Dbh (cm)[c] |
| <25 |
| 25–37 |
| 38–50 |
| ≥51 |
| Decay class[c] |
| Recent-dead |
| Intermediate-dead |
| Long-dead |
| *n* |

[a] Species of logs ($F = 5.98$;
availability.
[b] Primarily lodgepole pine.
[c] Diameter classes of logs ($F$
to availability.
[d] Limited to 15–24 cm dbh.
[e] Long-dead logs preferred (

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Table 3. Characteristics of foraging strata (%) where pileated woodpeckers were observed foraging, and characteristics of available logs and snags that were measured at 240 plots (20 × 20 m) in 12 home ranges, northeastern Oregon, 1989–91.

| Characteristic | Downed log | | Snag | | Live tree observed |
|---|---|---|---|---|---|
| | Observed | Plots | Observed | Plots | |
| Tree species[a] | | | | | |
| Grand fir | 23 | 28 | 47 | 75 | 41 |
| Douglas-fir | 25 | 6 | 21 | 9 | 21 |
| Ponderosa pine | 30 | 27 | 16 | 5 | 16 |
| Western larch | 20 | 14 | 14 | 7 | 21 |
| Other[b] | 2 | 25 | 2 | 4 | 1 |
| Dbh (cm)[c] | | | | | |
| <25 | 26 | 46[d] | 8 | 59[d] | 9 |
| 25–37 | 34 | 33 | 26 | 27 | 27 |
| 38–50 | 24 | 12 | 30 | 9 | 29 |
| ≥51 | 16 | 8 | 36 | 5 | 35 |
| Decay class[e] | | | | | |
| Recent-dead | 1 | 18 | 24 | | |
| Intermediate-dead | 23 | 66 | 61 | | |
| Long-dead | 76 | 16 | 15 | | |
| *n* | 995 | 2,779 | 1,030 | 558 | 484 |

[a] Species of logs ($F = 5.98$; 5, 45 df; $P < 0.01$; Friedman's) and snags ($F = 7.48$; 5, 75 df; $P < 0.01$; Friedman's) not used in proportion to availability.
[b] Primarily lodgepole pine.
[c] Diameter classes of logs ($F = 3.28$; 3, 33 df; $P = 0.03$; Friedman's) and snags ($F = 63.05$; 3, 45 df; $P < 0.01$; Friedman's) not used in proportion to availability.
[d] Limited to 15–24 cm dbh.
[e] Long-dead logs preferred ($F = 47.67$; 2, 22 df; $P < 0.01$; Friedman's).

ner (1979*a*) also reported a variety of foraging strategies for pileateds with the majority of excavation occurring in winter, and more pecking and scaling occurring during the spring and summer. Excavation involved gaining access to interior wood where the woodpeckers fed primarily on ants, probably carpenter ants (*Camponotus* spp.) and some thatching ants (*Formica* spp.) (Bull et al. 1992*a*). Pecking the bark may have uncovered some ants (*Lasius*, *Leptothorax*) and beetles that occurred under the bark rather than in the interior wood (T. R. Torgersen and E. L. Bull, unpubl. data). Tree gleaning occurred primarily in June and July on live Douglas-fir and grand fir when the birds were probably feeding on larvae of western spruce budworm. We found budworm mandibles in woodpecker scats (Bull et al. 1992*a*).

We observed pileated woodpeckers gleaning branches of live Douglas-fir and grand fir that were infested with western spruce budworm larvae in June and July. This timing coincided with the highest use of live trees (42%) that we observed and also coincided with the greatest abundance of the large, late-instar budworms (Fellin and Dewey 1986). Use of live trees again increased from November to January when we observed woodpeckers frequently excavating at the base of live western larch. We think they were feeding on carpenter ants in these larch because ant galleries were evident in some of them. Conner (1981) also noted pileateds feeding on carpenter ants near the base of live trees in winter.

Use of snags was greatest in the winter, presumably because logs became inaccessible when snow covered them. Shallow snow apparently did not preclude use of logs because we observed birds wiping snow off logs with their bills and then feeding in the log.

## MANAGEMENT IMPLICATIONS

Past management for pileated woodpeckers followed guidelines presented by Thomas et al. (1979) that were based on providing specified snag densities in 121-ha territories. These guidelines were based on the best knowledge available at the time. From our findings, we now know that 121-ha areas are much smaller than observed pair home ranges, and habitat components other than snags are important in managing for pileated woodpeckers in northeastern Oregon. Management plans for pileated woodpeckers should be revised to incorporate this new information.

We recommend using an average home range

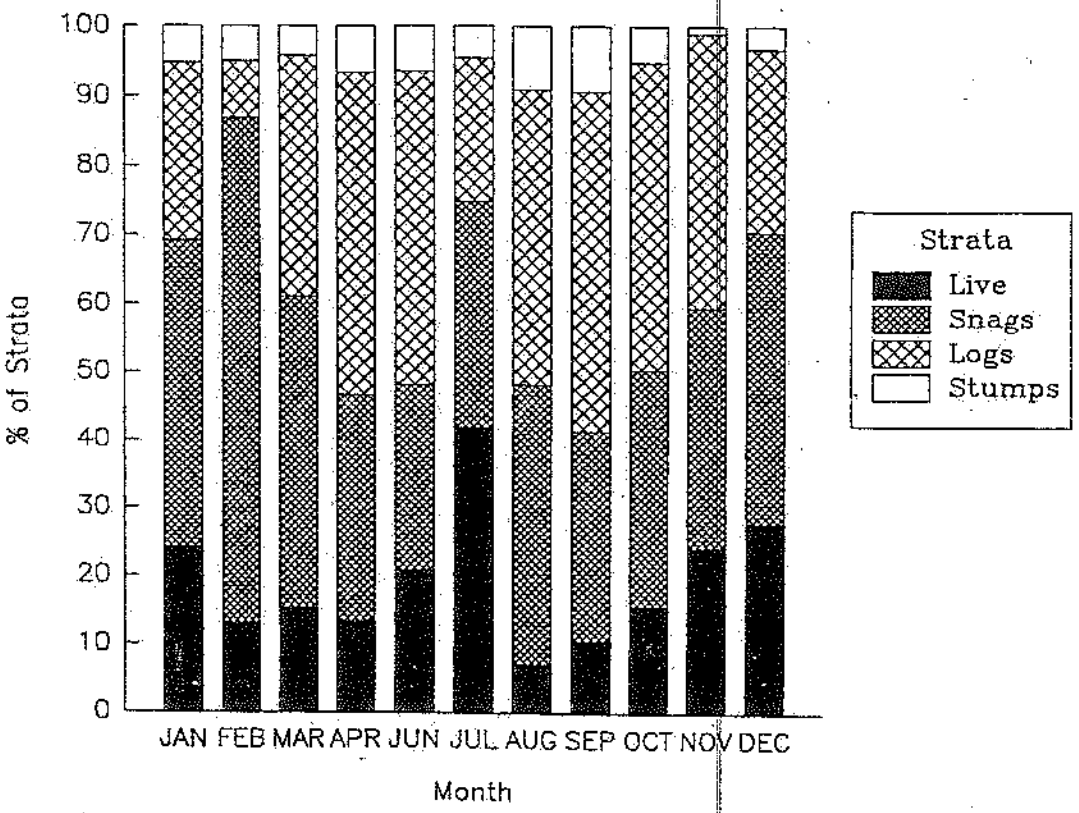


Fig. 3. Monthly foraging strata used by radio-tagged pileated woodpeckers, northeastern Oregon, 1989–91.

size of 364 ha of forest, more than 3 times the size of current prescribed management areas. Within those home ranges, we recommend that about 75% be in the grand fir forest type; at least 25% be old growth and the remainder be mature; at least 50% of the area should have ≥60% canopy closure; at least 40% of the area should remain unlogged, with the remainder having no more than partial overstory removals so mature stands are retained after logging.

Downed logs were a critical component of the foraging habitat, but only 37% showed evidence of pileated woodpecker feeding. We recommend leaving ≥100 logs/ha in management areas, with a preference for logs ≥38 cm in diameter (long-dead logs) and for all species except lodgepole pine. We also recommend leaving ≥8 snags/ha for nesting, roosting, and foraging; at least 20% of these snags should be ≥51 cm dbh.

The existing pileated management areas (121 ha) on National Forests are about 8 km apart. If only 1 pair of pileateds occurs in each management area, and there is 1 management area for every 4,860 ha, then only 2% of the total forest is being managed for pileated woodpeckers. Additionally, our observations indicate that isolated pairs in marginal (i.e., minimum standard) habitats are unlikely to sustain a population. This information suggests that larger blocks of habitat (for >1 pair), in closer proximity, should be managed for pileateds to provide self-sustaining populations. Such management action is similar to that recommended for the northern spotted owl (*Strix occidentalis*) (Thomas et al. 1990), and would increase the probability of birds finding new mates because if 1 member of a pair dies, the surviving mate does not leave the territory.

Managing for minimum levels of a species is risky (Conner 1979*b*). Consequences can be unfortunate when new data reveal that current recommendations are inadequate to provide the population levels desired, because other options often have been eliminated. Therefore, we recommend managing clusters of 3 or more pairs in 1 block of habitat with blocks distributed across the landscape through time. This man-



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ement should include the appropriate forest types, successional stages, logging activities, canopy closures, snag densities, large-diameter live trees, and downed log densities within a larger home range area.

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