

## 7. Pileated Woodpecker

### Ecology, Behavior and Habitat

The pileated woodpecker in North America is only exceeded in size by the ivory-billed woodpecker in the southeastern United States and the imperial woodpecker in western Mexico. The pileated woodpecker's range extends from central British Columbia south into Northern California, east from Idaho across North Dakota (Dechant 2001, with the colonization by trees of an historic open North Dakota landscape) and east from a general line descending south from Minnesota to eastern Texas (as cited in Bull and Jackson 1995).

The pileated woodpecker is not considered to be migratory (Bull and Jackson 1995). The pileated woodpecker is most often associated with mature forests (Conner et al. 1979, Conner 1980, Shackelford and Conner 1997) although the presence of large trees for nesting is reported to be more important than forest age (Kirk and Naylor 1996, Giese and Cuthbert 2003). The pileated woodpecker is able to do well in young and fragmented forests with abundant remnant (older) structure (Mellon et al. 1992).

Many tree species are used by the pileated woodpecker to excavate nest cavities and selection of the tree appears to depend mainly on the availability of suitable trees (Kirk and Naylor 1996). The pileated can excavate a cavity in solid wood (Bull 1987) but most often uses trees partially softened by fungal decay (Conner et al. 1976, Bull 1987). Pileated woodpeckers excavate a new cavity each year and reuse of old cavities is rare (Bull and Jackson 1995).

Territory size varies considerably, ranging from 321 to 630 ha [(mean =  $407 \pm 110.3$  ha (SE))] for seven pairs radio tracked, and a mean of  $597 \pm 338.1$  ha for nine individuals who had lost a mate (Bull and Holthausen 1993). Based on eleven birds fitted with radio transmitters, Mellon et al. (1992) in western Oregon reported pileated woodpeckers had territories somewhat larger (mean =  $478 \pm 219$  ha) than in eastern Oregon (Bull and Holthausen 1993). Eleven birds fitted with radio transmitters in Missouri had much smaller territories with a mean =  $87.5 \pm 31.6$  ha (Renken and Wiggins 1989).

Pileated woodpeckers are the only North American woodpecker that makes deep excavations in undecayed wood in search of food (Conner 1979, Bull et al. 1992, Bull and Jackson 1995, Bull and Holthausen 1993, Flemming et al. 1999). In summer, ants, particularly carpenter ants (Hoyt 1950), and other insects (including larvae of wood-boring beetles) are obtained on or near the surface of live and dead trees or by extensive excavation into partially decayed wood (Bull et al. 1986, 1992).

As a year-round resident, winter roosts are important and appear to be in habitats similar to that used during the breeding season (Bull and Jackson 1995). In winter, the pileated woodpecker excavates relatively sound wood around the base of a tree in search of carpenter ants (Hoyt 1950, Conner 1981, 1989, Bull et al. 1986, Flemming et al. 1999). The pileated woodpecker's territory appears to be defended all year (Bull and Jackson 1995).

Table 20. Summary of key habitat characteristics (mean  $\pm$  SD unless noted, sample size in parentheses) for the pileated woodpecker in recent studies.

	Montana McClelland and McClelland (1999)	Alberta Bonar (2001)	Washington Aubrey and Raley (2002)
Tree size (cm)	53.3 $\pm$ 11.9 (20)	45.6 $\pm$ 3.5 (14)	72.0 $\pm$ 14.4 (33)
Tree height (m)	26.6 $\pm$ 12.0 (20)	43.1 $\pm$ 14.7% had tall stands (14)	24.0 $\pm$ 0.1 (33)

Predation is reported to be the main cause of mortality (Bonar 2001). Predators include the goshawk, Cooper's hawk, red-tailed hawk, great-horned owl, American marten, and gray fox.

Detailed information of the behavior and ecology of the Pileated woodpecker is provided by Bull and Jackson (1995) in *The Birds of North America No. 146*. Several internet website provide further detailed information on the pileated woodpecker (e.g., Accessed March 20, 2005; <<http://nhp.nris.state.mt.us/mbd>>, and Accessed March 20, 2005; <<http://imn.isu.edu/digitalatlas>>).

### Northern Region

At Coram Experimental Forest in northwestern Montana, McClelland and McClelland (1999) found that the pileated woodpecker preferred western larch (n = 51) as a nest tree but also used ponderosa pine (n = 18), black cottonwood (n = 15), aspen (n = 7), western white pine (n = 3), grand fir (n = 1) and Douglas-fir (n = 1).

Nest trees were similar in size to roost trees and both were typically snags (81% and 78% respectively) and with broken tops (McClelland and McClelland 1999). Trees used by the pileated woodpecker were larger and taller than in random sites. Hutto (1995) reported habitat use by the pileated woodpecker similar to McClelland and McClelland (1999) in the Northern Rocky Mountains, i.e., mature cottonwood bottoms, ponderosa pine, and larch stands but also reported use of mixed conifer and cedar-hemlock.

Bonar (2001) conducted a five-year study of the pileated woodpecker in the boreal forest in the Rocky Mountain foothills in west central Alberta (Table 20). Bonar (2001) used information based on 158 total nests, collected from 1982-1998, and 14 territories by following 32 birds equipped with radio transmitters.

Bonnar (2001) found the pileated woodpecker used all available habitats at all scales examined to select nest cavity trees and for foraging. Significant variables in predicting habitat characteristics of pileated woodpecker territories included stands  $\geq 7$  m in height ( $P = 0.011$ ), potential nest tree density ( $P = 0.001$ ), winter foraging habitat ( $P = 0.06$ ), and percent upland forest ( $P = 0.003$ ).

The pileated woodpecker in Bonnar's (2001) study did select substrates with carpenter ants and cavity trees with stem decay, specifically aspen infected with *Phellinus* fungus. This "suggests that pileated woodpeckers select nest cavity trees primarily because of tree characteristics and that selection at other scales relates to the availability of potential nest cavity trees" (page 65). Bonnar (2001) found 22.3% of the available cavities were empty when inspected and empty cavities were present throughout the year

From 1990 to 1995, Aubrey and Raley examined habitat use by the pileated woodpecker in western Washington (Table 20). These authors used both playback of calls and telemetry to locate 25 nests. Overall, the pileated woodpecker preferred large trees but these cavity trees had less decay than roost sites, and 0.4 ha plots around nest sites had a higher density of both tree species and snags. Results of Aubrey and Raley (2002) are similar to that reported in Oregon by Bull (1987) in terms of use of large trees and snags.

The Regional nest site habitat relationships model for the pileated woodpecker (Table 21) and for the breeding season is based on two variables considered to be the most significant in the scientific literature. First, the dominance group is those tree species where the pileated is reported to have nested is included in the nest-site model. Second, tree size is included using the mean minus one standard deviation as the minimum size (i.e., from McClellan and McClellan 1997: Table 2, aspen). The assumption is that no upper limit exists in tree size selected as a nest cavity tree by the pileated woodpecker. The nest tree is the most important variable to estimate breeding habitat use by the pileated woodpecker (Kirk and Naylor 1996, Giese and Cuthbert 2003).

Cover is not included in the Regional nest site habitat relationships model. The pileated woodpecker is reported to use areas with 10% forest cover (Bonnar 2001). The Forest Service's definition of forest cover includes those areas with  $\geq 10\%$  tree cover.

The foraging model for the pileated woodpecker (Table 21) is based on habitat requirements to forage in winter (Bonnar 2001). Winter is the critical period for the pileated woodpecker (Bonnar 2001) as it is for many bird species (Perrins 1966, Nilson 1986, Newton 1998, and others).

In winter, the pileated woodpecker forages largely on stubs and logs as small as 7.4 cm but 25 to 50 cm substrates are used in greater proportion than available (Bonnar 2001). The model assumes no upper size limit exists to size of winter foraging substrate for the pileated woodpecker.

Habitat estimates for the pileated woodpecker based on the Regional nest tree habitat model (Table 21) show nest site habitat is abundant and well distributed across the Northern Region by National Forest (Table 22). Estimates of nest tree availability range from a low of 5,612 ha on

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the Lewis and Clark National Forest to a high of 175,349 ha on the Idaho Panhandle National Forests.

Table 21. Pileated woodpecker nest and winter foraging habitat relationships model for the Northern Region and Ecological Provinces (Bailey 1996).

Model	Dominance group <sup>1</sup>	Nest model (tree size cm)	Winter foraging substrate model (cm)
Regional NRMEP MRMEP SRMEP	ABGR, ABGR- 1MIX, IMXS, LAOC, LAOC- 1MIX, PSME, PSME-1MIX, PIPO, PIPO-1MIX. TSHE, TSHE- 1MIX, THPL, THPL-1MIX, POPUL, POPUL- 1MIX, BEPA, BEPA-1MIX, TGCH, POTR5, POTR-1MIX, PIEN, PIEN-1MIX	> = 39	>= 25

<sup>1</sup> Douglas-fir (PSME), ponderosa pine (PIPO), western white pine (PIMO3), western red cedar, (THPL), western hemlock (TSME), larch (LOAC), grand fir (ABGR), lodgepole pine (PICO), birch (BEPA), aspen (POTR5), cottonwood (POPUL), tolerant grand fir, cedar, and hemlock (TGCH), POTR (cottonwood), tolerant grand fir western hemlock (TGCH), and no single dominant (IMIX). 1MIX refers to the dominance of one species within a sample. See Appendix 6 for detailed definitions.

Winter foraging habitat estimates for the pileated woodpecker based on the Regional foraging habitat model (Table 22) show winter foraging habitat is abundant and well distributed across the Northern Region by Ecological Province and Forest (Table 22). Estimates of winter foraging habitat for the pileated woodpecker range from a low of 14,739 ha on the Helena Nation Forest to a high of 296,377 ha on the Idaho Panhandle National Forests. Bonar (2001) estimates about 40 ha are required per pileated woodpecker pair in winter (or winter habitat adequate from a low of 368 pairs on the Helena National Forest to a high of 7,409 pairs on the Idaho Panhandle National Forests).

A second consideration is to provide well distributed habitat. Few estimates of the territory size are available for the pileated woodpecker. Territory size varies considerably, ranging from 321 ha to 630 ha (mean = 407 ± 110.3 ha) in northeastern Oregon (Bull et al. 1992) to Bonar's study of 23 territories (mean = 1,360 ± 762.2 ha).

Table 22. Summary of habitat estimates (ha) for the pileated woodpecker by Region, Ecological Province (Bailey 1996) (only pileated woodpecker habitat of Forest Service lands is included in Ecological Province estimates) and National Forest in the USDA Forest Service Northern Region.

Region and Ecological Province	Forest	Model	
		Nest	Winter foraging
<i>Regional</i>		568,339	911,025
<i>NRMEP</i>		408,768	653,489
	Idaho Panhandle	175,349	296,377
	Kootenai	45,109	86,638
	Flathead	22,461	38,726
	Lolo	39,881	63,726
	Bitterroot	17,863	31,604
	Clearwater	108,105	136,418
<i>MRMEP</i>		145,619	232,888
	Beaverhead-Deerlodge	12,838	18,763
	Helena	5,895	14,739
	Lewis and Clark	5,612	17,857
	Nez Perce	121,274	181,529
<i>SRMEP</i>		13,952	24,648
	Gallatin	13,952	24,648

A median dispersal distance (square root of 407 ha, the smallest mean home range reported in the west, times 12) (Boman 2003) is estimated to be 240 km. Providing a spatially explicit map of well distributed breeding habitat centered on a nest tree or winter substrate habitat is technically impossible. A 240 km buffer placed around any snag  $\geq 41$  cm or around a  $\geq 21$  cm snag located anywhere on an individual National Forest in the Northern Region would include the entire ownership on that particular National Forest.

## **Short-term Viability**

The four criteria to evaluate viability are 1) distribution and amounts of habitat, 2) human disturbance, 3) biotic interactions, and 4) managing for ecological processes.

*Distribution of habitat.* The median dispersal distance of 240 km for the pileated woodpecker extends farther than the most extreme distance, point to point, within the boundaries of any National Forest in the Northern Region.

Well-distributed habitat is not an issue for the pileated woodpecker in the Northern Region.

*Amounts of habitat.* Habitat estimates for the pileated woodpecker based on the Regional nest tree habitat relationships model (Table 21) show nest site habitat is abundant and well distributed across the Northern Region by and National Forest (Table 22). Estimates of nest tree availability range from a low of 5,612 ha on the Lewis and Clark National Forest to a high of 175,349 ha on the Idaho Panhandle National Forests.

Winter foraging habitat estimates for the pileated woodpecker show winter foraging habitat based on the Regional winter foraging substrate model (Table 21) is abundant across the Northern Region by Ecological Province and Forest (Table 22). Bonar (2001) estimates about 40 ha are required per pileated woodpecker pair in winter (or winter habitat adequate from a low of 368 pairs on the Helena National Forest to a high of 7,409 pairs on the Idaho Panhandle National Forests).

Habitat on today's landscape is very abundant for the pileated woodpecker.

*Human disturbance.* Timber harvest may affect the availability of nest trees (Kirk and Naylor 1996, Giese and Cuthbert 2003) and winter foraging habitat (Bonar 2001). Timber management (seed shelterwood, selection, salvage, and intermediate) in the Northern Region in 2004 amounted in total to 8581 ha (of 9,045,255 forested ha in the Northern Region or 0.0009% of the landscape). Level of timber management is insignificant given the changes on the landscape due to fire suppression (Gallant et al. 2003, Hessburg and Agee 2003 and others).

*Biotic interactions.* No biotic interactions that negatively affect the pileated woodpecker are reported in the literature.

*Managing ecological processes.* Today's landscape with high numbers of intermediate sized trees (Hessburg et al. 2003) provide increased mounts of forage substrates within the range reported by Bonnar (2001). Pileated woodpeckers are known to feed on wood-boring beetles (as

cited in Bonar 2001) and benefit from the substantial increases in extent of post-fire and insect outbreak habitats (Table 14).

Short-term viability of the pileated woodpecker in the Northern Region is not an issue given the following.

- No scientific evidence exists that the pileated woodpecker is decreasing in numbers.
- Increases in the extent and connectivity of forested habitat have occurred since European settlement.
- Well-distributed and abundant pileated woodpecker habitat exists on today's landscape.
- Level of timber harvest (8581 ha of 9,045,255 or 0.0009% of the forested landscape in the Northern Region) is insignificant.