

SUPERCANOPY WHITE PINE AND WILDLIFE

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ABSTRACT. A survey of the literature showed that scattered supercanopy white pines perform a different wildlife function than do white pine communities. They add structural diversity to the communities in which they occur, providing nesting and foraging opportunities that would otherwise not be available. They are the preferred refuge trees and bedding sites for black bear mothers with cubs, which selected supercanopy white pines for 90 percent of all early spring beds and for 88 percent of summer overnight beds in northeastern Minnesota. Although supercanopy white pines comprise only a fraction of 1 percent of the trees in the Superior National Forest, they held 81 percent of eagle nests and 77 percent of osprey nests in 31 years of nest survey data. Supercanopy white pine snags show higher woodpecker use than do other northern forest snag species. Information is lacking about the importance of specific tree types (e.g. supercanopy white pines) to most wildlife species. It is important to maintain options for the future by maintaining the white pine component, including scattered supercanopy individuals, in all ecosystems in which it naturally occurs.

White pines (*Pinus strobus*) occur in Minnesota as white pine communities (often mixed with other tall pines) and as scattered individuals in other communities. Janet Green (this symposium) will discuss the wildlife values of white pine communities. I will discuss what little is known about the importance to wildlife of the scattered old supercanopy white pines that dot the horizons of northern landscapes. Scattered old white pines create conditions different from those created by white pine communities. The scattered trees add diversity to the aspen, birch, spruce, or fir communities in which they commonly grow. They add a vertical dimension and crown structure that is seldom duplicated by red pines (*P. resinosa*), jack pines (*P. banksiana*), or other northern tree species. In so doing, the white pines give these forests a multilayered quality that provides nesting and foraging opportunities for a greater range of species than otherwise might be the case. Beyond that, the old pines serve particular purposes for black bears (*Ursus americanus*), eagles (*Haliaeetus leucocephalus*), and ospreys (*Pandion haliaetus*).

BLACK BEAR BED SITES AND REFUGE TREES

Although black bears avoid white pine communities (DeBruyn 1992), scattered supercanopy white pines larger than 50 cm DBH are the preferred refuge trees and bed sites for black bears in northern forests (Elowe 1987, Rogers et al. 1988, Elowe and Dodge 1989, Rogers, unpubl. data). Black bear mothers commonly leave their cubs at mature white pine trees, where available, while they forage nearby in non-pine forest communities (Elowe 1987, Rogers et al. 1988). Mature white pines have thick, fissured bark that escaping cubs less than 5 months old can climb more easily than the slippery or shaggy bark of many other trees (Rogers et al. 1988, Elowe and Dodge 1989). Spring observations of habituated black bears in northeastern Minnesota showed that mothers with cubs selected white pines 41-92 cm DBH (average 69 cm DBH) for 26 (90 percent) of 29 beds even though white pines comprised less than 0.4 percent of the trees larger than 13 cm DBH in the study area (Rogers, unpubl. data). In late spring and summer, when food became more patently distributed, mothers with cubs foraged farther from white pines

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and used them for only 39 (55 percent) of 71 day beds but moved to white pines for 28 (88 percent) of 32 overnight beds (Rogers, unpubl. data). Lone females, by contrast, used white pines for only 14 (22 percent) of 64 day beds and only 9 (60 percent) of 15 overnight beds, using cool, lowland places for 33 (61 percent) of 54 day beds where habitat was recorded (Rogers, unpubl. data).

BLACK BEAR DENS

Supercanopy white pines are unique among northern forest trees in their potential for becoming high quality den sites. They have large diameters, moderately decay-resistant outer wood (Hosie 1969), and a strong tendency to become hollow (White 1953, Heinselman 1973). Tree cavities are preferred den sites for female black bears throughout the range of the black bear (Jonkel and Cowan 1971, Taylor 1971, Lindzey and Meslow 1976, Hamilton and Marchinton 1980, Johnson and Pelton 1981, Rogers and Allen 1987, Weaver and Pelton 1992). Tree cavities provide superior insulation and protection in winter. They may be particularly important to adult females because parturition and lactation occur in winter dens, and dry, well-insulated cavities allow females to expend approximately 15 percent less energy for body temperature maintenance and more for parturition and lactation (Johnson et al. 1978). Den trees in other parts of North America have generally been between 84 and 257 cm DBH (Switzenberg 1955, Pelton et al. 1980, Weaver and Pelton 1992). In northeastern Minnesota, only two hollow trees close to that size were observed in 24 years of study, and both were used as dens (Rogers 1987). The smaller of these was a 81-cm DBH red pine; the larger was a white pine. Both were in the Boundary Waters Canoe Area Wilderness in a single white/red pine stand more than two centuries old (Heinselman 1973, M. L. Heinselman, personal communication, 1991). The bases of both trees had been scarred by fire about a century ago, creating entrances into their hollow centers. Also in that stand was a hollow red pine snag that was used as a den. The snag was 3 m tall with a 126 cm diameter near the base at den level. In another stand, a white pine stump larger than 120 cm in diameter was used as a den. All were used by female bears (Rogers, unpublished data).

OSPREYS, BALD EAGLES, AND WHITE PINES

The open, irregular crowns of supercanopy white pines enable birds with large wingspans to land and nest. Thirty-one years of nest survey data from the Superior National Forest (SNF) showed that 215 (81 percent) of 264 bald eagle nests and 232 (77 percent) of 301 osprey nests were in white pines even though these trees comprise less than 0.5 percent of the trees larger than 10 cm DBH in the SNF (Kingsley and Ramquist, 1992).

WHITE PINES AND OTHER WILDLIFE SPECIES

Supercanopy white pines are used by many other species of wildlife, but no definite obligate relationship has been proven (Martin et al. 1951, Elias 1980, Rogers 1991, Green 1992). The seeds are eaten by red squirrels (*Tamiasciurus hudsonicus*), gray squirrels (*Sciurus carolinensis*), chipmunks (*Tamias sciurus*), deer mice (*Peromyscus maniculatus*) black-capped chickadees (*Parus atricapillus*), red crossbills (*Loxia curvirostra*), red-breasted nuthatches (*Sitta canadensis*), and others (Martin et al. 1951, Elias 1980). The inner bark is a favorite winter food of porcupines (*Erithizon dorsatum*) (Hazard 1982). Raptors that use supercanopy white pines as perches include the rare boreal owl (*Aegolius funerea*) (Personal communication, Steven G. Wilson, Forest Ecologist, Minnesota Department of Natural Resources, 1991).

When supercanopy white pines become supercanopy snags, their decay-resistant outer wood (Hosie 1969) enables them to stand for many years and their tendency to become hollow (White 1953, Heinselman 1973) increases their ability to provide homes for the larger cavity-dwelling birds and mammals. Large snags such as supercanopy white pines can be substituted for smaller ones in forest wildlife management but small snags cannot replace larger ones (Thomas et al. 1979). In Ontario, white pine snags were the snags preferred by woodpeckers for feeding and nesting, and the larger, more decayed snags were the most preferred (Quinby 1989). Fifty-five (49 percent) of 112 white pine snags (average DBH 39 cm) showed woodpecker use, whereas only 3 (14 percent) of 22 red pine snags (average DBH 45 cm) showed use. Only 30 percent of *Populus* snags were used, and only 0-14 percent of other snag species (*Picea glauca*, *P. mariana*, *Abies balsamea*, *Betula papyrifera*, *Pinus banksiana*, *Acer rubrum*, and *Thuja occidentalis*) showed use (Quinby 1989). The thick bark of white pine snags often separates from the outer wood of the trunk, providing roosting areas for one of Minnesota's less common bats, the silver-haired bat (*Lasionycteris noctivagans*). White pine snags eventually fall and become large diameter decaying logs that persist longer than smaller logs and permit greater development of dependent communities (J. W. Thomas, Biologist, U.S. Forest Service, personal communication, 1991). Healthy forests are not only growing trees, they are functioning ecosystems, which include dead and dying trees that provide food for insects, homes for wildlife, and microsites for seedling establishment.

THE NEED FOR STUDY

The white pine harvest that began in Minnesota in 1839 brought many habitat changes. Aspen, birch, spruce, and balsam fir replaced much of the white pine and enabled white-tailed deer and coyotes to expand their ranges northward (Longley and Wechsler 1980, Rogers et al. 1981). Effects of white pine harvest on smaller, less noticeable animals are unknown because no wildlife censuses were conducted before the harvest. Most inhabitants of Minnesota's white pine range have not been studied sufficiently to determine direct or indirect relations with specific tree species. Detailed habitat information is still needed for most of Minnesota's mammal, bird, reptile, amphibian, and invertebrate species. Without full information about habitat requirements, forest managers need to preserve all components of Minnesota's ecosystems to reduce the risk of species extirpation.

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