WHITE PINE
ECOLOGY

— the ideal species

If you tried to design a coniferous forest tree species that was adapted to the moist forest environments of the Inland Northwest (northern Idaho, northeastern Washington, northeastern Oregon, and northwestern Montana), you would probably come up with a tree that is much like the majestic western white pine. White pines grow rapidly when moisture conditions are favorable (average precipitation in the western white pine region ranges from 28 to 60 inches annually), and they tolerate the extremes of winter cold and summer drought that commonly occur in Inland Northwestern forests. They produce seed crops at 3- to 4-year intervals, and under relatively open conditions, compete well with aggressive, shade-intolerant species such as western larch and lodgepole pine.

FRONT COVER PHOTOGRAPH BY: Pam Benham.
INSIDE FRONT COVER PHOTOGRAPH: Potlatch Historical Society, THIS PAGE: At 60 years old in 1937, this stand of almost pure white pine near Coeur d'Alene, Idaho, was a stunning example of the white pine forest type. Montford Creek Natural Area, Deception Creek Experimental Forest. PHOTOGRAPH COURTESY OF: USDA Forest Service.
dependence on fire

One reason white pine was so successful and so abundant in the Inland Northwest is because the species is so well-adapted to fire. White pine seedlings can get established initially in moderately shady areas, but once established, white pines grow best in full sunlight. Even moderate amounts of shade will reduce their growth. To persist in this ecosystem, white pines need fire or some other force to create large openings in the forest.

Historically, wildfires were common in Inland Northwestern forests. They were largely responsible for the diverse mosaic of species, age classes, and stand structures that characterized forests in the region. Patchy fires of low and mixed severity averaged 50 to 100 years between occurrences in the same stands. Large, high-intensity, stand-replacing fires occurred at 150- to 250-year intervals.

TO PERSIST IN THIS ECOSYSTEM, WHITE PINES NEED FIRE OR SOME OTHER FORCE TO CREATE LARGE OPENINGS IN THE FOREST.

Fires created open spaces of different sizes where white pines could become established. In the larger openings, white pine seedlings would eventually outgrow competing species and dominate the forest for 200 years or more. Because white pines often lived to 350 years and occasionally to 500, there were plenty of mature trees to provide a seed source when the next stand-replacing wildfire came along.

resistance to native pests

White pine's ecological success was also related to its resistance to most native insects and diseases. As stands aged, insects and diseases thinned out the more susceptible species, thereby maintaining or increasing white pine's dominance.

White pines did have one primary native foe, however, the mountain pine beetle. While fungal root diseases slowly removed white pines of all sizes, mountain pine beetles could kill their aging hosts in just one year.

TOP: The great fire of 1910 burned across more than 3 million acres of forest in the Inland Northwest, including the Little North Fork of the St. Joe River, St. Joe National Forest, Idaho. Wildfires regularly created large openings in the forest where new white pine seedlings became established and eventually outcompeted other tree species. PHOTOGRAPH BY: J. B. Harm, courtesy of USDA Forest Service. RIGHT: From the mid-1980s and into the 1990s, beetles killed nearly all the white pines in the more than 200-year-old Monford Creek Grove, Monford Creek Natural Area, Deception Creek Experimental Forest, Idaho. PHOTOGRAPH BY: Art Zack.
During periods of drought, mountain pine beetles killed thousands of mature white pines over thousands of acres. Heavy fuel loads that resulted from these outbreaks then set the stage for the next stand-replacing fire. Once the fires did their work, they created open growing conditions that were ideal for a new generation of vigorous, fast-growing white pines. Trees in adjacent stands and residual trees whose seeds matured after the fire had passed through provided the seed that became the new young stands of this remarkable species.

—a hub in the wheel of life in the forest

Even dead and dying white pines were critical to the cycles of life in the forest. Their tops provided roosts for large birds such as bald eagles and ospreys that build nests in large, broken-topped trees along lakes and streams. They also attracted woodpeckers that created holes in the tree trunks and nested in large snags. Owls and smaller birds followed—swallows in riparian areas and bluebirds in more open forests.

Chipmunks, raccoons, squirrels, and bats also found shelter in the old veterans. As carpenter ants and wood borers moved in, they helped recycle the wood of the old giants. The insects, in turn, provided an additional food source for bears and many kinds of forest birds.

By the time natural wildfires returned to a stand, the dead giants had little protection against the flames. Eventually, much of their wood burned. Some became soil wood or charcoal and left pools of nutrients in the soil that were (and are) essential to the long-term high productivity of the Inland Northwest’s forests.

Fires cranked the wheel of forest life in another way. Large burned white pine snags can stand for decades, and fire-killed logs may persist on the forest floor for more than a century. Whether standing or down, the dead trees provided shelter for an array of forest critters that included mice, foxes, bobcats, martens, skunks, fishers, minks, bears, and other animals who made their dens in the hollowed-out shells that remained after the flames had passed. Eventually the downed trunks were home to more fungi that decomposed the wood, further enriching the forest soils and increasing their ability to hold water.

Native fish also relied on the once-great white pines. In addition to providing shade directly to streams when they were standing, large trees would sometimes fall into streams, creating natural deep pools and critical habitat for cutthroat and bull trout.

Even dead and dying white pines were critical to the cycles of life in the forest.

Today, few forest trees in the Inland Northwest reach the age and size that were common to old-growth white pines. Losing the white pines has ultimately meant losing important habitat for the creatures that traditionally relied on the species for food and shelter. Although we cannot create large trees overnight, planting white pine—and managing at least some of our forests for production of large stems—will go a long way toward restoring these habitats and the natural cycles of life in our Inland Northwestern forests.