



Whitebark Pine *Pinus albicaulis*

General Description

Imagine a tree's life in the subalpine zone at treeline. Hurricane force winds blast you with snow and ice in winter storms. Summer winds rob your moisture. Thin, rocky soil offers little purchase for your roots or nourishment during the short growing season. The remarkable whitebark pine (*Pinus albicaulis*) thrives here, all the while sustaining wildlife, other plants, and watershed health.

Whitebark pine can grow to 12–18 m tall (40–60 ft) and, rarely, up to 1.5 m (5 ft) in diameter. They are shorter, or even shrub-like, in Krummholz form, at higher, windier elevations. The bark is thin, scaly, and grayish. Their needles are 4–10 cm long (1.5–3 in), in clumps of 5 at the ends of upswept branches. Being monoecious, both smaller male pollen cones (typically scarlet in full bloom) and larger female seed-bearing cones grow on the same tree. The purple to dark brown female cones grow 5–8 cm long (2–3 in) on the branch tips of the upper tree. Unlike other pines, the scales don't open at maturity to release their seeds. Their closed, purplish cones and 5-needle bunches distinguish them from similar Pacific Northwest pines, like the western white pine (*Pinus monticola*), which has longer, pointier cones, and the lodgepole pine (*Pinus contorta*), which has 2 needles in a bunch and smaller cones.

Habitat and Distribution

Preferring full sunlight, whitebark pine commonly grow on ridges and just below tree line between 1300 and 3700 m (4300–12,100 ft), at higher elevations than most other pines. Their fast growing, deep roots

and stout stems buffer them from strong and desiccating mountain winds. They range from southwest Canada to the Sierra Nevada in California and east to Wyoming.

Life Cycle

Whitebark pine rely heavily on the Clark's nutcracker (*Nucifraga columbiana*) for reproduction. The nutcracker's stout, straight beak can dig through the unopened scales of a mature pine cone for its seeds. The pea-sized seeds are roundish, wingless, and larger than other conifer seeds. Carrying the seeds in a pouch under its tongue, the bird buries them in shallow soil caches, sometimes up to 10 km away. Nutcrackers are known to cache up to 90,000+ seeds in a good seed crop year! The lucky seeds that escape the nutcracker's sharp spatial memory for finding them again often sprout. Slow-growing, the whitebark pine takes 25 to 30 years to begin producing cones. The cones take 2 years to mature. Peak cone production begins at 60 to 80 years and continues for several hundred more. Some trees live over 1000 years!

Ecology

Other than birds, many animals feed on this tree's high-calorie, nutritious seeds, which are 52% fat, 21% protein, and contain minerals like copper, zinc, iron, manganese, and calcium. Red squirrels (*Tamiasciurus hudsonicus*) collect the seeds in caches, which grizzly bears (*Ursus arctos horribilis*) raid. In fact, grizzly bear fecundity has been tied to the size of the whitebark pine cone crop. New grasses and herbs establish more easily under whitebark pine trees, promoting plant succession in the harsh subalpine. And the watershed benefits too. Snow piled up against and shaded by the trees melts more slowly, extending downstream water supplies.

Fire has mixed effects on whitebark pine. It can kill mature trees, whose thin bark and relatively short stature make them vulnerable. But it leaves behind burned mineral soil in which the trees' seeds sprout readily, often cached there by the nutcracker. Moreover, fire suppression in Western forests has



NPS/Jen Hooke

Whitebark pine (*Pinus albicaulis*)

boosted competing conifers, like the mountain hemlock (*Tsuga mertensiana*), which naturally succeed whitebark pine in the absence of disturbance, like fire.

Conservation

Whitebark pine are in steep decline throughout their range from a combination of factors. As a result, they have been a candidate for listing under the Endangered Species Act since 2011. Warmer temperature trends have triggered epidemic outbreaks of the mountain pine beetle (*Dendroctonus ponderosae*) and lowered the trees' resistance to white pine blister rust, caused by a nonnative fungus (*Cronartium ribicola*), both of which have killed millions of trees. Historical fire suppression allowed the march of more shade-tolerant competitors into whitebark pine habitat, replacing this species through succession. Both public and private organizations, like the Whitebark Pine Ecosystem Foundation, are focused on its conservation.

Where to See

In Klamath Network parks, whitebark pine occurs in Crater Lake and Lassen Volcanic National Parks.

Learn More

<https://www.audubon.org/news/better-know-bird-clarks-nutcracker-and-its-obsessive-seed-hoarding>

https://www.oregonencyclopedia.org/articles/whitebark_pine/#.X2kuzGhKg2w



NPS/Jen Hooke

Clark's nutcracker on whitebark pine cones.



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