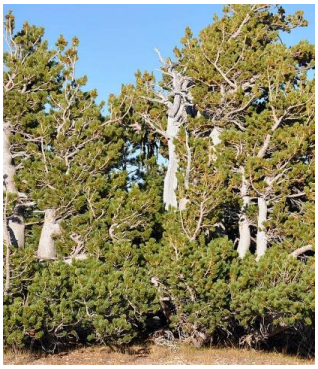
Whitebark pine

Pinus albicaulis

OREGON DEPARTMENT OF AGRICULTURE

THREATENED


Cones (left), habit (center), and habitat (right) of whitebark pine. Photos by Bruce N. Newhouse (left and right) and Gerald D. Carr (center), Courtesy of OregonFlora. If downloading images from this website, please credit the photographer.

Family

Pinaceae

Plant description

Pinus albicaulis is a long-lived conifer tree, typically 5–20 m tall with trunks up to 1.5 m in diameter, and a rounded or irregularly spreading crown. The mature bark of *P. albicaulis* is smooth, fissured into scales, and white to gray in color. The mature crown is often deformed due to wind and snowpack exposure. Buds are ovoid, light red to brown, and not resinous. The leaves are needles in clusters of five, upcurved, and 3–7 cm long. Whitebark pine seed cones are erect, measure 4–9 cm long, are gray to dark purple, with scale tip knobs angled and prickled. The cone scales do not open at maturity, but are usually torn apart by Clark's nutcracker or squirrels. The Clark's nutcracker will consume many seeds and cache some underground that will eventually grow into seedlings when conditions are satisfactory.

Distinguishing characteristics

Whitebark pine is the only stone pine in North America, with indehiscent seed cones and wingless seeds held in place by the cones' scales. Before cone production, whitebark pine can be confused with *Pinus flexilis* (limber pine), which also grows in high elevation montane forests. Limber pine can be distinguished by their elongated green cones that point down when on the tree and open at maturity compared to whitebark pine's rounded purplish cones that point up on the tree and are opened by wildlife.

Habitat

Whitebark pine occurs on cold, windy, high-elevation sites and in scattered areas of the warm and dry Great Basin. It is a hardy pine that grows at subalpine tree lines or with other high-mountain conifers just below the tree line and subalpine zone. *Pinus albicaulis* generally grows on steep slopes, with windy exposures and well-draining, poorly developed soils that are coarse, rocky, and shallow over bedrock. It is only a little shade tolerant, making it easy for more shade-adapted tree species to outcompete it. *Pinus albicaulis* requires two or more consecutive years of adequate and consistent soil moisture to allow for growth of reproductive individuals and nut production for a masting year.

Range

Pinus albicaulis has a geographically broad range throughout western North America at high elevations of 2,950 to 12,000. It is found in Oregon, Washington, California, Nevada, Idaho, Montana, Wyoming, British Columbia, and Alberta, Canada. In Oregon, whitebark pine is distributed along the Cascade Mountain Range with isolated stands

occurring in the Blue and Wallowa Mountains.

Oregon counties

Deschutes, Klamath, Lake, and Jackson

Federal status

Threatened

Threats

The major threats identified by the US Fish and Wildlife Service include white pine blister rust, mountain pine beetles, altered fire regime, and climate change. While whitebark pine is a fire-adapted species, it can be threatened by high-intensity fire resulting from fuel accumulations. The lack of natural fire disturbance has also affected natural forest succession across its range. White pine blister rust (*Cronartium ribicola*) is a nonnative pathogen that spreads through an alternate host and causes disease in five-needle pines, its primary host. Alternate hosts are usually woody shrubs in the *Ribes* genus but can also be herbaceous plants in *Pedicularis* and *Castilleja* genera. Some *P. albicaulis* individuals are resistant to white pine blister rust and serve as evidence of inheritable resistance and ability to limit the spread of the pathogen. Mountain pine beetles (*Dendroctonus ponderosae*) are another major threat to whitebark pine trees and are considered a significant source of tree mortality. Mountain pine beetles are a native insect that are considered an important natural disturbance for forests, however, when climate favors them with higher temperatures, the beetle population can increase to epidemic levels causing severe forest damage. The colder temperatures of *P. albicaulis* habitat has helped keep mountain pine beetle populations from reaching epidemic level at high elevation, but as climate change increases temperatures, the threat of mountain pine beetle may significantly increase. Whitebark pine is severely vulnerable to climate change, with habitat loss anticipated across the species' range as a direct and indirect impact of changing climates. While the species could establish itself at higher, colder elevations, eventually there may not be suitable habitat to migrate to, and such migrations may have negative impacts to alpine communities.

References

Oregon Biodiversity Information Center (ORBIC). 2022. Element Occurrence Reports for *Pinus albicaulis*. Unpublished cumulative data current to July 27, 2022. Institute for Natural Resources, Portland State University, Portland, OR.

US Fish and Wildlife Service (USFWS). 2021. Species Status Assessment Report for the Whitebark Pine, *Pinus albicaulis*. Prepared by the Wyoming Ecological Services Field Office. US Fish and Wildlife Service, Cheyenne, Wyoming.