

Species at Risk

Limber Pine and Whitebark Pine



Limber Pine
(*Pinus flexilis*)



Whitebark Pine
(*Pinus albicaulis*)

STATUS

Whitebark pine and limber pine trees can live over 1,000 years. They establish and grow at high elevations under harsh conditions that many other trees cannot tolerate including windy, dry conditions, in poor soils, and at treeline. Whitebark pine and limber pine may establish rapidly after fire, and aid in early establishment of high-elevation forests. They can form pure stands but usually grow with other species. Whitebark pine protects snowpack, regulating flows of mountain creeks and rivers. The large, nutritious seeds of both pines are an important food for almost 100 species of birds and animals. Whitebark pine relies totally, and limber pine relies heavily, on the Clark's nutcracker to reproduce – this jay-sized bird pecks seeds out of cones to cache in the ground where they germinate. Whitebark pine and limber pine form unique forest communities that are fundamental to the biodiversity of the mountains and foothills of Alberta.

You can help by learning to identify these endangered species. Prevent cutting or damaging of whitebark and limber pine – they grow very slowly so replacing damaged or cut trees takes decades or centuries. These trees cannot be used for firewood, lumber, tent poles, Christmas trees, or any other use.

Report the location of whitebark pine and limber pine trees you discover to the Alberta Conservation Information Management System.

More information on limber pine and whitebark pine in Alberta.

The Whitebark Pine Ecosystem Foundation

[www.albertaparks.ca/albertaparksca/management-land-use/alberta-conservation-information-management-system-\(acims\)/submit-data.aspx](http://www.albertaparks.ca/albertaparksca/management-land-use/alberta-conservation-information-management-system-(acims)/submit-data.aspx).

<http://aep.alberta.ca/fish-wildlife/species-at-risk/species-at-risk-publications-web-resources/plants/default.aspx>.

www.whitebarkpine.ca/ and www.whitebarkfound.org/



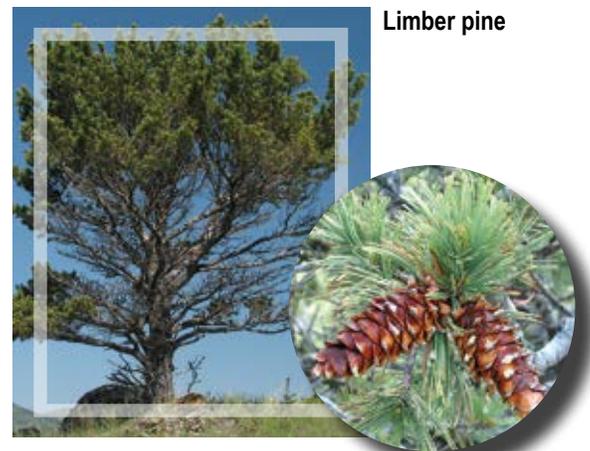
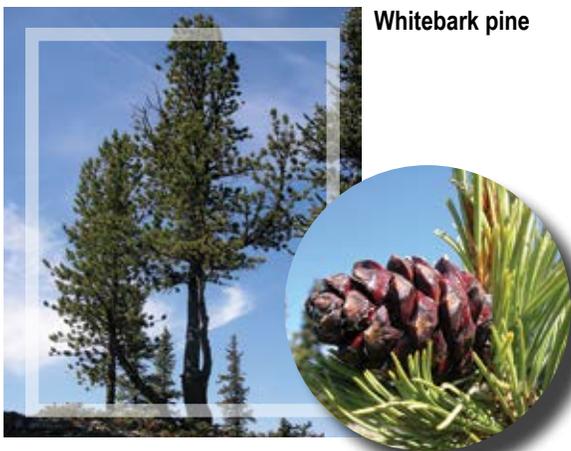
DESCRIPTION

Both whitebark pine and limber pine are endangered under Alberta's *Wildlife Act*. Under the federal *Species At Risk Act*, whitebark pine is endangered, and limber pine is proposed for listing as endangered.

Across Alberta, whitebark pine and limber pine stands are being monitored to track trends in health and regeneration. These surveys identify areas that urgently need restoration, and locate potentially rust-resistant trees from which to collect cones. Seedlings grown from these trees can be used for restoration and for gene conservation. These species are very difficult to tell apart if they are growing in the same area. The main features you can use to identify them are the cones and the habitat.

	Whitebark pine	Limber pine
Seed cones	<ul style="list-style-type: none"> • egg-shaped • right angles to branches • purple to dark brown when mature • thick scales never open to release seeds • start producing around 40 years, with full cone crops by age 80 to 100 • mast cone years every 3-5 years with few cones in between 	<ul style="list-style-type: none"> • long, pointed • not at right angles • medium to russet brown when mature • thinner scales open when mature • start producing around 30 years, with full cone crops by age 60 to 80 • mast cones are every 2-4 years with some cones in between
Pollen cones	• bright red to purple-red: July-August	• yellow: June-August
Needles	<ul style="list-style-type: none"> • Bundles of 5 • Medium length 	<ul style="list-style-type: none"> • Bundles of 5 • Medium length
Height	• 5 to 20 m	• Up to 15 m
Form	<ul style="list-style-type: none"> • Single-stem tree to shrubby multi-stem • Branches sweep up 	<ul style="list-style-type: none"> • Single-stem tree, often multi-stem • Branches sweep up
Bark	• Whitish, becoming grey and scaly with age	• Whitish, becoming grey and scaly with age
Habitat	<ul style="list-style-type: none"> • Subalpine (1500 m) up to treeline • Well-drained to dry sites • Often in poorly developed soil or talus • Usually ridges and south facing slopes 	<ul style="list-style-type: none"> • Foothills up to 2000 m • Well-drained to dry sites • Often in shallow soil • Usually ridges and south facing slopes

Both of these trees are keystone species: they play essential roles in their ecosystems, and if they were not present the ecosystems would change or disappear because species in an ecosystem are interdependent.



Similar Species

Whitebark pine and limber pine can easily be distinguished from the more common lodgepole pine and jack pine in Alberta by the number of needles in a bundle. Whitebark and limber pine have five needles, while lodgepole and jack pine have two.

Jack Pine
Pinus banksiana



Lodgepole Pine
Pinus contorta
var. *latifolia*



THREATS

The fungus causing white pine blister rust was introduced into Canada in the early 1900s from Europe, and has devastated North American 5-needle pine species. The fungus is native to Asia, where the trees have evolved to tolerate it. Spores land on needles, the fungus grows inside needles into the branch, and infections spread to the main stem. Most infected seedlings and young trees die before producing cones. When cone-bearing branches die, the trees can't reproduce. Weakened trees are more susceptible to mountain pine beetle attack. Some trees are naturally resistant to rust and those trees are the key to restoration and recovery.



White pine blister rust infects whitebark and limber pine and splits open the bark of branches and stems with blister-like cankers full of orange spores in June, July and August (see photo). Infected needle and branch tissue dies. Small mammals often eat the cankers because they are dense in carbohydrates, so chewed bark can be a sign of infection.

Mountain pine beetle is a native forest insect that attacks and kills many species of pine. The beetle prefers to attack large, mature trees that usually die the next year. Mountain pine beetle outbreaks decimate valuable cone-producing whitebark pine and limber pine trees, and kill many trees with natural resistance to white pine blister rust. Verbenone is a chemical produced by pine beetles that deters mountain pine beetles from attacking trees by sending a scent signal that the tree is already occupied. Verbenone application is most effective for protecting trees or stands where beetle infestation pressure is low to moderate.

Habitat loss from fire suppression and climate change threatens

both species through decreasing habitat and increasing competition from other species. Subalpine fir and spruce are more shade tolerant and grow faster than whitebark pine and limber pine. They suppress pine regeneration and change the stand to a dense spruce-fir forest. Historically, a mix of high and low intensity fires burned these stands, opening up the canopy and understory and providing good regeneration conditions for whitebark pine and limber pine. As the climate warms, competing species are establishing farther upslope as treelines rise.

RESTORATION AND RECOVERY

Alberta has approved recovery plans for both pine species, and is working to mitigate the effects of the threats and reverse the declines of these species and restore these important and beautiful ecosystems. Success requires many agencies and groups to continue their successful track record of working together, in Alberta and across jurisdictions where whitebark pine and limber pine grow. Below are some of the priority actions from the recovery plans:

- Seed has been collected from limber pine and whitebark pine throughout the species' ranges to preserve genetic diversity, a key part of biodiversity. This seed is securely stored in the provincial seed bank.
- Better maps of the species' ranges are being developed for more effective management and conservation.
- Trees that appear to have natural resistance to white pine blister rust are being identified in the field and seed collections from them are ongoing. Efforts are being made to protect these special trees from mountain pine beetles and wildfire.
- Alberta and Parks Canada are testing these potentially resistant trees to confirm whether they really are resistant to blister rust. The goal is to have a diverse supply of locally adapted, disease-resistant seed for restoration in Alberta.
- Past efforts to eradicate blister rust failed, but disease-resistant trees have been used to successfully restore several pine species. Many tens of thousands of disease-resistant seedlings must be planted to ensure these ecosystems can persist over the long term.
- Prescribed fire has been undertaken to restore historical fire patterns and help improve regeneration conditions for whitebark pine and limber pine.
- Researchers and partner agencies within and outside Alberta are working together to address gaps in our knowledge.
- Sharing information with partners and the public helps raise awareness and support.



HABITATS

Whitebark pine can grow at treeline, on steep, rocky cliffs with shallow soil, on sites exposed to strong winds, and on many subalpine forest sites. These trees are important for stabilizing soil and reducing erosion on steep sites. On sites that receive most of their moisture as snow in the winter, the trees help accumulate snow and prolong snow melt, providing water for mountain streams and rivers, and reducing flooding and erosion caused by quick snowmelt.

Limber pine grows from harsh, high elevation sites down to the grassland foothills of southern Alberta where whitebark does not grow. Where limber pine grows at high elevations, it also plays an environmentally important role in stabilizing soil, reducing erosion, accumulating snow, and regulating snowmelt.

In southern Alberta the ranges of these pines overlap. Whitebark pines are found as far north as the Kakwa Wildland Interprovincial Park at 54°N, while the northernmost limber pines are near Kootenay Plains in the David Thompson corridor at 52°N. In the northern part of its range, whitebark pine is restricted to the acidic soils of the Main Range of the Rocky Mountains.

WILDLIFE

Clark's nutcracker is essential for regeneration

The Clark's nutcracker is in the crow and jay family. It relies heavily on the seeds of whitebark and limber pine for food. These birds are the only effective seed disperser for whitebark pine, and are the primary agent dispersing limber pine seeds. They open the cones with their strong beaks, pick out the seeds — holding up to 100 at a time in a special pouch below the tongue — and cache the seeds with their beak in small groups a few centimeters under the ground, often choosing sites that are snow-free early on for easy access. They have incredible memories and dig up many of these caches in winter and spring.



Once cached, seeds of both limber and whitebark pines germinate 1-3 years later and new trees will start producing cones around age 50.

INTERACTIONS WITH OTHER SPECIES



The large, fat- and protein-rich seeds of these pines are an important food for red squirrels, bears, and many small birds and rodents.

Squirrels gather cones and store them in middens so they can eat the seeds during winter and spring.



Black bears and grizzly bears dig up squirrel middens and also climb trees to eat seeds from cones.