

# Whitebark pine (Pa) - *Pinus albicaulis*

Tree Species > Whitebark pine



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# BC Distribution of Whitebark pine (Pa)

Range of Whitebark pine



Whitebark pine is typically found in the MH and ESSF parklands such as this one in the coast-interior ecotone

## Geographic Range and Ecological Amplitudes

### Description

Whitebark pine is a small - to medium-sized (rarely >30 m tall), slow-growing, long-lived tree of high mountains. When mature, it develops multi-stemmed growth form, with typically long branches and upswept branched crown, with brown, scaly bark. It is not a timber crop species, but is valued for watershed protection and aesthetics. Its seeds are an important food for grizzly bears and other wildlife.

### Geographic Range

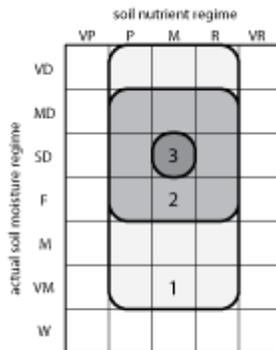
Geographic element:

Western North American/mainly Cordilleran and less Pacific

Distribution in Western North America:

(central) in the Pacific region; **central** and south in the Cordilleran region

### Ecological Amplitudes



generalized edaphic amplitude of whitebark pine according to actual soil moisture and nutrient regimes

#### Climatic amplitude:

(alpine tundra) - **subalpine boreal** - (cool temperate)

#### Orographic amplitude:

(montane) - **subalpine**

Occurrence in biogeoclimatic zones:

(lower, southern AT), upper submaritime MH, **upper southern ESSF**, (upper southern ICH)

#### Edaphic Amplitude

Range of soil moisture regimes:

(very dry) - moderately dry - **slightly dry** - fresh - (moist) - (very moist)

Range of soil nutrient regimes:

poor - **medium** - rich

The most productive growth of whitebark pine occurs on rich sites (it is absent on very poor sites); therefore, it could be concluded from field observations

carried out by Krajina (1969) that whitebark pine requires for productive growth higher amounts of calcium and magnesium than does lodgepole pine.

## Tolerance and Damaging Agents

### Root System Characteristics

On most sites, whitebark pine develops a deep and spreading root system. It is well anchored, even on the rocky substrates and is seldom uprooted despite its large, exposed crown and the violent winds to which it is subjected. Roots of whitebark pine are associated with both ecto- and endo-mycorrhizae.

### Tolerances

tolerance to	tolerance class	comments
low light	L	possibly moderately shade-tolerant on some sites
frost	H	
heat	M	summers are cool in subalpine boreal climates
water deficit	H	infrequent to frequent on water-deficient sites
water surplus	L	absent on waterlogged sites
nutrient (mainly N) deficiency	M	absent in very poor, acid soils

### Damaging Agents

damaging agent	resistance class	comments
snow	H	
wind	H	
risk class		
fire	L	not a major concern in the upper subalpine forest
insect	H	a serious concern; mountain pine beetle, white pine weevil
fungi	M	white pine blister rust; root and butt rots not a serious concern (e.g., Red ring rot and annosus root and butt rot)
other agents	L	dwarf mistletoes ( <i>Arceuthobium</i> spp.)

**Associated tree species and successional role**

In British Columbia, whitebark pine grows in pure or mixed-species stands, mainly in broadly even-aged stands. With increasing elevation, the species grows in isolated clumps on exposed ridges and as krummholz. Whitebark pine is a pioneer (primary succession) and is present in early, mid-, and even late stages of secondary succession. During secondary succession, whitebark pine may be replaced by mountain hemlock (MH zone) or Engelmann spruce and subalpine fir (ESSF zone).

associated tree species	occurrence class	major area of occurrence
limber pine	L	upper ESSF.
subalpine fir	L	upper ESSF.
engelmann spruce	L	upper ESSF.

**Silvical Characteristics**

characteristic	interpretive comments class	
reproduction capacity	L	a low germination rate, related to the development and condition of the seed coat and embryo
seed dissemination capacity	H	dispersal essentially by Clarks nutcrackers
potential for natural regeneration in low light	L	practically nil; a shade-intolerant species
potential for natural regeneration in the open	H	
potential initial growth rate (<5 years)	L	
response of advance regeneration to release	na	advance regeneration does not develop in the absence of adequate light and seedbeds.
self-pruning capacity in dense stands	na	dense stands are very infrequent.
Crown spatial requirements	H	
light conditions beneath	na	

closed-canopy, mature stands

potential productivity

na

non-crop species; site index functions are not available.

Longevity

H

Possibly to 1,000 years.

## Genetics and Notes

### Genetics

Most of the wide phenotypic variation in growth form in whitebark pine is apparently the result of differences in site and climate.

### Notes

Whitebark pines greatest values are for wildlife habitat, watershed protection, and aesthetics. More detailed silvics information is given by:

Arno, S.F. and R.J. Hoff. 1990. *Pinus albicaulis*. Pp. 268-279 in R.M. Burns and B.H. Honkala (technical coordinators) *Silvics of North America*, Vol 1. Agri. Handbook 654, USDA For. Serv., Washington, D.C.