

Subalpine fir (BI)- *Abies lasiocarpa*

Tree Species > Subalpine fir

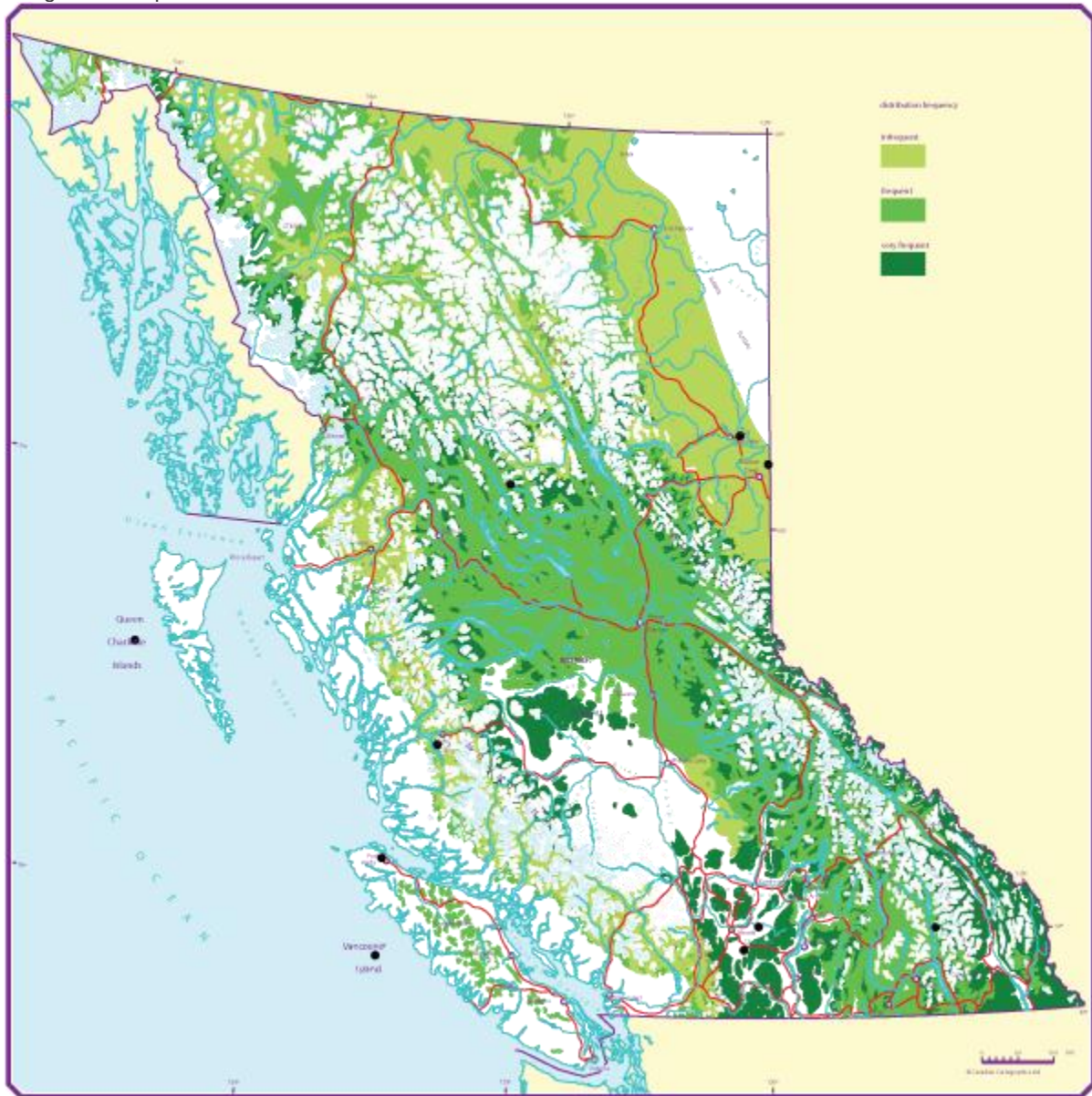


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BC Distribution of Subalpine fir (BI)

Range of Subalpine fir



Old-growth, subalpine fir stands cover a large area of the ESSF zone, particularly in wetter areas, such as northwest of Smithers

Geographic Range and Ecological Amplitudes

Description

Subalpine fir is a medium - to large-sized (exceptionally >40 m tall), evergreen conifer, at maturity with a low-taper stem, narrow, dense, cylindrical crown, with a spire-like top, short, drooping branches, and grayish-brown bark, breaking into irregular scales with age. Its light, soft, odorless wood is used mainly for lumber.

Geographic Range

Geographic element:

Western North American/mainly Cordilleran and less Pacific

Distribution in Western North America:

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

Ecological Amplitudes

Climatic amplitude:

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

Orographic amplitude:

montane - **subalpine** - (alpine)

Occurrence in biogeoclimatic zones:

(lower AT), subarctic MH, SWB, **ESSF, MS**, (BWBS), SBS, (upper IDF), upper ICH, (wetter subarctic CWH)

Subalpine fir grows mainly in humid, continental boreal climates, with a short growing season; less frequently in cool temperate climates, with a longer growing season. When these climates become drier and/or warmer, subalpine fir is absent or its occurrence is rare (e.g., in the SBPS and PP zones).

Edaphic Amplitude

Range of soil moisture regimes:

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

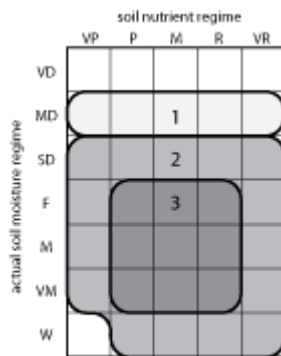
Range of soil nutrient regimes:

very poor - **poor** - **medium** - **rich** - very rich

Field studies indicate that subalpine fir is most vigorous on moist and rich sites, with calcium - and magnesium-rich soils such as those derived from basaltic or limestone parent materials. On very moist sites, such edaphic conditions are usually a result of seepage.

The native range of subalpine fir in British Columbia.

Ecological Amplitudes



generalized edaphic amplitude of subalpine fir according to actual soil moisture and nutrient regimes

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Tolerance and Damaging Agents

Root System Characteristics

In moderately deep, freely drained soils, subalpine fir develops a relatively deep root system; a relatively flat, plate-like root system is formed in poorly drained soils. A superficial lateral root system develops in suppressed seedlings, saplings, and even poles. Fine roots occupy predominantly surface organic layers and are associated with ecto - and endo-mycorrhizae.

Tolerances

tolerance to	tolerance class	comments
Low light	H	Less tolerant than Pacific silver fir, more tolerant than grand fir.
Frost	H	Tolerates frozen soil.
Heat	M	Protection-requiring on warm and dry sites.
Water deficit	M	Protection-requiring on dry and warm sites.
Water surplus	H	Tolerant of flooding, high water table, and strongly fluctuating water table.
Nutrient (mainly N) deficiency	H	Frequent in acid, very poor soils.

Damaging Agents

damaging agent	resistance class	comments
Snow	H	Heavy-snowpack tolerant.
Wind	L	Low resistance when exposed by heavy partial cuttings. Frequently in krummholz form at the subalpine/alpine boundary.

risk class		
Fire	H	Wildfires are frequent in ESSF and SBS.
Insect	H	Western spruce budworm, western balsam bark beetle, and balsam woolly adelgid.
Fungi	H	Root rots (e.g. laminated root rot),

decay in living trees (heart and butt rots, e.g. Indian paint fungus).

Additional information for BI damaging agents

From the Pacific Forestry Centre:

[Diseases for Subalpine Fir from Pacific Forestry Centre](#)

Pests

[Western Spruce Budworm](#)

[Western Balsam Bark Beetle](#)

[Balsam Woolly Adelgid](#)

Root Rots

[Annosus Root Rot](#)

[Tomentosus Root Disease](#)

[Rhizina Root Rot](#)

[Fusarium Root Rot](#)

Indian Paint Fungi

[Indian Paint Fungi](#)

[PDF for True heart-rots of the Pacific region](#)

Associated tree species and successional role

In British Columbia, subalpine fir grows in pure stands or in a variety of mixed-species stands, with one or more tree species. It is often a pioneer species (primary succession) and present in early, intermediate, and late stages of secondary succession; a minor component in old-growth stands in the MH, SWB, IDF, ICH, and CWH zones, and a major component in old-growth stands in the ESSF, MS, BWBS, and SBS zones.

associated tree species	occurrence class	major area of occurrence
Engelmann spruce	H	The most common associate in ESSF
White spruce (& hybrids)	H	Mainly in SBS and BWBS
Lodgepole pine	M	Mainly in SBS and BWBS
Western hemlock	L	Submaritime CWH and ICH
Mountain hemlock	L	Submaritime MH and wettest ESSF
Subalpine larch	L	
Common douglas	L	IDF and ICH
Western redcedar	L	ICH
Trembling aspen	L	Mainly in SBS and BWBS

Balsam poplar & Black cottonwood	L	Continental climates
Limber pine	L	Upper ESSF
Black spruce	L	Mainly in BWBS
Whitebark pine	L	Upper ESSF
Western larch	L	Southeastern MS, IDF and ICH
Paper birch	L	Mainly in SBS and BWBS
Grand fir	L	Submaritime CWH and southeastern IDF and ICH
Pacific silver fir	L	Submaritime CWH and MH

Silvical Characteristics

characteristic		interpretive comments class
Reproduction capacity	M	Seed production begins at an age of 20 years.; low percentage of sound seed.
Seed dissemination capacity	L	Maximum dispersion <100 m from the parent tree.
Potential for natural regeneration in low light	H	Regenerates on all substrates.
Potential for natural regeneration in the open	L	Short dispersion distance.
potential initial growth rate (<5 years)	L	Very low in low light; <10 cm/yr when planted in the open, higher on low-elevation sites.
Response of advance regeneration to release	H	1-2 years delay in radial growth response; 3-5 years delay in height growth response.
Self-pruning capacity in dense stands	H	Dense, second-growth stands are very frequent.
Crown spatial requirements	L	Very narrow crowns.
Light conditions beneath closed-canopy, mature stands	L	Associated with poorly developed understory vegetation.

Potential productivity	H	Decreases with increasing elevation; site index (50 yr @ bh) on zonal sites decreases from ± 30 m on montane sites to < 10 m on upper subalpine sites.
Longevity	M	Increases with increasing elevation, occasionally > 250 years.

Genetics and Notes

Genetics

Information on subalpine fir population differences is virtually nonexistent. Undoubtedly, any species with the range in elevation and latitude of subalpine fir will exhibit differences in growth, phenology, dormancy, resistance to heat and cold, etc., among different populations. Corkbark fir is the only recognized natural variety of subalpine fir. Some evidence from field studies on young trees suggests that subalpine fir may hybridize with grand fir or Pacific silver fir, however, such hybrids have not been described (aforementioned observations were made in the Fraser, Skagit, and Skaist River valleys).

Notes

Subalpine fir is a very productive species on a wide range of sites. Its productivity results from large leaf biomass, high shade tolerance, low crown spatial requirements (high basal area), low taper, and thin bark. These characteristics pertain to the whole genus *Abies*. The high shade tolerance of subalpine fir makes the species a desirable component in mixed-species stands, mainly with Engelmann and interior (hybrid) spruce.

Subalpine fir as well as spruce is well suited for very moist and poorly aerated sites. Natural regeneration occurs on a variety of seedbeds and advance regeneration responds well to release; thus, natural regeneration should be preferred to planting, especially on subalpine sites, considering a slow initial growth.

Subalpine fir, when in stands developed from advanced regeneration, is very susceptible to attack by Indian paint fungus, which destroys the heartwood. Thus, pure subalpine fir stands may be a poor silvicultural option. Engelmann spruce or interior spruce, which show higher resistance to Indian paint fungus, may ensure good timber production, when planted immediately after cutting. More detailed silvics information is given by:

Alexander, R.R., R.C. Shearer, and W.D. Shepperd. 1990. *Abies lasiocarpa*. Pp. 60-70 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.

Oliver, C.D. and R.M. Kenady. (editors) 1983. *Proceedings of the biology and management of true firs in the Pacific Northwest*. Symposium Contribution No.

45, College of Forest Resources, University of Washington, Seattle
Washington.