

# The Ecology of the Engelmann Spruce - Subalpine Fir Zone



The Engelmann Spruce – Subalpine Fir Zone occupies the highest forested elevations in British Columbia’s many mountain ranges. Steep, snow-covered mountain sides are blanketed with old-growth spruce and subalpine fir forests. The deep snows provide good skiing and give rise to clear, fast-flowing mountain streams that carry moisture to picturesque high-elevation parklands and herb meadows. Several major provincial parks are located here, and outdoor recreation and timber harvesting are both important economic resources.





# Location



The Engelmann Spruce – Subalpine Fir Zone occupies the uppermost forested elevations in the southern three-quarters of the interior of British Columbia. The zone rings the province's vast Interior Plateau, encircling an enormous area from below the United States border north almost to Dawson Creek and from the Coast Mountains east across into

Alberta. The zone occurs mainly in steep and rugged terrain and takes in parts of all of the major mountain ranges south of the Peace River region, including the Selkirks, the Purcells, the Columbia and Rocky Mountains, and the Skeena, Babine, and Omineca ranges. The zone is predominantly mountainous and includes some high valley bottoms as well as tracts of gentler, hilly terrain in areas such as the Quesnel and Shuswap highlands.

# Climate

Cold and snowy conditions prevail for five to seven months of the year in the Engelmann Spruce – Subalpine Fir Zone, where snowpacks as deep as two to three metres are common. Snows are heaviest in the wetter parts of the zone: for example, in the area of the northern Selkirks and along the Coast Mountains. In the drier areas, where snowfalls are relatively light, soils usually freeze early and remain frozen for several months. In subalpine parkland, at the highest elevations of the zone, snows are heavy and can stay on the ground until July. Not only are winters long and cold, summers are short and cool, with mean monthly temperatures above 10°C for up to two months of the year.



Peter Inaker

# Ecosystems

Forests of Engelmann spruce and subalpine fir cover the land in the lower and middle elevations of this zone. Since spruce typically lives longer than fir, it usually dominates the forest canopy in mature stands. Subalpine fir is abundant in the understorey. However, at high elevations in the zone and in some of the wetter parts of the zone, subalpine fir often dominates.

In the subalpine parklands that occur at higher elevations, the landscape is dotted with scattered islands of fir trees mixed in with areas of heath, meadow, and grassland. On the heath, mountain-heathers dominate, usually on wet sites where snow remains into the summer. At the higher elevations, wind is an important factor in the formation of krummholz, bushy clumps of prostrate conifers that grow near the treeline in areas where deep snow accumulates. Krummholz trees put up long leaders that become dry and rough from exposure to driving wind and ice crystals.

In drier parts of the zone, trees occur primarily in places where soils are deeper and where snow accumulates and provides moisture for the growing season and protection from winter winds. In these areas and in areas that have been disturbed by fire, lodgepole pine is often the main species.



Alex Inesberg



Peter Inaker



Whitebark pine, limber pine, and alpine larch are also common in drier parts of the zone.

Limber pine and alpine larch occur mainly at higher elevations in southeastern British Columbia.

Whitebark pine ranges north almost to McBride in the east and the Skeena River in the west.

Other species — mountain hemlock, amabilis fir, western white pine, Douglas-fir, western hemlock, and western redcedar — occur only occasionally in special circumstances. The zone contains few deciduous trees of any kind.

White-flowered rhododendron is a characteristic shrub that occurs throughout the zone.

Sometimes it grows in such dense tangles that a person can hardly walk through it. Other important shrubs include black huckleberry, grouseberry, and false azalea in the south. Also characteristic of the subalpine are open meadows which occur in valley bottoms, in parkland areas that receive high snow-falls, and on lower, gentling sloping ground where melting snow produces continuous seepage and the ground

stays moist throughout the growing season.

White-flowered rhododendron  
*Rhododendron albiflorum*  
Del Meidinger



Alpine larch  
Peter Tasker



Sitka valerian  
*Valeriana sitchensis*  
F. Boos

These subalpine meadows contain a variety of showy, flowering herbs, including Indian hellebore, arrow-leaved groundsel, subalpine daisy, paintbrush, foam-flower, and Sitka valerian, which gives the Engelmann Spruce – Subalpine Fir Zone its characteristic scent. Grasslands are limited, but they are a conspicuous feature

in the drier regions in the south where grass commonly occurs on steep, south-facing slopes.



Center Mark



# Wildlife

The wet, cool summers, long, cold and snowy winters, and steep terrain make the Engelmann Spruce – Subalpine Fir Zone suitable for a wide variety of wildlife. In spring and summer, avalanche tracks provide food for moose, black bear, and grizzly bear, which are abundant here. During fall, the bears feed on blueberries and huckleberries. Rocky Mountain elk, Rocky Mountain bighorn sheep, white-tailed deer, and stone sheep are restricted to particular areas, but ungulates such as moose, mountain goat, caribou, and mule deer find habitat in much of the zone. Moose usually move out of these areas in winter to escape the deep snowfall, but mountain goat and caribou frequently over-winter here. Because caribou rely exclusively on tree lichens in old-growth forests to see them through the snow season, the loss of old-growth forests in this zone represents a danger to their survival. In summer, many large mammals graze in the meadows associated with the high-elevation parkland forests of southeastern British Columbia.

Furbearing animals such as marten, fisher, and wolverine also use the zone's conifer forests for habitat, along with the highly characteristic Gray Jay and seed-eating birds such as the Red Crossbill, White-winged Crossbill, Pine Siskin, and Clark's Nutcracker. Golden Eagles make their nests in south-facing cliffs where they can feed on large rodents such as the hoary marmot and the Columbian ground squirrel. Clouds of no-see-ums are also a familiar feature of forests in the Engelmann Spruce – Subalpine Fir Zone.



Caribou  
*Rangifer tarandus*  
MOF



Gray Jay  
*Perisoreus canadensis*  
Mark Nyhof



Columbian ground squirrels  
*Spermophilus columbianus*  
MOF

There are relatively few species at risk in this zone, however, the mountain beaver is one. It is restricted to the Cascades and little is known of its ecology in B.C.



Mountain beaver  
*Aplodontia rufa*  
MOELP

## Avalanche Tracks

The Engelmann Spruce – Subalpine Fir Zone contains several special ecosystems, including parkland meadows, subalpine meadows, avalanche tracks, talus slopes, and rock outcrops.



Avalanche tracks are a prominent feature in mountainous areas where snowfalls are heavy. Deep snow packs build up in concave areas, and when the pack gives way, the snow funnels down a chute, removing any tall vegetation in its path. Because of repeated avalanches in the same chute, the tracks usually remain clear of trees. Instead, they develop a distinctive kind of vegetation — a lush green tangle of tall shrubs such as Sitka alder and herbs such as cowparsnip, lady fern, stinging nettle, triangle-leaved ragwort, Indian hellebore, and meadowrue. This species-rich ecosystem is an important place for bears to forage in the spring and early summer.



# Resources

In accessible parts of this zone, timber harvesting is the major economic activity. The lower elevations, especially sites that receive more moisture from up-slope seepage, produce large amounts of harvestable Engelmann spruce and subalpine fir. Because of the adverse climate and terrain, the only significant agricultural activity is summer livestock grazing in the drier parts of the zone. However, several major parks, such as Tweedsmuir, Wells Gray, Kootenay, Mount Revelstoke, Glacier, and Mount Robson are located in the ruggedly scenic parts of the Engelmann Spruce – Subalpine Fir Zone. With all the major ski hills in the British Columbia interior located here, skiing is a significant resource, along with other outdoor recreation activities such as camping, hiking, and mountaineering. Hunting is also a major attraction because of the large population of ungulates such as moose, mule deer, mountain goat, caribou, and elk.



Peter Tasker

## Clark's Nutcracker

The Clark's Nutcracker, a member of the crow family, has a powerful bill that can tear apart whitebark pine cones and crack the hard-coated seeds inside. It also has a special pouch in

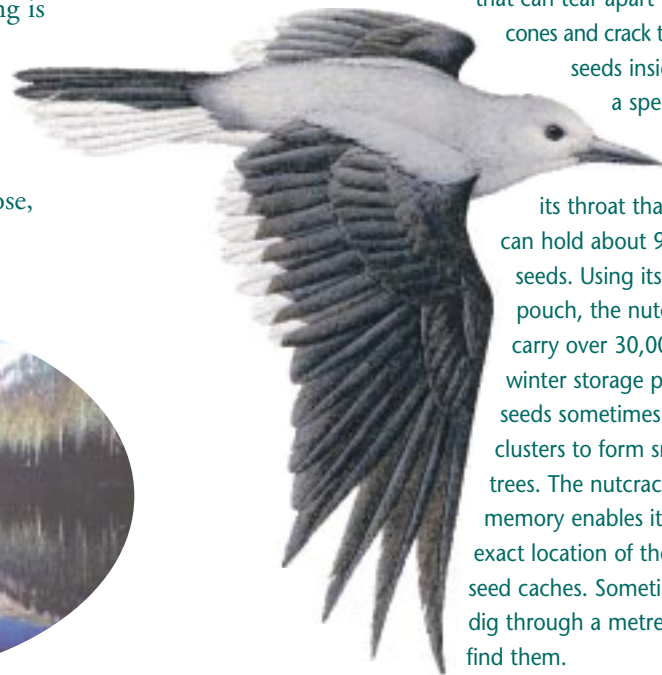


Photo: Dion Mamasynski

its throat that can hold about 90 seeds. Using its pouch, the nutcracker can carry over 30,000 seeds to winter storage places. Uneaten seeds sometimes germinate in clusters to form small groves of trees. The nutcracker's amazing memory enables it to find the exact location of thousands of seed caches. Sometimes it may dig through a metre of snow to find them.

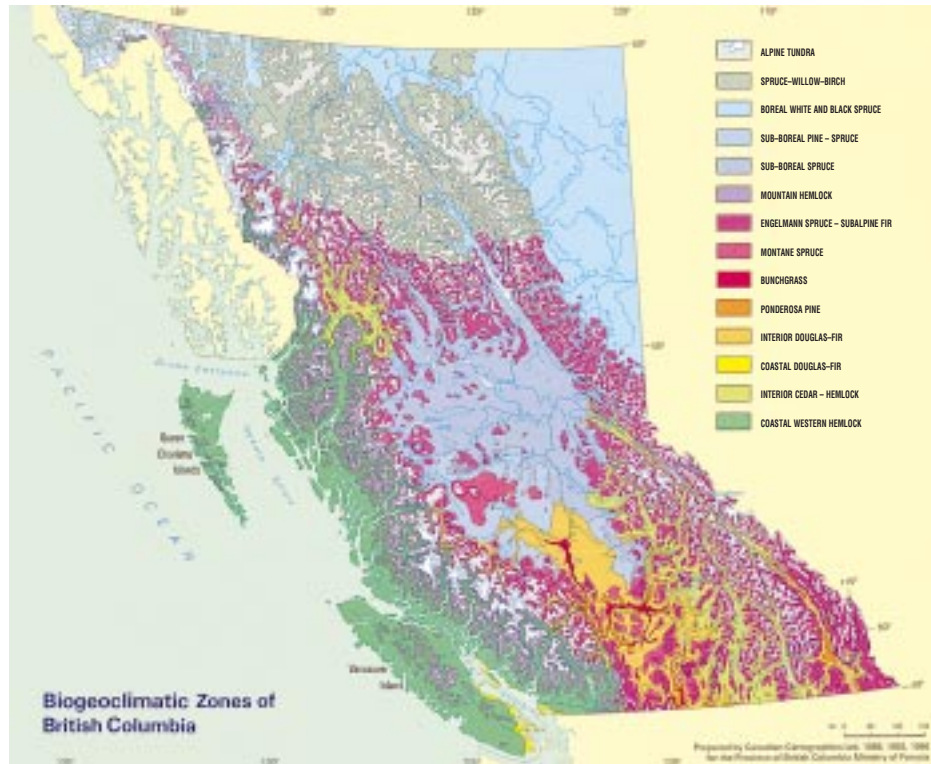


Gibson Lake, Kokanee Glacier Park  
Peter Tasker

Clark's Nutcracker  
*Nucifraga columbiana*  
Illustration: Mark Nyhof







The Engelmann Spruce – Subalpine Fir Zone is one of 14 biogeoclimatic or ecological zones within British Columbia. These zones are large geographic areas that share a similar climate within the province. Brochures in this series explore each zone.



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