

Rocky Mountains:

1. Alpine:

The Alpine Subregion includes all areas above treeline including vegetated areas, rockland, snowfield and glaciers.

Climate

This is the coldest subregion in Alberta with mean May - September temperatures of about 6 °C and essentially no frost-free period. Mean annual precipitation ranges from 420-850 mm and is likely higher for some areas. Greater wind speeds are a factor both in redistributing snow and especially in increasing cooling and evapotranspiration rates.

Soils

Much of the Alpine Subregion has no soil, the amount of weathered material being too thin to qualify as a soil. Soils in general are weakly-developed Regosolics and Brunisolics. A few Podzolics have developed under heath communities, especially where a thick layer of aeolian material, including volcanic ash, has accumulated. Gleysolics occur in wet sites. Cryosolics occur but their extent is poorly known.

Vegetation

Deep, late-melting snowbeds are occupied by *Carex nigricans* (black alpine sedge) communities. Moderate snowbed communities typically contain dwarf shrub heath tundra which is dominated by *Phyllodoce* spp. (heathers), *Cassiope* spp. (mountain heathers), and *Vaccinium scoparium* (grouseberry). Shallow snow areas on ridgetops and other exposed sites typically contain communities dominated by *Dryas octopetala* (white mountain avens), *Salix nivalis* (snow willow) and *Silene acaulis* (moss campion), or *Kobresia myosuroides* (kobresia). Diverse, colourful herb meadows occur in moist sites below melting snow banks or along streams. Highest elevation communities are composed mainly of lichens on rocks and shallow soil.

Some floristic differences are apparent south of Crowsnest Pass. *Cassiope* spp. (mountain heathers) are absent and *Phyllodoce* spp. (heathers) are more restricted than further north. *Xerophyllum tenax* (bear grass) meadows occur in some low elevation Alpine areas and other vegetation communities are apparently confined to this part of the province.

Wildlife

Many species range regularly in both the Subalpine and Alpine Subregions, including Columbian ground squirrel, pika, hoary marmot, grizzly bear, mountain goat, and bighorn sheep. White-tailed ptarmigan, gray-crowned rosy finch, horned lark and water pipit are restricted to the Alpine Subregion during the nesting season.

2. Sub Alpine:

The Subalpine Subregion occupies a band between the Montane and Alpine Subregions in the south and between the Upper Foothills and Alpine Subregions in the north.

The upper limit of the Subalpine Subregion ranges from about 2300 m in southern Alberta to 2000 m in northern Alberta. Lower elevational limits are around 1600 m in the south and 1350 m in the north.

Climate

The mean annual temperature ranges from -1 °C to 3 °C with a mean July temperature of 15 °C in the south and 9C in the north. Below freezing temperatures occur in all months and the frost-free period is likely less than 30 days. Total annual precipitation ranges from 460 mm in the drier Front Ranges to more than 1400 mm in parts of the south. Winter precipitation is higher in this subregion than any other in Alberta with often more than 200 cm of snowfall.

Soils

Soils vary widely reflecting the great diversity in parent materials and ecological conditions. Brunisolics and Luvisolics are most common and occur under a wide variety of conditions. Regosolics commonly occur on colluvial slopes and on active

fluvial landforms. Podzolics are largely confined to upper elevation, moist sites under spruce-fir forests. Cryosolics occur in Upper Subalpine sites in the Front Ranges from central Banff National Park to at least as far north as Willmore Wilderness Park. Solifluction is a common process on these sites. Gleysolics and Organics occur on wet sites on a variety of materials.

Vegetation

The Subalpine is often divided into two portions - a Lower Subalpine characterized by closed forests of lodgepole pine, Engelmann spruce and subalpine fir, and an Upper Subalpine with spruce-fir closed forests and open forests near treeline.

At lower elevations in the Subalpine Subregion, lodgepole pine forests cover extensive areas following fire. Common understory species include *Shepherdia canadensis* (buffaloberry), *Elymus innovatus* (hairy wild rye), *Aster conspicuus* (showy aster), *Arctostaphylos uva-ursi* (bearberry), *Juniperus* spp. (junipers), *Arnica cordifolia* (heart-leaved arnica), *Linnaea borealis* (twinflower), *Orthilia secunda* (one-sided wintergreen) and *Cornus canadensis* (bunchberry). At higher elevations, *Menziesia ferruginea* (false azalea) and *Vaccinium scoparium* (grouseberry) are important. In the south, *Rubus parviflorus* (thimbleberry), *Symphoricarpos occidentalis* (western snowberry), *Spiraea betulifolia* (white spiraea) and *Acer glabrum* (Rocky Mountain maple) are also important.

Engelmann spruce-subalpine fir forests typically occur on higher, moister sites which have not been as subject to fire as the lodgepole pine forests. Typical understory species include *Menziesia ferruginea* (false azalea), *Vaccinium membranaceum* (huckleberry), *Rhododendron albiflorum* (white-flowered rhododendron), *Vaccinium scoparium* (grouseberry), *Moneses uniflora* (one-flowered wintergreen), *Cornus canadensis* (bunchberry) and *Orthilia secunda* (one-sided wintergreen). Older, mesic forests have a thick carpet of mosses and lichens including *Hylocomium splendens*, *Pleurozium schreberi*, *Ptilium crista-castrensis*, *Dicranum scoparium* and *Peltigera aphthosa*.

The understory of the forests of the Waterton Lakes National Park area contains a number of species that do not occur further north. These include *Xerophyllum tenax* (beargrass), *Rubus parviflorus* (thimbleberry), *Luzula piperi* (Piper's wood rush), *Tiarella trifoliata* (foam flower) and *Pachystima myrsinites* (mountain lover).

High elevation grasslands occur in the Subalpine, mostly on steep, southerly and westerly aspects in the Front Ranges. Dominant species include *Elymus innovatus* (hairy wild rye), *Koeleria cristata* (June grass), and *Arctostaphylos uva-ursi* (bearberry). Snow avalanches also create a diverse mix of shrubby and herbaceous communities.

Wildlife

The occurrence of animal species in the Subalpine Subregion generally overlaps with the Subregions above and below. Species of the coniferous forests are widespread throughout the Foothills and Boreal Forest Natural Region including spruce grouse, gray jay, golden and ruby-crowned kinglets, yellow-rumped warblers, pine siskin, boreal chickadee, marten, snowshoe hare, black bear, deer mouse, red-backed vole and red squirrel.

Several Subalpine forest birds are restricted to the Rocky Mountain Natural Regions including Steller's jay, varied thrush and Townsend's warbler. These species, along with winter wren, are most common in the Main Ranges along the Continental Divide and in the extreme southwest.

A few species are confined to the northern part of the Subregion, such as willow ptarmigan, mountain caribou and golden-crowned sparrow.

Typical of higher elevations near timberline are hermit thrush, white-crowned sparrow, Brewer's sparrow, and golden-crowned sparrow. Rock fields are used by golden-mantled ground squirrel, yellow pine chipmunk, least chipmunk, pika and hoary marmot. American dipper and harlequin ducks occur along fast-flowing streams.

3. Montane:

Much of the southerly portion of the Montane Subregion occurs on east-west trending ridges that extend out from the Foothills Belt from the U.S. border to the Porcupine Hills. To the north, the Montane Subregion occurs mostly along major river valleys. Along the Bow River, it extends from the lower reaches of the Ghost River to about Castle Junction and, along the North Saskatchewan River from Kootenay Plains to Saskatchewan Crossing. The most northerly outlier is along the Athabasca River and adjacent valleys from Yellowhead Pass to Brule Lake. A small, disjunct area is the Ya-Ha-Tinda along the Red Deer River west of Sundre. Portions of the Cypress Hills are also included here. Elevations range from 1000-1350 m



in Jasper National Park, to 1350-1600 m in Banff National Park, to more than 1600 along the Eastern Slopes south of Calgary.

Climate

Chinooks are characteristic of the Montane Subregion and it is intermittently snow-free in the winter. The mean temperature for May - September is about 12 °C with a mean July temperature of 15 °C and a mean January temperature of -8 °C. There are about 70 frost-free days per year. Average annual precipitation is about 600 mm with a range of 300 - 1280 mm. Precipitation is lower in the northerly portion of the Montane.

Soils

Soils under grasslands are mostly Chernozemics, Brunisolics and Regosolics. Forest soils include Brunisolics and Luvisolics.

Vegetation

The Montane landscape is characterized by a pattern of open forests and grasslands. Characteristic tree species include *Pseudotsuga menziesii* (Douglas fir), *Pinus flexilis* (limber pine) and *Picea glauca* (white spruce). Douglas fir forests occur on moderate to steep slopes.

Closed Douglas fir forests typically have understories containing *Calamagrostis rubescens* (pine grass), *Elymus innovatus* (hairy wild rye), *Carex concinnoides* (northwestern sedge), *Arctostaphylos uva-ursi* (bearberry), *Juniperus* spp. (junipers), and *Symphoricarpos albus* (snowberry). Understory species of importance in the Waterton Lakes National Park area include *Berberis repens* (Oregon grape), *Physocarpus malvaceus* (ninebark), *Acer glabrum* (Rocky Mountain maple), *Clematis occidentalis* (purple clematis), and *Agropyron spicatum* (bluebunch wheat grass).

Limber pine forests are generally open and occur on the most exposed rock outcrops and eroding morainal or colluvial slopes. Common understory species include *Arctostaphylos uva-ursi* (bearberry), *Juniperus* spp. (junipers), *Agropyron spicatum* (bluebunch wheat grass), *Festuca idahoensis* (Idaho fescue), *Galium boreale* (northern bedstraw), *Cerastium arvense* (mouse-ear chickweed), *Penstemon eriantherus* (crested beard-tongue) and *Phacelia* spp. (scorpion-weed).

Grasslands are typically dominated by *Agropyron spicatum* (bluebunch wheatgrass), *Festuca* spp. (fescue grasses) and *Danthonia* spp. (oatgrasses) with a large diversity of forbs.

Lodgepole pine forests occur on upland sites and are similar to dry forests of the adjacent Subalpine Subregion. *Shepherdia canadensis* (buffaloberry), *Calamagrostis rubescens* (pine grass), and *Elymus innovatus* (hairy wild rye) are important understory species.

Wildlife

Douglas fir - limber pine habitats are typically inhabited by blue grouse, mountain chickadee, Hammond's flycatcher, Clark's nutcracker, mule deer, elk and Columbian ground squirrel. These habitats are also important ungulate winter range. Denser Douglas fir and lodgepole pine forests also contain yellow-rumped warbler (Audubon's subspecies), dark-eyed junco (Oregon subspecies), chipping sparrow, red crossbill, pine siskin and red squirrel. Aspen forests typically contain MacGillivray's warbler, warbling vireo and lazuli bunting.

Wetlands, streams and lakes are very productive for wildlife with Barrow's goldeneye, common snipe, red-winged blackbird, common yellowthroat, beaver, muskrat, and western toad. Spotted frog and long-toed salamander are two species of wet areas that are restricted to the Rocky Mountain Natural Region in Alberta.

The Cypress Hills have a distinctive but depauperate fauna due to their isolated position and the nature of post-glacial colonization. Several species typical of the Montane Subregion, such as mountain chickadee and blue grouse, do not occur in the Cypress Hills. However, the Mearn's subspecies of the dark-eyed junco occurs in Canada only in the Cypress Hills.