

7. Plant Communities

From Windswept Prairie to Lush Forest

As we have seen, patterns of topography, temperature, precipitation, and fire vary greatly over the Crown of the Continent. These variations result in a broad array of plant communities, from prairie



grasslands to alpine meadows, with a patchwork forest in between.

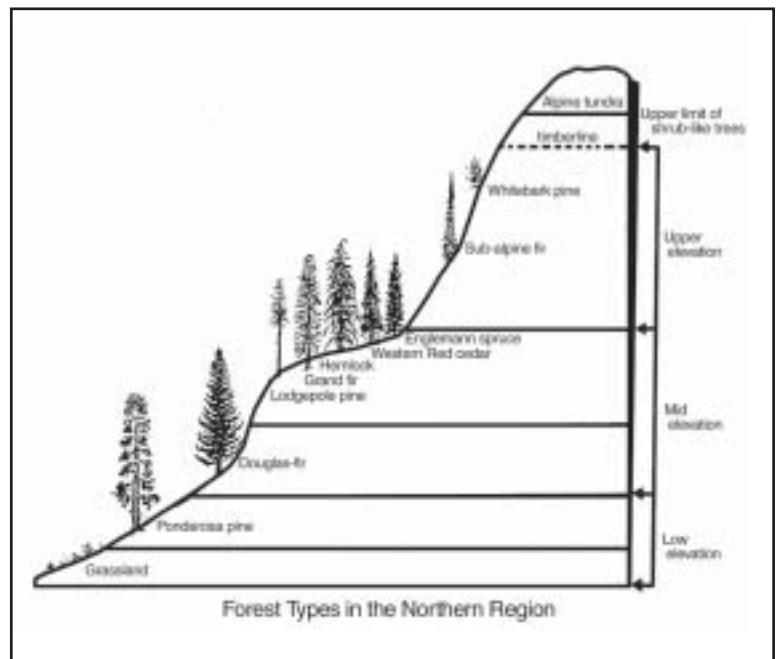
Two key factors determine what kind of plants grow in a given spot, available moisture and temperature. As we saw in the last chapter, both moisture and temperatures vary from the east side of the ecosystem to the west. One of the most striking features of this landscape is the different vegetation found in the wet, western portion of the Crown, where dense forests prevail, and the dry, eastern part, where grasses reign. The difference is quite abrupt, and visible by anyone motoring across the Continental Divide.

While many species grow on both sides of the Continental Divide, others are confined, or are more or less common, on one side compared to the other. For example, huckleberries are quite common on the west side of the Divide, while buffalo berries are more common on the drier east side. Douglas fir trees dominate the west side, while limber

pine and creeping juniper are more common on the east. Western red cedar, western larch, and western hemlock are all found on the west side, but rarely appear on the east. Aspen, on the other

hand, is more common on the east side.

Plant life also changes up and down mountains, since temperatures cool as elevation increases. Because the Crown of the Continent is a complex patchwork of local microclimates, it is also a complex mosaic of forest types.



Two deciduous trees, cottonwood and birch, demand more water than coniferous trees. Because summers in the Crown of the Continent are dry, these trees grow only along lakes and streams or where shallow groundwater provides a ready supply of water. Because of its relatively arid climate, with particularly dry summers, Crown of the Continent forests are dominated by conifers, with needles to help conserve water during summer. Tree species are specialized for local conditions. Western hemlock and western red cedar are commonly associated with the lush Pacific Coast, but are also found in a moist climatic zone in the northern Flathead Valley, near Lake McDonald in Glacier National Park and near Fernie, B.C. Ponderosa pine forests are found in the Seeley-Swan Valley, the Flathead Valley, and elsewhere in the southern and western portions of the ecosystem. Englemann spruce are common at higher elevations on both sides of the Continental Divide. Lodgepole pine forests are widespread on both sides of the Continental Divide. Limber pine grows on windswept ridges of the east side, while its relative, the whitebark pine, grows on dry, south- and west-facing slopes near the tree line. Western larch are particularly visible in the fall, when these conifers turn golden and lose their needles.

Waterton Lakes National Park has about 971 vascular plants on record. Glacier National Park botanists have recorded 1,258 plant species, while 1,026 species have been recorded in the Flathead National Forest. Clearly, many of the same plant species are found in all three locations. While none of these plant lists represent total numbers for the ecosystem, they help illustrate the plant diversity here. Compared to some other parts



of North America of equal area (particularly southern regions that were never glaciated), the Crown of the Continent is not particularly diverse in terms of the total number of plant species.

Human activities such as logging, agriculture, the introduction of exotic species, and fire suppression have changed plant life in the Crown of the Continent. Still, the major, natural functions of plant communities continue largely unchanged here, compared to 200 or even 4,000 years ago. It is also important to remember that plant communities are in a constant state of change or succession, with or without human interference. Natural change may be gradual, but it is constant. These changes can be very slow, like a fen that has remained relatively stable for thousands of years. Or, change can occur quickly, as in the wake of a forest fire.

Ecoregions: Zones of Plant Life

The plant communities of the Crown can be broken into several zones called *ecoregions* (see map on page 60). Ecoregions reflect differences in climate, whether the changes occur because of rain shadows or elevation. However, other features come to play as well. For example, a slope's aspect (whether it faces to or away from the sun) and wind exposure can influence the local ecoregion.

Boundaries between ecoregions in the Crown are higher on warmer, drier slopes that are exposed to the wind or with a westerly or southerly aspect. Conversely, boundaries between ecoregions are lower on cold, moist slopes that are lee of the wind and have a northerly or southerly aspect. Individual plant species may grow in more than one zone, so zones blend into each other with no distinct lines in between.

From low elevation to high, the Crown of the Continent's ecoregions are:

- Grasslands
- Foothills/parkland
- Montane
- Subalpine
- Alpine

Grasslands were common in the valley bottoms and prairie edges of the Crown of the Continent. Because grasslands are prime locations for agriculture, they have been altered across much of North America.

East of the Continental Divide, grasslands continue in an unbroken belt along the eastern fringe of the Rocky Mountain Front, continuing into the Great Plains or Canadian prairie. This grassland is typified by rough fescue, blue bunch wheatgrass, oat grass, and June grass, punctuated with Rocky Mountain juniper and limber pine and a variety of shrubs.

Waterton Lakes National Park includes 33 square kilometers (13 square miles) of fescue prairie—the only such sample protected in the Canadian national parks.

Grasslands originally carpeted portions of the Mission Valley, the Tobacco Valley, the Elk Valley, and the Blackfoot-Clearwater Valley, west of the Continental Divide. Protected portions of grassland west of the Continental Divide include the National Bison Range, Dancing Prairie Preserve, Wild Horse Island State Park in Flathead Lake, and the



small patches of prairie of the North Fork of the Flathead in Glacier National Park.

Aspen grow in extensive parklands, in lowland meadows, and on the foothills of the Rocky Mountain Front. They grow in clumps, which are actually many clones, sprouted from the roots of a single plant.

Characteristic plants of the foothills include lupine, prairie crocus, saskatoon berry, wild bergamont, chokecherry, and various grasses.

Montane forests are the low- to mid-elevation forests, dominated by Douglas fir, lodgepole pine, western larch, and other coniferous tree species. Ninebark, mountain maple, saskatoon berry, and other shrubs provide an understory below the trees. The diverse patchwork of montane forest makes a quilt that covers

much of the Crown of the Continent on both sides of the divide. Common understory species in the limber pine and Douglas fir forests east of the divide include bearberry, common juniper, and white fescue on drier sites and white spiraea, western meadow rue, and heart-leaved arnica on moister sites.



Western white pine, lodgepole pine, and western larch grow after fires or logging clear away older forests. Western red cedar grows in a few lush lowlands on the western side of the ecosystem. Ponderosa pine grows in drier sites on the edge of prairies, particularly in the southern part of the Crown of the Continent. Douglas fir grows in a remarkable variety of sites throughout the Crown, on both sides of

the divide. Limber pine grows on the eastern slope, also surviving in some extremely harsh conditions.

Other shrubs common in the montane forests of the west side include alder, huckleberry, and mountain ash. Pacific yew grows in moist, low-elevation, west side forests and



was recently harvested for taxol, a cancer-fighting drug. Forbs of the montane forest include

lupine, paintbrush, glacier lilies, aster, bunchberry, arnica, and pine grass.

At higher elevations, the climate becomes colder and the montane forest fades out to subalpine forest. Subalpine forests tend to have a more closed canopy than montane forests. Snows accumulate deeper, and the growing season is shorter, in the subalpine. Trees like western ponderosa pine, western larch, and Douglas fir gradually fade from the scene. Other tree species are better adapted to this increasingly harsh landscape.

The dominant pine of the subalpine is the lodgepole, particularly in areas that have burned in the past 100 years. Another pine species of the subalpine is the whitebark pine, which is no longer common in the Crown of the Continent. Whitebark pine is among the first to colonize the high country after a fire, and individual whitebark pine specimens



can live 1,000 years. Subalpine fir and Englemann spruce are also common trees of the subalpine, particularly in areas where fires have not burned in more than a century. Subalpine larch, a different species than western larch, grows near timberline on slopes where snow persists well into spring. Subalpine larch turn their characteristic gold a full month before their lowland cousins.

Subalpine fir are adapted to deep snow. Their boughs form a steep roof, to shed heavy, wet snow and not break under its weight. Subalpine fir can thrive in the shade of dense stands, so modern fire suppression has unintentionally favored it over whitebark pine and subalpine larch. The dense *Menziesia* bush (false huckleberry) is a common understory shrub in the subalpine. Huckleberry is also common here, as are glacier lilies. Beargrass is a widespread flower of the Crown's montane and subalpine. Waterton Park is one of the few places in Canada where beargrass grows.

Avalanche chutes are a common feature on steep slopes in the subalpine zones. Powerful snowslides annually clear away trees, allowing sunlight to feed shrubs, forbs, and grasses. These in



turn are important feeding areas for grizzly bears and browsing mammals. Plants of avalanche chutes include green alder and stunted subalpine fir and aspen; lush herbs include arrowleaf ragwort and fleabane.

Some experts divide the subalpine ecoregions into the lower and upper subalpine. In general, the forests of the lower subalpine

grow to form a closed canopy, while the forests of the upper subalpine are more widely spaced.

In the upper subalpine ecoregion, subalpine fir, Douglas fir, limber pine, and Englemann spruce live in dwarfed, twisted clumps called *krummholtz* or *kruppelholz*. Trees hundreds of years old may be only a few feet tall and have a tortured bonsai look from the rigors of mountain weather.

The land above the trees is called the alpine. The highest country of the Crown of the Continent will not support trees at all. Essentially, trees will not grow where the average daily July temperature does

not exceed 10°C (50°F). Summer temperatures determine the level of the tree line, although local conditions such as soil, wind, and snowpack can also alter the tree line.

In the Crown of the Continent, the alpine generally begins at about 2,100 meters (6,930 feet) on the west and 1,800 meters (5,940 feet) on the east. In spite of harsh conditions, the alpine enjoys long summer days and ample water. The result is a surprisingly rich natural community adapted to a harsh zone. Generally, the higher the latitude, the lower the elevation of tree line. Therefore, the tree line in the Crown is lower than the tree line in Colorado, but higher than the tree line in the Yukon.

Much of the alpine is not well vegetated. On dry sites, the predominant plants are mats of mountain avens and shrubfields of mountain heather. Lichens cover extensive rocky areas, called *scree* or *talus*. Particularly striking are the seasonal displays of alpine wildflowers, such as spring beauties and glacier lilies, in areas where snow lingers. Wildflowers such as spring beauty contain

underground bulbs called *corms*. Corms are essentially stored solar energy, which allows the plants to thrive in the short growing season, sometimes flowering even before the snow is completely melted. Other alpine plants grow in low, extensive mats and help build soil and provide protection for other species that follow. Pincushion plants, such as carpet pink or moss campion, flourish in areas

in the thinnest soil.

They grow only an inch or two high to avoid the harsh wind, but may patiently bloom for 350 years.

Where soil is almost nonexistent, vascular plants give way entirely to lichens.

These hardy organisms

can be found even on the highest, most perpendicular rock faces of the Continental Divide.

Wetlands and riparian areas are other important plant communities which can occur at all elevations, wherever surface or subsurface water exists. Riparian describes lakeshore and streamside plant communities. (*Ripa* is Latin for riverbank.)

Fens are unique wetlands because they are comprised entirely of peat. Examples in the Crown of the Continent include Pine Butte Swamp on the Rocky Mountain Front west of Choteau, Montana, and Glacier National Park's McGee Meadow. Fens are unlike bogs, in that they have surface and/or groundwater flowing in and

out continuously. (Bogs receive their water only through precipitation and do not exist in the



Crown of the Continent.)

Fens are the most biologically rich sites in the Crown of the Continent, supporting plants, insects, and even a mammal (the northern bog lemming) not found elsewhere in the Crown. Even a small fen can host more than eighty species of plants. Although they are small portions of the overall landscape, fens add greatly to the biodiversity of the Crown.

Streams, lakes, and rivers provide a steady supply of water, and thus provide a place where deciduous trees can survive. Cottonwoods in stringers along streams are often the only trees growing for many kilometers on the prairie. Riparian zones are biologically rich. For example, a census in Montana shows that roughly half of the state's birds nest in riparian areas. Cottonwood species include black, Great Plains, and narrow-leaf. Understory shrubs in the riparian zone include willow species and red osier dogwood, among others. Horsetail ferns, or *Equisetum*, are a common riparian plant.

Non-Vascular Plants and Plantlike Organisms

Mosses, lichens, fungi, and liverworts are ecologically vital, non-vascular organisms. Although they get less attention than more showy or economically valuable organisms like wildflowers and trees, they have vital functions in the ecosystem. Non-vascular plants fix nitrogen, break woody debris into useful soil, and provide food for many animals. Some forest ecologists compare the



non-vascular plants of a forest to the foundation of a house.

Squirrels, elk, and many other mammals eat mushrooms and other fungi. Morels and shaggy manes are popular with human pickers (and can be economically valuable), but be warned—many mushrooms and fungi are poisonous. Fungi grow throughout the Crown, but are more abundant and diverse on the western slopes of the ecosystem, where they receive more moisture.

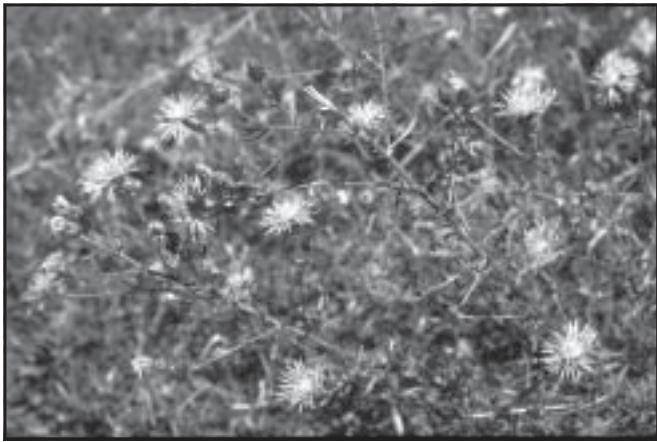
Lichens grow on the surface of rocks, hang from tree branches, and live on the ground. They have colorful names such as lung liverwort, frosted rocktripe, dog pelt, ragbag, common witch's hair, and edible horsehair. These organisms are primitive. Lichen reproduce by fragmentation; fungi reproduce via spores.

Weeds

About 10% of the flora of the Crown of the Continent is exotic or not native to the area. About 1% of the total flora is categorized as noxious weeds, which displace natives, often with repercussions throughout the native ecosystem. Weeds deprive plant eaters of nutrients, and in some cases poison them outright. Weeds generally reduce biodiversity by out-competing natives.

Some non-native plants, like timothy, were intentionally planted as livestock feed, escaped cultivation, and have become naturalized and widespread. Other weeds, such as orange hawkweed, have begun making inroads into the Crown of the Continent over the last decade. Exotic plants often thrive in areas disturbed by human activity, such as ditches and roadbeds. Large blocks of wilderness can be effective barriers to weeds; however, weeds do invade wilderness areas via natural carriers, such as wind, or unnatural carriers, such as livestock, hay, or even pant cuffs.

Biologists at the Flathead National Forest have identified 119 exotic plants in that area. Of those, 24 are listed as noxious by the local weed departments. The number of weeds appears to be growing in the Crown. In 1920, Glacier National Park listed 57 alien plant species; by the 1990s, the total was more than 120. Waterton Lakes National Park has identified 83 non-native plants, as of 1994, and is focusing on actively controlling 17 of them. Some of the “most wanted” weeds include spotted knapweed, ox-eye daisy, tansy ragwort, purple loosestrife, leafy spurge, sulfur



cinquefoil, dalmatian and yellow toadflax.

Another devastating exotic organism is not a vascular plant, but rather an airborne fungus called *blister rust*. In 1910, European pine tree seeds were imported into a nursery in British Columbia. A fungus inadvertently imported with those seeds spread throughout the Rocky Mountains with devastating results. The fungus proved fatal to five-needle pines, such as western white pine, whitebark pine, and limber pine. Vast stands of once-vibrant trees have been reduced to standing dead trees called *snags*. The trees, particularly whitebark pine, are important food sources for red squirrels, Clark’s nutcrackers, and both black and grizzly bears. The loss of this species in places like the Whitefish Range has cascaded through that food chain. Whitebark pine were

once common in the high country of the Crown of the Continent. Today, the stands of dead whitebark pines are ghost forests, and the species is functionally extinct in much of the ecosystem.

Rare Plants

In the United States, the criteria for listing plants as threatened or endangered under the Endangered Species Act are more stringent than the criteria for listing mammals. There is one endangered plant in the Montana portion of the Crown of the Continent. That is the water howellia, which grows in relict oxbows and glacial pothole ponds in the Swan Valley.

Land managers and botanists create lists of rare plants based on rarity and specific threats. Often, the life histories of these plants are poorly understood, so management generally consists of identifying populations of such plants and preventing disturbance. The Flathead National Forest lists 52 sensitive plants; Glacier



National Park has 63 rare plants; Waterton Lakes National Park has 179 species that are rare in Alberta, some of which are rare in Canada.

Part of the challenge of conserving plants is enlisting public support. Plants lack the charisma of endangered species like wolves and grizzly bears. A telling joke among botanists is that endangered plants are the things you step on, while searching for endangered animals.

Role of Plants in the Ecosystem

Plants provide a wide variety of functions for ecosystems. These include:

- Food and cover for wildlife
- Stabilization of soil
- Moderating air temperatures and humidity
- Regulating levels of carbon dioxide in the atmosphere
- Helping retain water on a landscape

Plants also have a wide variety of economic uses, from lumber for building homes, to mushrooms and huckleberries collected for food, to chemical compounds used in medicine.



Sources

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Land Cover in the Glacier National Park Area

