

SUBALPINE FOREST

Subalpine spruce-fir forests occur in high elevations above the ponderosa pine forests and below timberline (tree line) and the alpine tundra, roughly 9,000 ft to almost 12,000 ft in elevation. The wetter subalpine forest is full of life as it provides abundant shelter and food for wildlife with a vibrant understory. The subalpine forest typically has tight tree spacing and canopy, numerous downed logs and trees, mosses, and ferns.

Tree Species

Tree species of the subalpine forest are dominated by Engelmann spruce and subalpine fir, with Douglas fir, Colorado blue spruce, and aspen intermixed. The blue spruce tends to grow along riparian areas and small aspen clones are found amongst the spruce-fir. Douglas fir is more likely to occur in the lower elevation extents of the forest. Some of the trees may grow in more suitable pockets, somewhat protected from the elements, in 'tree islands' near timberline. The forest holds snow in winter, often four feet or more in the protection of the trees and shade of the canopy.

Engelmann spruce (*Picea engelmannii*) grow in high elevation, cold and more humid areas of the western United States. The spruce stands often occur on slopes and can tolerate shade more than many other conifers. The spruce is a tall tree with cones growing normally in the upper third of the tree. The cones have delicate paper-thin scales that protect the seeds. Their single needles are four-sided, unlike the flatter needles of a fir. At the highest elevations, like bristlecone pine, Engelmann spruce will grow as krummholz trees or trees that are only low shrub height due to the harsh conditions.

Subalpine fir (*Abies lasiocarpa*) have dense, flat, soft needles with branches that narrow or 'spire' near the top of the tree. The purple-blue cones of the fir grow upright on the branches instead of hanging down and their scales usually disintegrate before falling off the tree. Seedlings of the fir are browsed by elk, mule deer, Rocky Mountain bighorn sheep and snowshoe hare. The bark is nearly white to gray and mostly smooth except for resin blisters. Subalpine fir stands in southern Colorado and northern New Mexico may include the subspecies, corkbark fir (*Abies lasioscarpa* var. *arizonica*).

Mosaic

The subalpine forest has patches of aspen and bristlecone pine forests interspersed as well as high biodiversity montane wet meadows which support species of sedges and a diverse range of forbs including wildflowers. The forest often borders fens and sloped wetlands that are the highest portions and beginnings of the watersheds that feed streams and rivers below.

Understory

The subalpine ecosystem supports numerous fungi species. A few of the many species include *Boletus rubriceps*, *Amanita muscaria*, *Cortinarius elegantio-montanus*, *Cantharellus cibarius*, *Pleurotus populinus*, *Lactarius deliciosus* and *Sarcodon imbricatus*. The fungi in the forest can be designated as saprophytic (wood eating) or mycorrhiza (tree root symbiosis).

Forbs in the wet understory and meadows include wild strawberries, lady's slipper orchid, heartleaf arnica, marsh marigold, chiming bells, ferns, elephantella, shooting star, glacier lily, mountain harebell, monkshood,

aspen daisy, mountain lupine, mariposa lily ... and many more. Spotted coralroot, rosy and yellow paintbrush are parasitic or semi-parasitic plants that have little to no chlorophyll so the plants rely on stealing nutrients from the root systems of nearby plants. *Veratrum californicum* also known as 'corn lily', is a tall, broad-leaved plant somewhat resembling a corn plant that grows along the edges of the forest in meadows. The poisonous tall plant that is not a corn or a lily, is very distinctive and can grow 3-4 ft tall. It is often seen near the base of the Glacier Lakes Road.

Wildlife

The upper elevation of the forest is a transition zone to the exposed alpine tundra so many alpine animals use the forest for shelter. Animals of the subalpine ecosystem include snowshoe hare, montane shrew, golden mantle squirrel, black bear, coyote, elk, bobcat, and perhaps occasionally lynx. The dense forest is harder for elk to navigate, but the elk and Rocky Mountain bighorn sheep utilize the more open patches and the wet meadows for grazing.

The snowshoe hare (*Lepus americanus*) undergoes a seasonal coat color change from a white winter coat to a brown in the summer. The hare's large feet are lined with stiff hair for staying on top of snow in winter through spring. The hare eats grasses and forbs in summer, and buds, twigs, and tree bark in winter. A prey of many high elevation predators, the snowshoe hare uses a zig-zag pattern to try and escape.

The American marten (*Martes americana*) or pine marten are found in San Juan, Sangre de Cristo and Jemez mountains of southern Colorado & New Mexico. The martens, related to weasels, eat voles, snowshoe hares, pika, mice, berries, and carrion. The martens prefer areas with lush vegetation and downed stumps and logs in the spruce-fir forest but will also climb trees. Biologists conducting marten surveys in the past have found tracks on Vermejo, but the surveys produced no actual sightings of the small predator.

Terrestrial macroinvertebrates (land insects) including decomposers and pollinators are important to the ecosystem. Beetles, termites and ants help breakdown woody materials. The numerous flowering plants need pollinators including native bees, flies and hummingbirds like the broad-tailed hummingbird that will use nearby spruce for nesting.

Birds found in the subalpine forests include the Canada jay, dusky grouse, wild turkey, pine grosbeak, mountain chickadee, brown creeper, American dipper, Steller's Jay, pygmy owl, boreal owl, white-tailed ptarmigan (in upper extents), and western wood peewee (edges). The large dusky grouse are common in the forest and hens can be seen herding chicks back into the safety of the dense forest cover.

Mortality

The fire return interval for the subalpine forest is 300 or more years. The Englemann spruce and subalpine fir are not well adapted to withstand fire. Both trees have very thin bark, unlike the fire dependent ponderosa pine's thick bark layer. When fire does occur in the forest, it can be intense with the density of down and dead trees in the forest, and fires will likely crown.

The western spruce budworm is the cause of most mortality in subalpine ecosystems. The larvae is the most common defoliator in the west, eating the foliage or needles and eventually killing trees before

metamorphosing into the adult moth form. The budworms eat not only blue and Engelmann spruce, but also Douglas and subalpine firs.

Forest Management

Vermejo's Forestry Department conducts occasional treatment or thinning projects in the subalpine forest. Past treatment areas include the Allen Creek Project, the Glacier Project north of the Old Costilla Lodge, as well as thinning near the new Costilla Lodge.