

# Northern Rockies Ecosystem Types and Descriptions

As determined for use in categorizing resources in the database.

## Overview

Within the boundaries of the Northern Rockies Fire Science Network (NRFSN) that serves northeastern Washington, northern, central, and southeastern Idaho, western Montana, and northwestern Wyoming, there are steep elevational gradients, wide ranging climate conditions, and a diversity of ecosystem types. Below are the common broad ecosystem types that occur within the NRFSN. Ecosystems are presented in approximate elevational order from the highest elevation and coldest alpine regions to the lowest elevation and warmest foothills and valley regions.

## Alpine forest/krummholz

The alpine forest/krummholz ecosystem occupies very high elevation sites where growing seasons are short, temperatures are cold, and high winds are common. Possible tree species include whitebark pine (*Pinus albicaulis*), alpine larch (*Larix lyallii*), and limber pine (*P. flexilis*), but because of very harsh growing conditions, tree heights are often severely stunted.

## Alpine/subalpine shrubland/meadow

The alpine/subalpine shrubland/meadow ecosystem occurs at high-elevation sites where temperatures are very cold and snow pack substantial. In the alpine zone, this ecosystem is dominated by low-growing vegetation that typically includes heathers (*Cassiope* spp.), dwarf blueberry species (*Vaccinium* spp.), sedges (*Carex* spp.), and rushes (*Juncus* spp.). In the subalpine zone, this ecosystem occurs on steep slopes with shallow rocky soils and is dominated by deciduous shrubs such as rusty menziesia (*Menziesia ferruginea*), alderleaf buckthorn (*Rhamnus alnifolia*), sitka alder (*Alnus viridis*), mountain ash (*Sorbus* spp.), and grasses such as bluejoint (*Calamagrostis canadensis*), pinegrass (*C. rubescens*), and sedges (*Carex* spp.).

## Subalpine wet spruce-fir forest

The subalpine spruce-fir forest ecosystem that occurs on mesic to wet sites is commonly found on north slopes, in high-elevation ravines, or other areas where moisture collects or snow persists. Common canopy species include Engelmann spruce (*Picea engelmannii*), subalpine fir (*Abies lasiocarpa*), and mountain hemlock (*Tsuga mertensiana*). Whitebark pine (*Pinus albicaulis*), alpine larch (*Larix lyallii*), and limber pine (*P. flexilis*) are also possible in the subalpine wet subalpine spruce-fir forest and here may grow as large-sized trees. Ericaceous shrub species (*Vaccinium*, *Phyllodoce*, *Menziesia* spp.) are common in the understory.

## Subalpine dry spruce-fir forest

In the subalpine dry spruce-fir forest ecosystem, the most common canopy species are Engelmann spruce (*Picea engelmannii*) and subalpine fir (*Abies lasiocarpa*), but western hemlock (*Tsuga heterophylla*), Douglas-fir (*Pseudotsuga menziesii*), and lodgepole pine (*Pinus contorta*) are also common, especially on regenerating sites. Whitebark pine (*Pinus albicaulis*), alpine larch (*Larix lyallii*), and limber pine (*P. flexilis*) are also possible in the subalpine wet subalpine spruce-fir forest and here may grow as large-sized trees. The shrub understory can be extremely diverse. Possible associates include Rocky Mountain maple (*Acer glabrum*), Saskatoon serviceberry (*Amelanchier alnifolia*), mallow ninebark (*Physocarpus malvaceus*), currant (*Ribes* spp.), thimbleberry (*Rubus parviflorus*), common snowberry (*Symphoricarpos albus*), and mountain big sagebrush (*Artemisia tridentata* subsp. *vaseyana*) on the driest sites.

## Montane wet mixed-conifer forest

The montane wet mixed-conifer forest ecosystem in the montane zone is typically dominated by western hemlock (*Tsuga heterophylla*), western redcedar (*Thuja plicata*), and grand fir (*Abies grandis*) but often supports several seral species following forest disturbances. Seral species may include Douglas-fir (*Pseudotsuga menziesii*), western white pine (*Pinus monticola*), lodgepole pine (*Pinus contorta*), or western larch (*Larix occidentalis*). This ecosystem is common on moist to wet upland sites. Common understory shrubs include Oregon boxleaf (*Paxistima myrsinites*), gray alder (*Alnus incana*), Rocky Mountain maple (*Acer glabrum*), common snowberry (*Symphoricarpos albus*), bunchberry dogwood (*Cornus canadensis*), and thimbleberry (*Rubus parviflorus*).

### **Montane dry mixed-conifer forest**

The dry mixed-conifer forest ecosystem in the montane zone has highly variable species composition. The type is often dominated by Douglas-fir (*Pseudotsuga menziesii*) and found on warm, dry sites with gravelly soils. Other conifers in the dry mixed-conifer forests can include western larch (*Larix occidentalis*), grand fir (*Abies grandis*), ponderosa pine (*Pinus ponderosa*), and lodgepole pine (*Pinus contorta*). Grasses are generally the most abundant understory species but shrubs such as kinnikinnick (*Arctostaphylos uva-ursi*), and oceanspray (*Holodiscus discolor*) are also possible.

### **Persistent montane shrubland**

The persistent montane shrubland ecosystem occurs as small- to large-sized patches of long-lived deciduous shrubs. While these shrubland patches are often considered seral to montane conifer forest types, recurring fire or especially dense stocking of shrubs can slow conifer recruitment considerably, making this a persistent vegetation type. Shrubs common to the persistent montane shrubland ecosystem include Rocky Mountain maple (*Acer glabrum*), oceanspray (*Holodiscus discolor*), mountain ash (*Sorbus* spp.), and thimbleberry (*Rubus parviflorus*). Herbaceous vegetation is rare.

### **Aspen woodland**

The aspen woodland ecosystem occurs from the foothills to the subalpine zones. This ecosystem type generally occurs on gentle to moderate slopes where soils are deep and lack a high gravel or rock component. In the foothills zone aspen woodlands are generally restricted to mesic sites. Quaking aspen (*Populus tremuloides*) is the dominant and sometimes only canopy species, but there can be conifer associates including Engelmann spruce (*Picea engelmannii*), white spruce (*Picea glauca*), ponderosa pine (*Pinus ponderosa*), and Douglas-fir (*Pseudotsuga menziesii*). Understory vegetation ranges from complex with multiple shrub and herbaceous layers to simple with just a single layer of forbs and/or grasses.

### **Riparian woodland/shrubland**

The riparian woodland/shrubland ecosystem occupies streambanks from the foothills to the subalpine zones. In the lower montane and foothills zones, this ecosystem is primarily dominated by deciduous trees and shrubs. Possible canopy tree species include maples (*Acer* spp.), cottonwoods (*Populus* spp.), willows (*Salix amygdaloides*), Douglas-fir (*Pseudotsuga menziesii*), and Rocky Mountain juniper (*Juniperus scopulorum*). Shrubs may occur in the understory or as a tall shrub canopy. Dominant shrubs include Rocky Mountain maple (*Acer glabrum*), alders (*Alnus* spp.), water birch (*Betula occidentalis*), redbud dogwood (*Cornus sericea*), and willow (*Salix* spp.). In the montane to subalpine zones, canopy trees in the riparian ecosystem are typically conifers and the understory is rarely well developed.

### **Ponderosa pine woodland/savanna**

The ponderosa pine woodland/savanna ecosystem occurs predominantly in the foothills on warm, dry, exposed sites. Ponderosa pine (*Pinus ponderosa*) is the dominant and sometimes only canopy species; however, Douglas-fir (*Pseudotsuga menziesii*), lodgepole pine (*Pinus contorta*), and western larch (*Larix occidentalis*) are possible overstory associates. Trees in the ponderosa pine woodland/savanna are often more widely spaced than in the subalpine and montane forested ecosystems. The understory is typically grass dominated. Bluebunch wheatgrass (*Pseudoroegneria spicata*) is often dominant but other associates may include prairie Junegrass (*Koeleria macrantha*), needle and thread (*Hesperostipa comata*), and dryland sedges (*Carex filifolia* and *C. inops* subsp. *heliophila*). Possible shrub associates include big sagebrush (*Artemisia tridentata*), snowbrush ceanothus (*Ceanothus velutinus*), and snowberry (*Symphoricarpos* spp.).

### **Juniper woodland**

The juniper woodland ecosystem occurs in foothills and lower montane regions. This ecosystem type is generally restricted to sites with gravelly or rocky soils that experience harsh winter and dry summer conditions. Dominant trees are Rocky Mountain juniper (*Juniperus scopulorum*) or limber pine (*Pinus flexilis*). The canopy layer is generally open and a number of shrub species may grow in the understory: creeping juniper (*J. horizontalis*), kinnikinnick (*Arctostaphylos uva-ursi*), shrubby cinquefoil (*Dasiphora fruticosa*), big sagebrush (*Artemisia tridentata*), curl-leaf mountain mahogany (*Cercocarpus ledifolius*), rubber rabbitbrush (*Ericameria nauseosa*), Woods' rose (*Rosa woodsii*), and snowberry (*Symphoricarpos* spp.). The herbaceous layer is typically sparse.

### **Mountain shrubland/wooded draw**

The mountain shrubland/wooded draw ecosystem generally occupies the steep slopes of draws and ravines or transitional areas between riparian and upland communities in the foothills and lower montane zones. The ecosystem occurs in narrow strips, dense thickets, or irregular patches and can be quite diverse. The evergreen and deciduous shrub species possible in this ecosystem include: currants (*Ribes* spp.), plums (*Prunus* spp.), skunkbush sumac (*Rhus trilobata*), western snowberry (*Symphoricarpos occidentalis*), Saskatoon serviceberry (*Amelanchier alnifolia*), elderberry (*Sambucus* spp.), mountain mahogany (*Cercocarpus* spp.), antelope bitterbrush (*Purshia tridentata*), Woods' rose (*Rosa woodsii*), and Rocky Mountain juniper (*Juniperus scopulorum*).

### **Sagebrush steppe**

The sagebrush steppe ecosystem occurs from valleys to the subalpine zone. It occupies sites with gentle topography on nearly all slopes, aspects, and soil types. In the montane to subalpine zones, mountain big sagebrush (*Artemisia tridentata* subsp. *vaseyana*) is the dominant shrub. In the foothills and valleys, Basin big sagebrush (*A. t.* subsp. *tridentata*) or Wyoming big sagebrush (*A. t.* subsp. *wyomingensis*) are the dominant shrubs. Generally shrub cover is patchy in the sagebrush steppe, with the interspaces dominated by grasses and forbs. Typical grass associates include western wheatgrass (*Pascopyrum smithii*), needlegrasses (*Achnatherum* spp.), blue grama (*Bouteloua gracilis*), Sandberg bluegrass (*Poa secunda*), bluebunch wheatgrass (*Pseudoroegneria spicata*), and Idaho fescue (*Festuca idahoensis*).

### **Lower montane/foothills/valley grassland**

The lower montane/foothills/valley grassland ecosystem ranges from small isolated patches to park-like expanses between forests and shrublands. The grassland ecosystem is maintained by periodic disturbance. Bluebunch wheatgrass (*Pseudoroegneria spicata*) and Idaho fescue (*Festuca idahoensis*) dominate on drier sites that include southern and western slopes. Idaho fescue and rough fescue dominate (*Festuca campestris*) on wetter sites that include northern and eastern slopes.