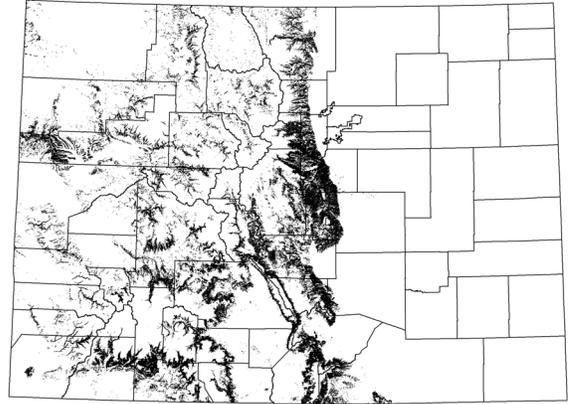


# ROCKY MOUNTAIN DRY-MESIC AND MESIC MONTANE MIXED CONIFER FOREST AND WOODLAND



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extent exaggerated for display

## ABIES CONCOLOR FOREST ALLIANCE

- Abies concolor* - *Pseudotsuga menziesii* / *Acer glabrum* Forest
- Abies concolor* - *Pseudotsuga menziesii* / *Erigeron eximius* Forest
- Abies concolor* - *Pseudotsuga menziesii* / *Vaccinium myrtillus* Forest
- Abies concolor* / *Arctostaphylos uva-ursi* Forest
- Abies concolor* / *Mahonia repens* Forest
- Abies concolor* / *Quercus gambelii* Forest
- Abies concolor* / *Symphoricarpos oreophilus* Forest

## ABIES CONCOLOR WOODLAND ALLIANCE

- Abies concolor* / *Festuca arizonica* Woodland
- Abies concolor* / *Galium triflorum* Woodland
- Abies concolor* / *Holodiscus dumosus* Scree Woodland

## PICEA PUNGENS FOREST ALLIANCE

- Picea pungens* / *Arctostaphylos uva-ursi* Forest
- Picea pungens* / *Arnica cordifolia* Forest
- Picea pungens* / *Carex siccata* Forest
- Picea pungens* / *Erigeron eximius* Forest
- Picea pungens* / *Juniperus communis* Forest
- Picea pungens* / *Linnaea borealis* Forest
- Picea pungens* / *Lonicera involucrata* Forest

## PICEA PUNGENS WOODLAND ALLIANCE

- Picea pungens* / *Festuca arizonica* Woodland

## PSEUDOTSUGA MENZIESII FOREST ALLIANCE

- Pseudotsuga menziesii* / *Acer glabrum* Forest
- Pseudotsuga menziesii* / *Arctostaphylos uva-ursi* Forest
- Pseudotsuga menziesii* / *Carex geyeri* Forest
- Pseudotsuga menziesii* / *Carex rossii* Forest
- Pseudotsuga menziesii* / *Festuca arizonica* Forest
- Pseudotsuga menziesii* / *Jamesia americana* Forest
- Pseudotsuga menziesii* / *Juniperus communis* Forest
- Pseudotsuga menziesii* / *Mahonia repens* Forest
- Pseudotsuga menziesii* / *Muhlenbergia montana* Forest
- Pseudotsuga menziesii* / *Paxistima myrsinites* Forest
- Pseudotsuga menziesii* / *Physocarpus monogynus* Forest
- Pseudotsuga menziesii* / *Quercus gambelii* Forest
- Pseudotsuga menziesii* / *Symphoricarpos oreophilus* Forest

## PSEUDOTSUGA MENZIESII WOODLAND ALLIANCE

- Pseudotsuga menziesii* / *Holodiscus dumosus* Scree Woodland
- Pseudotsuga menziesii* / *Leucopoa kingii* Woodland

## PSEUDOTSUGA MENZIESII TEMPORARILY FLOODED WOODLAND ALLIANCE

- Pseudotsuga menziesii* / *Betula occidentalis* Woodland
- Pseudotsuga menziesii* / *Cornus sericea* Woodland

**Overview:** These are mixed-conifer forests occurring on all aspects at elevations ranging from 4,000 to 10,800 ft (1,200-3,300 m). The composition and structure of overstory is dependent upon the temperature and moisture relationships of the site, and the successional status of the occurrence. *Pseudotsuga*

*menziesii* and *Abies concolor* are most common canopy dominants, but *Picea engelmannii*, *Picea pungens*, or *Pinus ponderosa* may be present to codominant. This system was undoubtedly characterized by a mixed severity fire regime in its "natural condition," with a high degree of variability in lethality and return interval. More mesic types are found predominantly in cool ravines and on north-facing slopes, including lower and middle slopes of ravines, along stream terraces, moist, concave topographic positions and north- and east-facing slopes which burn somewhat infrequently. Mesic types also include mixed conifer/*Populus tremuloides* stands.

**Characteristic species:** *Pseudotsuga menziesii* and *Abies concolor* are the most common canopy dominants, but *Picea engelmannii*, *Picea pungens*, or *Pinus ponderosa* may be present to codominant. *Populus tremuloides* is often present as intermingled individuals in remnant aspen clones, or in adjacent patches. A number of cold-deciduous shrub and graminoid species are found in many occurrences (e.g., *Arctostaphylos uva-ursi*, *Mahonia repens*, *Paxistima myrsinites*, *Symphoricarpos oreophilus*, *Jamesia americana*, *Quercus gambelii*, and *Festuca arizonica*). Other important species include *Acer glabrum*, *Acer grandidentatum*, *Amelanchier alnifolia*, *Arctostaphylos patula*, *Holodiscus dumosus*, *Jamesia americana*, *Juniperus communis*, *Physocarpus monogynus*, *Quercus X pauciloba*, *Robinia neomexicana*, *Rubus parviflorus*, and *Vaccinium myrtillus*. Where soil moisture is favorable, the herbaceous layer may be quite diverse, including graminoids such as *Bromus ciliatus* (= *Bromus canadensis*), *Calamagrostis rubescens*, *Carex geyeri*, *Carex rossii*, *Carex siccata* (= *Carex foenea*), *Festuca occidentalis*, *Koeleria macrantha*, *Luzula parviflora*, *Muhlenbergia montana*, *Muhlenbergia virescens*, *Poa fendleriana*, *Pseudoroegneria spicata*, and forbs such as *Achillea millefolium*, *Arnica cordifolia*, *Erigeron eximius*, *Fragaria virginiana*, *Linnaea borealis*, *Osmorhiza berteroi*, *Packera cardamine* (= *Senecio cardamine*), *Thalictrum occidentale*, *Thalictrum fendleri*, *Thermopsis rhombifolia*, *Viola adunca*, and species of many other genera, including *Lathyrus*, *Penstemon*, *Lupinus*, *Vicia*, *Arenaria*, *Galium*.

**Environment:** *Pseudotsuga menziesii* forests occupy drier sites, and *Pinus ponderosa* is a common codominant. *Abies concolor* dominated forests occupy cooler sites, such as upper slopes at higher elevations, canyon sideslopes, ridgetops, and north- and east-facing slopes which burn somewhat infrequently. *Picea pungens* is most often found in cool, moist locations, often occurring as smaller patches within a matrix of other associations.

**Dynamics:** Forests in this ecological system represent the gamut of fire tolerance. In the most mesic types, naturally occurring fires are of variable return intervals, and mostly light, erratic, and infrequent due to the cool, moist conditions. In general, fire suppression has led to the encroachment of more shade-tolerant, less fire-tolerant species (e.g., climax) into occurrences and an attendant increase in landscape homogeneity and connectivity (from a fuels perspective). This has increased the lethality and potential size of fires.

*Pseudotsuga menziesii* forests are the only true 'fire-tolerant' occurrences in this ecological system. *Pseudotsuga menziesii* forests were probably subject to a moderate-severity fire regime in presettlement times, with fire-return intervals of 30-100 years (Crane 1982). Many of the important tree species in these forests (*Populus tremuloides*, *Pinus ponderosa*, *Pinus contorta*) are fire-adapted (Pfister 1977), and fire-induced reproduction of *Pinus ponderosa* can result in its continued codominance in *Pseudotsuga menziesii* forests (Steele et al. 1981). Successional relationships in this system are complex. *Pseudotsuga menziesii* is less shade-tolerant than many northern or montane trees such as *Tsuga heterophylla*, *Abies concolor*, and *Picea engelmannii*, and seedlings compete poorly in deep shade. At drier locales, seedlings may be favored by moderate shading, such as by a canopy of *Pinus ponderosa*, which helps to minimize drought stress. In some locations, much of these forests have been logged or burned during European settlement, and present-day occurrences are second-growth forests dating from fire, logging, or other occurrence-replacing disturbances (Mauk and Henderson 1984, Chappell et al. 1997).

**Variation:** The alliances in this system are found on slightly different, but intermingled, biophysical environments: *Abies concolor* dominates at higher, colder locations; *Picea pungens* represents

mesic conditions; *Pseudotsuga menziesii* dominates intermediate zones. As many as seven conifers can be found growing in the same occurrences, with the successful reproduction of the diagnostic species determining the association type. Common conifers include *Pinus ponderosa*, *Pinus flexilis*, *Abies lasiocarpa* var. *lasiocarpa*, *Abies lasiocarpa* var. *arizonica*, *Juniperus scopulorum*, and *Picea engelmannii*. The composition and structure of overstory is dependent upon the temperature and moisture relationships of the site, and the successional status of the occurrence (DeVelice et al. 1986, Muldavin et al. 1996).

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- Pfister, R. D. 1977. Ecological classification of forest land in Idaho and Montana. Pages 329-358 in: Proceedings of Ecological Classification of Forest Land in Canada and Northwestern USA, University of British Columbia, Vancouver.
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Rank:	A	B	C	D
<b>① CONDITION</b>				
<b>Community structure</b>	A mature stand of mixed conifer that consists of 10 trees per acre at least 150 years old. Usually this is a multi-aged stand with some dead standing trees as well as some fallen mature trees. Where the site is dry, the stand would be more open compared to a cooler, more moist site such as a north-facing slope or drainage bottom. Some of the overstory trees would have large and open branched, flattened or dead tops and contain some rot.	Little to no evidence of past logging disturbance over a major proportion of the occurrence and majority of stand is > 100 years old, may show evidence of selective logging that has altered their structure.	Stands regenerated naturally after logging or young to mature stands with significant history of selective logging disturbance that altered composition or structure.	Immature, "dog-hair" stand of conifers, especially white fir with very low species diversity.
<b>Non-native species</b>	Few to no invasive species are present.	May be present with low to moderate frequency in the understory, but have low percent cover.	May be uncommon to frequent but do not dominate or co-dominate understory (<10-20% cover).	
<b>② SIZE</b>				
<b>Acres</b>	>5,000	2,000-5,000	1,000-2,000	< 1,000
<b>③ LANDSCAPE CONTEXT</b>				
<b>Surrounding land</b>	Occurrence surrounded by a large area (>2000 ac/800 ha) of natural vegetation.	Landscape composed of at least 80% natural or semi-natural vegetation; or landscape has very little development or agriculture but has major components of non-native vegetation in at least one physiognomic layer or is composed primarily of young tree plantations.	Landscape is a mosaic of agricultural or semi-developed areas and natural or semi-natural vegetation, the latter composing 25-80% of the landscape, or landscape is dominated by very young tree plantations (cut within last 20 years).	Occurrence surrounded primarily by urban or agricultural landscape, with <25% landscape cover of natural or semi-natural vegetation.
<b>Connectivity</b>	Connectivity of adjacent systems allows natural ecological processes, e.g., fire and species migrations to occur. No unnatural barriers present. Few small roads in the surrounding landscape.	Adjacent systems surrounding occurrence retain much connectivity. Few non-natural barriers present.	Adjacent systems surrounding occurrence are fragmented by alteration with limited connectivity.	Connectivity is severely hampered.