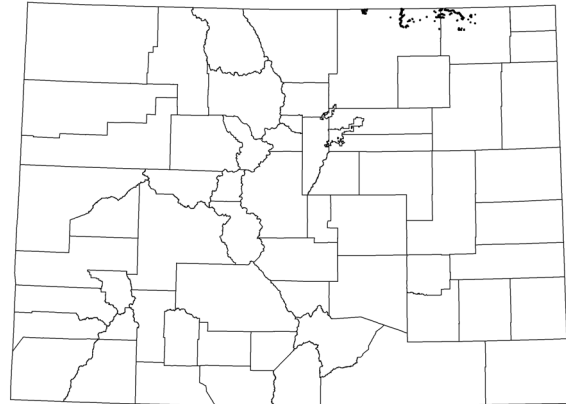


ROCKY MOUNTAIN FOOTHILL LIMBER PINE – JUNIPER WOODLAND



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extent exaggerated for display

- JUNIPERUS SCOPULORUM WOODLAND ALLIANCE
Juniperus scopulorum / *Schizachyrium scoparium* Woodland
- PINUS FLEXILIS WOODLAND ALLIANCE
Pinus flexilis / *Juniperus scopulorum* Woodland
- RHUS TRILOBATA SHRUB HERBACEOUS ALLIANCE
Rhus trilobata Rocky Mountain Shrub Herbaceous Vegetation

Overview: This ecological system occurs in foothill and lower montane zones in the Rocky Mountains from northern Montana south to central Colorado and on escarpments across Wyoming extending out into the western Great Plains. In Colorado, this system is limited to High Plains escarpment in the Ogallala formation of northeastern Colorado and adjacent southeastern Wyoming, where stands are believed to be either relictual from larger coniferous woodlands of the Pleistocene, or of more recent origin, perhaps due to seed caching by indigenous peoples. These limber pine woodlands are a subset of the scarp woodlands found throughout the Western Great Plains. Although similar processes are believed to have shaped scarp woodlands throughout the region, occurrences in Wyoming and western Nebraska are typically dominated by *Pinus ponderosa* instead of *Pinus flexilis*, and are currently classified as part of the Rocky Mountain Ponderosa Pine Savanna.

Characteristic species: In eastern Colorado, this system is characterized by an open tree canopy or patchy woodland that is dominated by either *Pinus flexilis* or *Juniperus scopulorum*, with occasional inclusions of *Pinus ponderosa*. A sparse shrub layer may be present, with *Rhus trilobata*, *Cercocarpus montanus*, and *Ribes cereum* being the most common species. Herbaceous layers are generally sparse, but range to moderately dense and are typically dominated by perennial graminoids of the adjacent grasslands, such as *Bouteloua gracilis*, *Boutelous curtipendula*, and *Schizachyrium scoparium*.

Environment: Elevations in Colorado are in the range of 5,250 to 5,550 feet (1,600-1,700 m). Occurrences are restricted to breaks and escarpments with shallow soils and fractured bedrock derived from a variety of parent material including limestone, sandstone, and shale. Annual precipitation in the area is in the range of 13-17 in (33-43 cm), primarily occurring during the spring months.

Dynamics: The processes shaping the distribution and persistence of scarp woodlands is not well understood. The interaction of wind, fire, and topography is thought to have played a major role in the current pattern of occurrences. These woodlands are not physiologically limited to a particular substrate, but are generally found on larger, relatively high escarpments, and not on smaller or more gently sloping breaks. The abrupt topographic changes may act as natural fire breaks. In addition, the typically sparse vegetation of the breaks in comparison with the adjacent deeper soils does not

allow grassland fires to carry into the woodland understory. However, other factors such as disturbance from firewood cutting, drought, and agricultural use may also influence the distribution and persistence of these woodlands.

Variation: In the Colorado portion of the High Plains escarpment, woodlands are all dominated by *Pinus flexilis*, and *Pinus ponderosa* is found only in a few places. To the north, stands are typically dominated by *Pinus ponderosa*, and *Pinus flexilis* is rarely found.

Dreyfuss, A. 2002. The ecology of *Pinus flexilis* stands on the shortgrass steppe. M.S. Thesis. Department of Rangeland Ecosystem Science. Colorado State University, Fort Collins, CO.

Schuster, W.S.F., J.B. Mitton, D.K. Yamaguchi, C.A. Woodhouse. 1995. A comparison of limber-pine (*Pinus flexilis*) ages at lower and upper treeline sites east of the Continental Divide in Colorado. *Am. Midl. Nat.* 133: 101-111.

Wells, P.V. 1965. Scarp woodlands, transported grassland soils, and concept of grassland climate in the Great Plains region. *Science* 148:246-249.

Wells, P.V. 1970. Postglacial vegetational history of the Great Plains. *Science* 167:1574-1582.

Rank:	A	B	C	D
① SIZE				
Acres may include intervening draws without trees	>100	50-100	10-50	< 10
② CONDITION				
Community structure	Native species dominant. Limber pine population is stable, with many age classes, including seedlings, represented.	Native species dominant. Limber pine population is stable.	Herbaceous cover is co-dominated by native and non-native species. Alteration of vegetation is extensive but potentially restorable over several decades. Limber pine population may be declining.	Non-native species are dominant. Alteration of vegetation is extensive and restoration potential is low.
Invasive exotics with major potential to alter structure and composition (e.g., leafy spurge, knapweeds, non-native thistle, <i>Bromus inermis</i> , <i>Poa pratensis</i> , <i>Bromus tectorum</i>)	Absent or < 1% cover.	May be present, but <3% cover.	Likely to be present.	Present, may have significant cover.
Disturbance	Recurrent disturbance from fire, drought, logging, or agricultural use is not contributing to deterioration of the occurrence or preventing normal reproduction of limber pine.		Disturbance is extensive and significant enough to have notable impact on species composition and stand dynamics.	Disturbance is extensive and significant. System remains fundamentally compromised despite restoration of some processes.
③ LANDSCAPE CONTEXT				
Connectivity	Connectivity of adjacent systems allows natural ecological processes, e.g., fire and species migrations to occur. No unnatural barriers present.	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.
Surrounding land	At least 90% native and unaltered landscape with very little to no urban development or agriculture.	Surrounding landscape composed of at least 75% natural or semi-natural vegetation, with little urban development within or adjacent to the occurrence.	Surrounding landscape is a mosaic of agricultural or semi-developed areas with >50% natural or semi-natural vegetation. Some non-natural barriers are present. Significant disturbance, but easily restorable.	Major human-caused alteration of surrounding landscape. Adjacent systems surrounding occurrence are mostly converted to agricultural or urban uses.