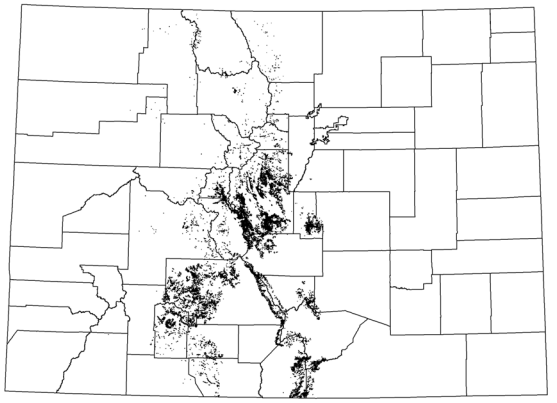
ROCKY MOUNTAIN SUBALPINE-MONTANE LIMBER-BRISTLECONE PINE WOODLAND

D.G. Anderson



extent exaggerated for display

PINUS ARISTATA WOODLAND ALLIANCE
- *Pinus aristata / Festuca arizonica* Woodland
- *Pinus aristata / Festuca thurberi* Woodland
- *Pinus aristata / Juniperus communis* Woodland
- *Pinus aristata / Ribes montigenum* Woodland
- *Pinus aristata / Trifolium dasyphyllum* Woodland
- *Pinus aristata / Vaccinium myrtillus* Woodland

PINUS FLEXILIS WOODLAND ALLIANCE
- *Pinus flexilis / Arctostaphylos uva-ursi* Woodland
- *Pinus flexilis / Calamagrostis purpurascens* Woodland
- *Pinus flexilis / Juniperus communis* Woodland
- *Pinus flexilis / Leucopoa kingii* Woodland

Overview: This large patch ecological system occurs throughout the Rocky Mountains on dry, rocky ridges and slopes. Although it can be found near upper treeline above the matrix spruce-fir forest, it also occurs at lower elevations. These are typically woodlands of xeric, high elevation sites, but may also extend down to the lower montane in the central and northern Rocky Mountains, particularly along the Front Range north into Canada. Limber and bristlecone pine do not necessarily occur together, but the two species occupy a similar ecological niche. Where the two are co-occuring, limber pine is often confined to the lower portion of its potential habitat. *Pinus aristata* is more-or-less endemic to the Southern Rocky Mountian ecoregion, reaching its northernmost station in Gilpin County, Colorado. *Pinus flexilis* is more widely distributed and also occurs in mixed conifer systems. It largely replaces bristlecone pine north of I-70.

Characteristic species: The open tree canopy is often patchy and is strongly dominated by *Pinus flexilis* or *Pinus aristata* with the latter restricted to southern Colorado and northern New Mexico. Other trees such as *Juniperus* spp., *Pinus contorta, Pinus ponderosa*, or *Pseudotsuga menziesii* are occasionally present. *Arctostaphylos uva-ursi, Cercocarpus ledifolius, Juniperus communis, Mahonia repens, Purshia tridentata, Ribes montigenum*, or *Vaccinium* spp. may form an open shrub layer in some stands. The herbaceous layer, if present, is generally sparse and composed of xeric graminoids, such as *Calamagrostis purpurascens, Festuca arizonica, Festuca idahoensis, Festuca thurberi*, *Pseudoroegneria spicata*, or alpine plants such as *Trifolium dasyphyllum.*

Environment: Sites are harsh, exposed to desiccating winds with rocky substrates and a short growing season that limit plant growth. Higher elevation occurrences are found well into the subalpine - alpine transition on wind-blasted, mostly south to west-facing slopes and exposed ridges. *Pinus aristata* forests are typically found on steep, south-facing slopes from 8,850 to 12,140 ft (2,700-3,700 m). *Pinus flexilis* woodlands occupy similar habitats, but may occur at lower elevations than *P. aristata.* Calcareous substrates are important for *P. flexilis*-dominated communities in the northern Rocky Mountains and possibly elsewhere.

Dynamics: Both bristlecone and limber pine are slow-growing, long-lived species in which individuals may live for 1000 or more years. Fire is an important source of disturbance that facilitates stand regeneration in this system. Older woodlands are often broadly even-aged stands where seedlings are nearly absent, while areas that have recently burned may have abundant seedlings. Bristlecone is somewhat more tolerant of fire than is limber pine, however, both species appear to depend on fire for regeneration. Regeneration of limber pine on burned areas is largely due to the germination of seeds cached by Clark's nutcrackers.

Variation: This system is distinguished from lower montane and foothill limber pine stands in Wyoming and Montana. The foothill system is found at the lower treeline, below the zone of continuous *Pinus ponderosa* or *Pseudotsuga menziesii* woodlands and forest, and extends out into the eastern portions of these states in the foothill zones of mountain ranges, along rock outcrops, breaks along rivers, and on sheltered sites where soil moisture is slightly higher than surrounding grasslands.


R. Rondeau

Rank:	A	B	C	D
① CONDITION				
Community structure	Multiple age classes of bristlecone or limber pine are present (although many ancient stands naturally have little regeneration).			Bristlecone pine or limber pine do not have the opportunity to regenerate, often due to the lack of fires.
Exotic species	No or very few exotic species present with no potential for expansion.	Few to no exotic species with little potential for expansion if restoration occurs.		Exotic species may be dominant.
Disturbance	No or little evidence of alteration of the system due to excessive livestock grazing, fire suppression, past or current mining operation, recreation, fragmentation, etc. If the occurrence is fragmented it is due to natural breaks, e.g., avalanche chute or aspect.	Some evidence of an altered system due to excessive livestock grazing, fire suppression, past or current mining operation, recreation, etc. Occurrence may be slightly fragmented due to roads, but these breaks are small enough that fires could still proceed.	Excessive livestock grazing, fire suppression, or past or current mining operation, recreation, etc., are impacting the species composition and altering the natural fire regime.	The site is not restorable. System remains fundamentally compromised despite restoration of some processes. Soil compaction and continued disturbance are extensive throughout the occurrence.
② SIZE				
Acres	>2,000	1,000-2,000	300-1,000	< 300
③ LANDSCAPE CONTEXT				
Surrounding land	Adjacent systems are unaltered by urban, agricultural, or forestry uses (>90% natural).	Adjacent systems surrounding occurrence have limited or moderate urban, agricultural or forestry use (60-90% natural).	Adjacent systems surrounding occurrence are fragmented by alteration (20-60% natural). Alteration is significant, but easily restorable.	Adjacent systems surrounding occurrence are mostly converted to agricultural or urban uses, or the surrounding forest has been clearcut.
Connectivity	No barriers present. Connectivity of adjacent systems allows natural ecological processes (e.g., fires and avalanches) to occur.	Few non-natural barriers present. Adjacent systems retain much connectivity.	Some non-natural barriers are present. Adjacent systems have limited connectivity.	Connectivity is severely hampered.