USDA Natural Resources Conservation Service

Ecological site F043AP909MT
Upland Cool Woodland Group

Last updated: 3/20/2025
Accessed: 05/11/2025

General information

Provisional. A provisional ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model and enough information to identify the ecological site.

MLRA notes

Major Land Resource Area (MLRA): 043A–Northern Rocky Mountains

This MLRA is located in Montana (43 percent), Idaho (34 percent), and Washington (23 percent). It makes up about 31,435 square miles (81,460 square kilometers). It has no large cities or towns. It has many national forests, including the Okanogan, Colville, Kootenai, Lolo, Flathead, Coeur d'Alene, St. Joe, Clearwater, and Kaniksu National Forests.

This MLRA is in the Northern Rocky Mountains Province of the Rocky Mountain System. It is characterized by rugged, glaciated mountains; thrust- and block-faulted mountains; and hills and valleys. Steep-gradient rivers have cut deep canyons. Natural and manmade lakes are common.

The major Hydrologic Unit Areas (identified by four-digit numbers) that make up this MLRA are: Kootenai-Pend Oreille-Spokane (1701), 67 percent; Upper Columbia (1702), 18 percent; and Lower Snake (1706), 15 percent. Numerous rivers originate in or flow through this area, including, the Sanpoil, Columbia, Pend Oreille, Kootenai, St. Joe, Thompson, and Flathead Rivers.

This area is underlain primarily by stacked slabs of layered sedimentary or metasedimentary bedrock. The bedrock formations range from Precambrian to Cretaceous in age. The rocks consist of shale, sandstone, siltstone, limestone, argillite, quartzite, gneiss, schist, dolomite, basalt, and granite. The formations have been faulted and stacked into a series of imbricate slabs by regional tectonic activity. Pleistocene glaciers carved a rugged landscape that includes sculpted hills and narrow valleys filled with till and outwash. Continental glaciation over road the landscape in the northern half of the MLRA while glaciation in the southern half was confined to montane settings.

The average annual precipitation is 25 to 60 inches (635 to 1,525 millimeters) in most of this area, but it is as much as 113 inches (2,870 millimeters) in the mountains and is 10 to 15 inches (255 to 380 millimeters) in the western part of the area. Summers are dry. Most of the precipitation during fall, winter, and spring is snow. The average annual temperature is 32 to 51 degrees F (0 to 11 degrees C) in most of the area, decreasing with elevation. In most of the area, the freeze-free period averages 140 days and ranges from 65 to 215 days. It is longest in the low valleys of Washington, and it decreases in length with elevation. Freezing temperatures occur every month of the year on high mountains, and some peaks have a continuous cover of snow and ice.

The dominant soil orders in this MLRA are Andisols, Inceptisols, and Alfisols. Many of the soils are influenced by Mount Mazama ash deposits. The soils in the area have a frigid or cryic soil temperature regime; have an ustic, xeric, or udic soil moisture regime; and dominantly have mixed mineralogy. They are shallow to very deep, are very poorly drained to well drained, and have most of the soil texture classes. The soils at the lower elevations include Udivitrands, Vitrixerands and Haplustalfs. The soils at the higher elevations include Dystrocryepts, Eutrocryepts, Vitricryands , and Haplocryalfs. Cryorthents, Cryepts, and areas of rock outcrop are on ridges and peaks above timberline

This area is in the northern part of the Northern Rocky Mountains. Grand fir, Douglas-fir, western red cedar, western hemlock, western larch, lodgepole pine, subalpine fir, ponderosa pine, whitebark pine, and western white pine are the dominant overstory species, depending on precipitation, temperature, elevation, and landform aspect. The understory vegetation varies, also depending on climatic and landform factors. Some of the major wildlife species in this area are whitetailed deer, mule deer, elk, moose, black bear, grizzly bear, coyote, fox, and grouse. Fish, mostly in the trout and salmon families, are abundant in streams, rivers, and lakes.

More than one-half of this area is federally owned and administered by the U.S. Department of Agriculture, Forest Service. Much of the privately-owned land is controlled by large commercial timber companies. The forested areas are used for wildlife habitat, recreation, watershed, livestock grazing, and timber production. Meadows provide summer grazing for livestock and big game animals. Less than 3 percent of the area is cropland.

Classification relationships

ASSOCIATED HABITAT TYPES:
Major association with:
Douglas-fir/dwarf huckleberry

Minor association with:
Douglas-fir/pinegrass-kinnikinnick phase
Douglas-fir/ninebark
Douglas-fir/snowberry-pinegrass phase
Douglas-fir/ninebark-ninebark phase
Douglas-fir/rough fescue
Douglas-fir/snowberry
Douglas-fir/bluebunch wheatgrass
Douglas-fir/blue huckleberry-kinnikinnick phase
Douglas-fir/pinegrass-ponderosa pine phase
Douglas-fir/twinflower-snowberry phase
Douglas-fir/ninebark-pinegrass phase
Douglas-fir/Idaho fescue
Douglas-fir/pinegrass-pinegrass phase
Douglas-fir/twinflower
Douglas-fir/snowberry-bluebunch wheatgrass phase
Douglas-fir/pinegrass
Douglas-fir/blue huckleberry-blue huckleberry phase

Ecological site concept

• Site does not receive additional water
• Dominant Cover: Coniferous Forest
Reference vegetation community is an overstory of Douglas fir with an understory of either low shrubs including dwarf huckleberry (or less commonly twinflower) or the medium statured shrub ninebark (or less commonly blue huckleberry or common snowberry) with an herbaceous layer of pinegrass or native bunchgrasses and diverse forb species. The understory production averages 577 dry pounds per acre (200-1500).
• Soils are
o Generally not limy (limited extent)
o Moderately deep, deep, or very deep
o Not ashy or medial textural family
o Typically less than 5% stone and boulder surface cover (<15% max)
• Soil surface texture gravelly silt loam or gravelly loam or gravelly ashy silt loam in surface mineral 4”
• Parent material is till, mixed volcanic ash over till, colluvium
• Drainage class is well to somewhat excessively well drained; no flooding frequency
• Site Landform: moraines, mountain slopes, stream terraces, outwash terraces
• Moisture Regime: ustic/xeric/udic
• Temperature Regime: frigid
• Elevation Range: 3100-5000 ft
• Slope: 15-30%

Associated sites

F043AP905MT	**Shallow Cool Woodland Group** The sites both reside in cool site conditions of higher elevations. Both are in the ustic/udic and frigid regimes and in elevations of 3000 to 5000 feet and moderate to steep slopes of 15 to 50%.

Similar sites

F043AP905MT	**Shallow Cool Woodland Group** These sites are similar in that they both have reference communities dominated by Douglas fir and a diverse understory of cool adapted plants and reside in cool site conditions, though differ in depth of soil.

Table 1. Dominant plant species

Tree	(1) *Pseudotsuga menziesii* (2) *Pinus ponderosa*
Shrub	(1) *Physocarpus malvaceus* (2) *Vaccinium cespitosum*
Herbaceous	(1) *Calamagrostis rubescens* (2) *Pseudoroegneria spicata*

Physiographic features

• Site Landform: moraines, mountain slopes, stream terraces, outwash terraces
• Elevation Range: 3100-5000 ft
• Slope: 15-30%

Table 2. Representative physiographic features

Landforms	(1) Mountains > Mountain slope (2) Mountains > Stream terrace (3) Mountains > Outwash terrace
Elevation	3,100–5,000 ft
Slope	15–30%
Aspect	W, NW, N, NE, E, SE, S, SW

Climatic features

• Moisture Regime: ustic/xeric/udic
• Temperature Regime: frigid to cryic

• Representative Value (RV) of range of Mean Annual Precipitation: 19-28 inches
• Representative Value (RV) of range of Mean Average Annual Temperature: 39-43 degrees
• Representative Value (RV) of range of Frost Free Days: 50-90 days
SUMMARY TABLES ARE FOR AVAILABLE CLIMATE STATIONS WHICH ARE ALL LOCATED IN VALLEYS.

Table 3. Representative climatic features

Frost-free period (characteristic range)	77-87 days
Freeze-free period (characteristic range)	126-130 days
Precipitation total (characteristic range)	23-31 in
Frost-free period (actual range)	72-88 days
Freeze-free period (actual range)	124-130 days

Precipitation total (actual range)	21-32 in
Frost-free period (average)	81 days
Freeze-free period (average)	128 days
Precipitation total (average)	27 in

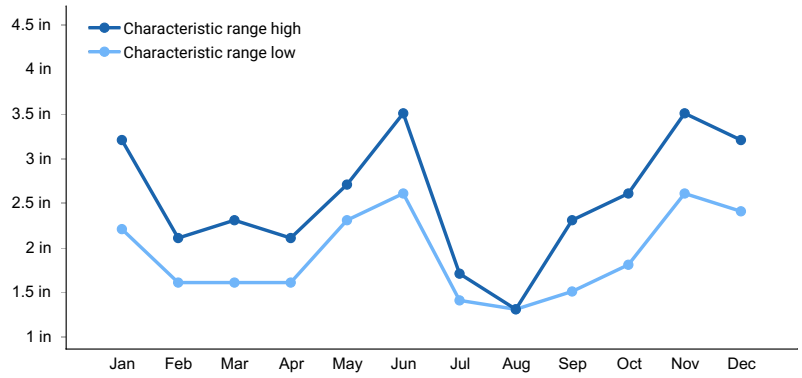


Figure 1. Monthly precipitation range

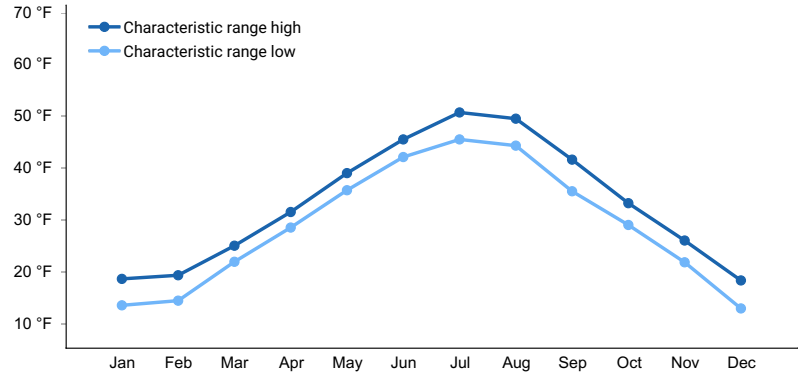


Figure 2. Monthly minimum temperature range

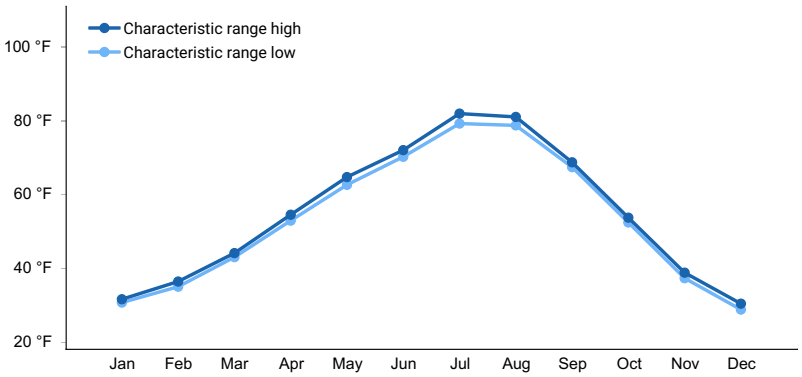


Figure 3. Monthly maximum temperature range

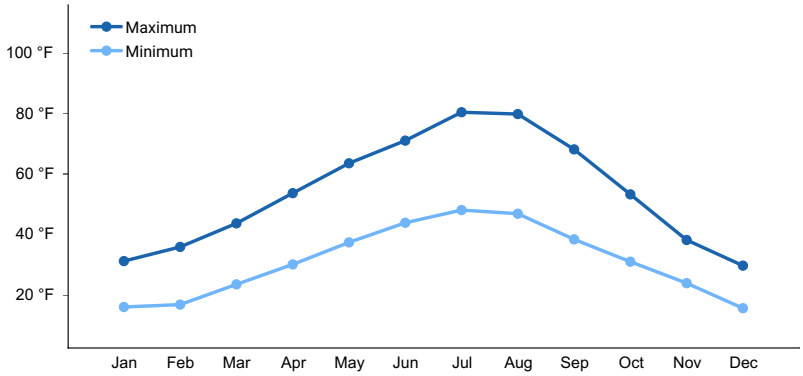


Figure 4. Monthly average minimum and maximum temperature

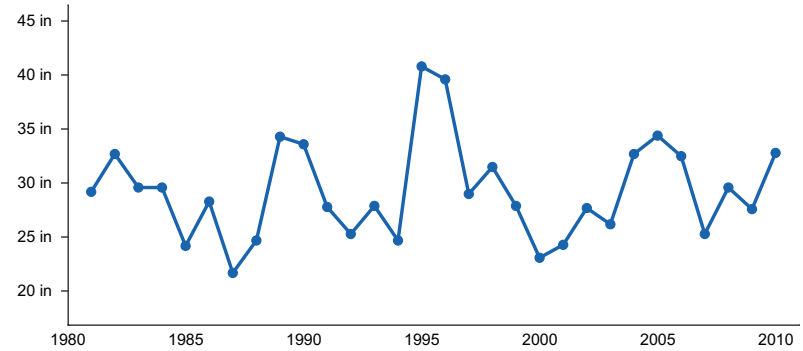


Figure 5. Annual precipitation pattern

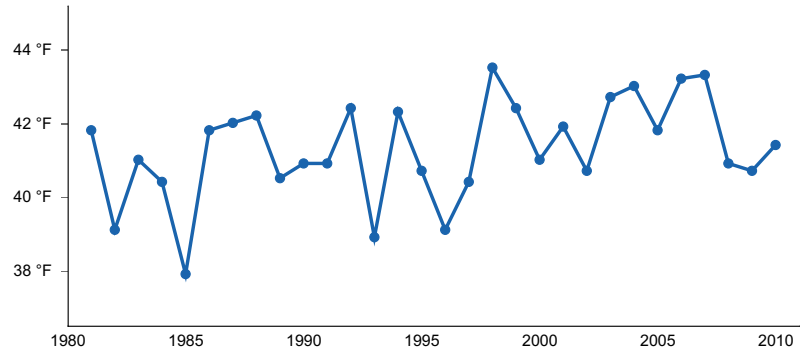


Figure 6. Annual average temperature pattern

Climate stations used

- (1) POLEBRIDGE 1 N [USC00246618], Essex, MT
- (2) WEST GLACIER [USC00248809], Kalispell, MT
- (3) HUNGRY HORSE DAM [USC00244328], Kalispell, MT
- (4) LINDBERGH LAKE [USC00245043], Seeley Lake, MT

Influencing water features

NO WATER FEATURES

Wetland description

DOES NOT APPLY

Soil features

• Soils are
o Generally not limy (limited extent)

o Moderately deep, deep, or very deep
o Not ashy or medial textural family
o Typically less than 5% stone and boulder surface cover (<15% max)
• Soil surface texture gravelly silt loam or gravelly loam or gravelly ashy silt loam in surface mineral 4”
• Parent material is till, mixed volcanic ash over till, colluvium
• Drainage class is well to somewhat excessively well drained; no flooding frequency

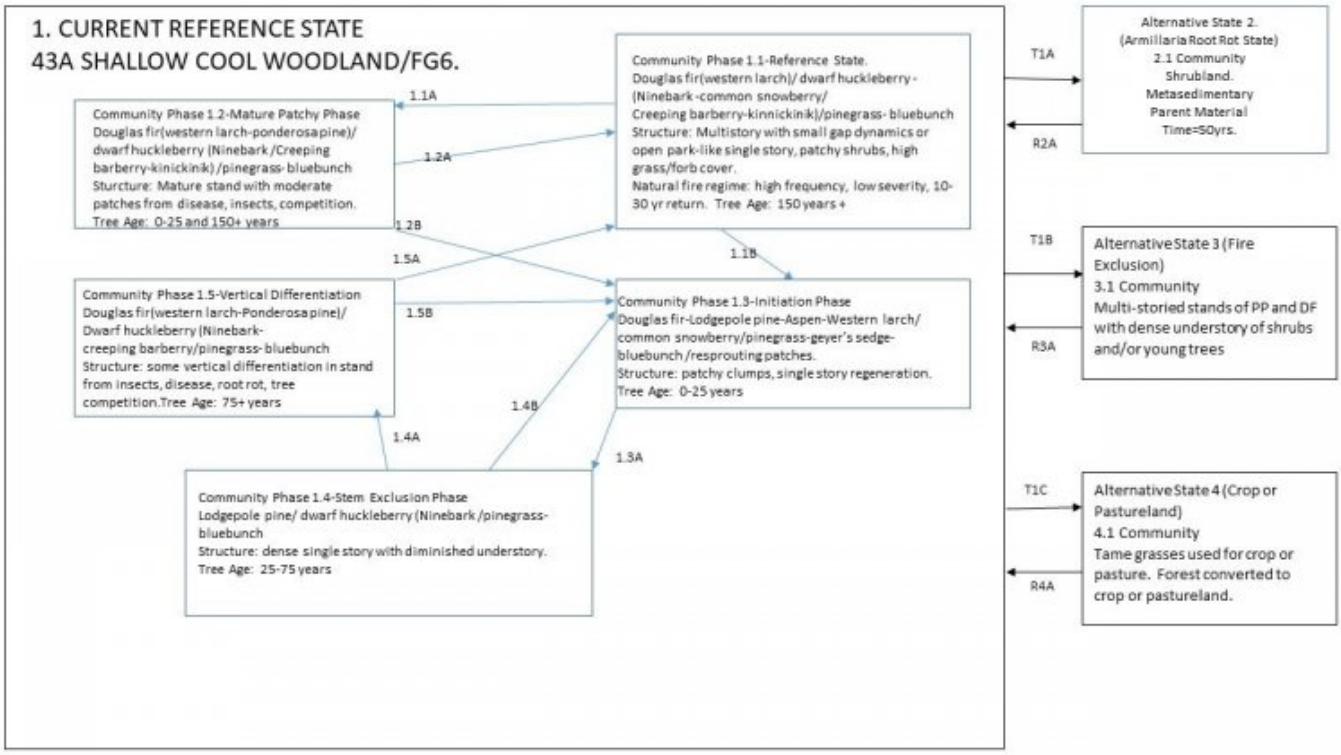
Table 4. Representative soil features

Parent material	(1) Volcanic ash (2) Till (3) Colluvium
Surface texture	(1) Gravelly silt loam (2) Gravelly loam (3) Gravelly, ashy silt loam
Drainage class	Well drained to somewhat excessively drained
Soil depth	20–60 in

Ecological dynamics

Legend
1.1A – Moderate sized patches of tree mortality due to fire, insect, disease, windthrow.
1.1B – Stand replacement disturbance. Severe Fire or insect mortality killing large pine/fir.
1.2A – Time and infilling of moderate sized patches with trees to a reference stand of multistory stand.
1.2B – Stand replacement disturbance. Severe Fire or insect mortality killing large pine/fir, return to initiation phase.
1.3A – Time with fire return interval extended to allow natural tree regeneration to grow into dense pole stands
1.4A – Time without fire to allow vertical differentiation of stand through small gaps from death due to disease, insects, small fires, windthrow.
1.4B – Stand replacing severe fire that returns the stem exclusion phase forest to the initiation phase
1.5A – Time with no major disturbance to transition to the reference phase community
1.5B – Stand replacing severe fire that returns the vertical differentiation phase to the initiation community
T1A – Armillaria Root Rot State in which the forest has been converted to a shrubland
T1B - Fire exclusion over long periods allowing stands to grow into homogenous multi-storied stands
T1C – Forest stands converted to cropland or pastureland
R2A – Forest management practices to convert shrubland back to forest including tree planting of less Armillaria Root Rot sensitive tree species
R3A – Forest stands restored by overstory thinning, ground and ladder fuels reduction, prescribed fire and seeding of native grasses and forbs.
R4A – Afforestation through planting of native trees /shrubs and seeding of native grasses and forbs, treatment of invasive plants and time.

State and transition model



Animal community

WILDLIFE USES
Deer, elk and commonly moose use this site heavily in winter particularly in areas with high cover of pinegrass. Areas with ninebark can afford good browse for wildlife.
Limited use for livestock, due to low cover of highly palatable grass species.

Hydrological functions

watershed value

Recreational uses

HIKING, BIKING, PHOTOGRAPHY, CAMPGROUNDS

Wood products

LUMBER PRODUCTS
Timber productivity ranges from moderate to high since site index is high and slopes are not limiting; and there are a variety of seral tree species present in seral phases and various management practices available.
In areas with high cover of pinegrass in the understory, management practices must consider site preparation to reduce grass cover for tree regeneration.

Other references

Pfister, Robert D., et al. "Forest habitat types of Montana." Gen. Tech. Rep. INT-GTR-34. Ogden, UT: US Department of Agriculture, Forest Service, Intermountain Forest & Range Experiment Station. 174 p. 34 (1977).

Contributors

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Approval

Grant Petersen, 3/20/2025

Rangeland health reference sheet

Interpreting Indicators of Rangeland Health is a qualitative assessment protocol used to determine ecosystem condition based on benchmark characteristics described in the Reference Sheet. A suite of 17 (or more) indicators are typically considered in an assessment. The ecological site(s) representative of an assessment location must be known prior to applying the protocol and must be verified based on soils and climate. Current plant community cannot be used to identify the ecological site.

Author(s)/participant(s)	
Contact for lead author	
Date	12/18/2020
Approved by	Grant Petersen
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:**

2. **Presence of water flow patterns:**

3. **Number and height of erosional pedestals or terracettes:**

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):**

5. **Number of gullies and erosion associated with gullies:**

6. **Extent of wind scoured, blowouts and/or depositional areas:**

7. **Amount of litter movement (describe size and distance expected to travel):**

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):**

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):**

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:**

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):**

12. **Functional/Structural Groups (list in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to):**

    Dominant:

    Sub-dominant:

    Other:

    Additional:

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):**

14. **Average percent litter cover (%) and depth (in):**

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):**

16. **Potential invasive (including noxious) species (native and non-native). List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site:**

17. **Perennial plant reproductive capability:**