

Ecological site F043AP904MT Shallow Cold Woodland Group

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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 overrode 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 Dystrocrypts, Eutrocrypts, 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:

subalpine fir/menziesia

Minorly association with:

subalpine fir/Sitka alder

subalpine fir/twinflower

subalpine fir/beargrass

Ecological site concept

- Site does not receive any additional water

This site has less productivity, resistance and resilience to disturbance due to the shallow soils, in comparison to the closely related Upland Cold Woodland which has deep soils.

- Dominant Cover: Coniferous Forest

Reference phase vegetation community is an overstory of subalpine fir mixed with Englemann spruce with an understory dominated by rusty menziesia and a diverse lower shrub and herbaceous layer including heartleaf arnica (*Arnica cordifolia*), pinegrass (*Calamagrostis rubescens*), Geyer's sedge (*Carex geyeri*), creeping barberry (*Mahonia repens*), white spirea (*Spiraea betulifolia*) and common snowberry (*Symphoricarpos albus*).

- Soils are

- o Generally not limy (limited extent)

- o Shallow (less than 50cm deep to bedrock, lithic, or paralithic root restrictive layer)

- o Not ashy or medial textural family

- o Typically less than 5% stone and boulder surface cover (<15% max)

- Soil surface texture stony silt loam or loam in surface mineral 4"

- Parent material is loamy till over residuum

- Drainage class is well drained; no flooding frequency

- Site Landform: glaciated mountain ridges, cirque headwalls, mountain slopes on U-shaped valley

- Moisture Regime: udic

- Temperature Regime: cryic

- Elevation Range: 4000-8000 ft

- Slope: 30-80%

Associated sites

F043AP908MT	<p>Upland Cold Woodland Group</p> <p>These sites both reside in upper subalpine areas that have cold site conditions, in udic and cryic regimes and elevations of 4000-6000 ft (though F043AP904MT can go up to 8000 feet) and slopes of 30-80%, Both reside in glaciated ridges, cirque headwalls, mountain slopes on U-shaped valley.</p>
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Similar sites

F043AP908MT	<p>Upland Cold Woodland Group</p> <p>These sites are similar in that the reference community is dominated by subalpine fir and has cold indicator understory plants like rusty menziesia and both reside in areas that have cold site conditions. Though F043AP904MT has shallow soils, and F043AP908MT has mixed volcanic ash in its parent material.</p>
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Table 1. Dominant plant species

Tree	(1) <i>Abies lasiocarpa</i> (2) <i>Picea engelmannii</i>
Shrub	(1) <i>Menziesia ferruginea</i> (2) <i>Vaccinium membranaceum</i>
Herbaceous	(1) <i>Xerophyllum tenax</i> (2) <i>Linnaea borealis</i>

Physiographic features

- Site Landform: glaciated mountain ridges, cirque headwalls, mountain slopes on U-shaped valley
- Elevation Range: 4000-8000 ft
- Slope: 30-80%

Table 2. Representative physiographic features

Landforms	(1) Mountains > Ridge (2) Mountains > Cirque headwall (3) Mountains > Mountain slope
Elevation	1,219–2,438 m
Slope	30–80%
Aspect	W, NW, N, NE, E, SE, S, SW

Climatic features

- Representative Value (RV) of range of Mean Annual Precipitation: 40-60 inches
- Representative Value (RV) of range of Mean Average Annual Temperature: 39-45 degrees
- Representative Value (RV) of range of Frost Free Days: 50-70 days

- Moisture Regime: udic
- Temperature Regime: cryic

ONLY AVAILABLE CLIMATE STATIONS ARE LOCATED IN VALLEYS AND MAY NOT BE REPRESENTATIVE TO THIS PARTICULAR SITE. ABOVE INFORMATION IS REPRESENTATIVE.

Table 3. Representative climatic features

Frost-free period (characteristic range)	30-87 days
Freeze-free period (characteristic range)	87-130 days
Precipitation total (characteristic range)	457-610 mm
Frost-free period (actual range)	1-89 days
Freeze-free period (actual range)	47-132 days
Precipitation total (actual range)	432-787 mm
Frost-free period (average)	61 days
Freeze-free period (average)	109 days
Precipitation total (average)	559 mm

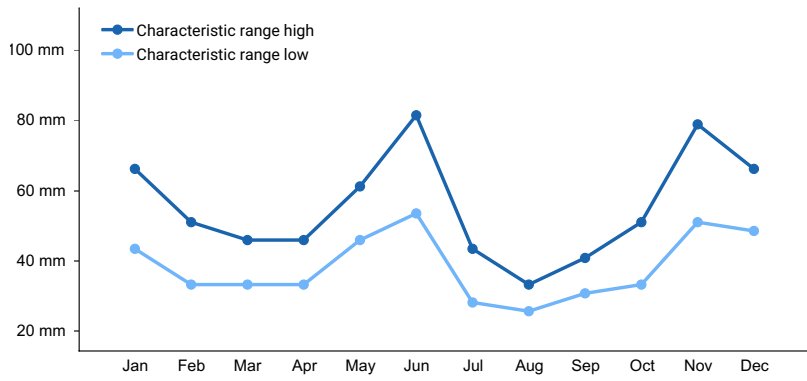


Figure 1. Monthly precipitation range

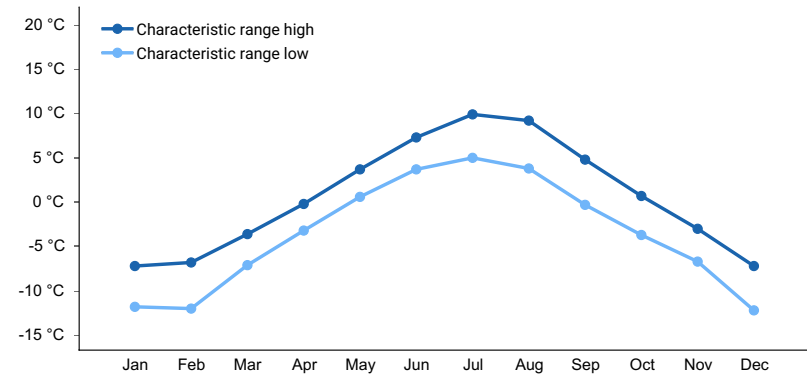


Figure 2. Monthly minimum temperature range

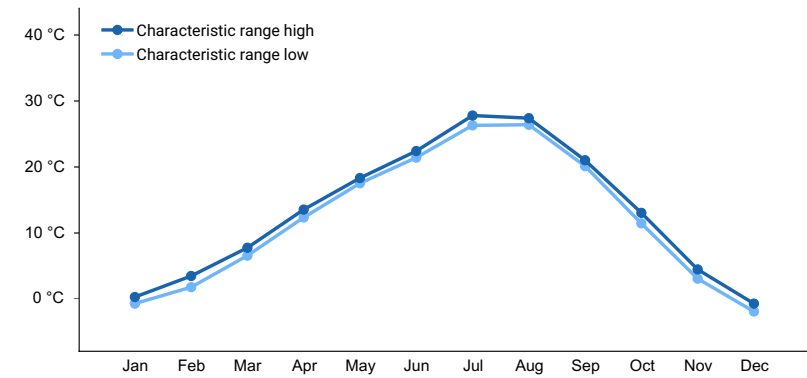


Figure 3. Monthly maximum temperature range

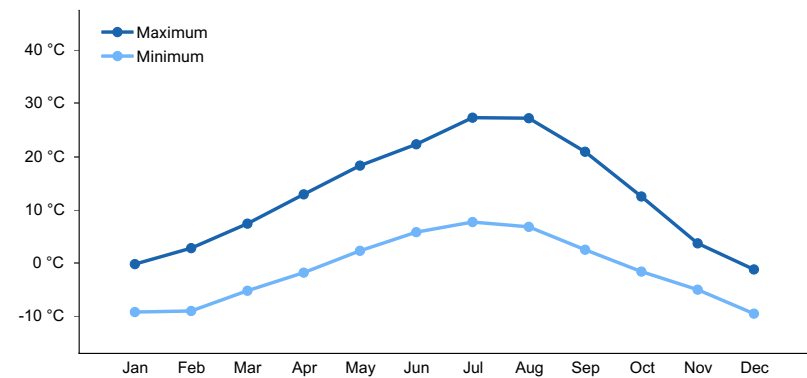


Figure 4. Monthly average minimum and maximum temperature

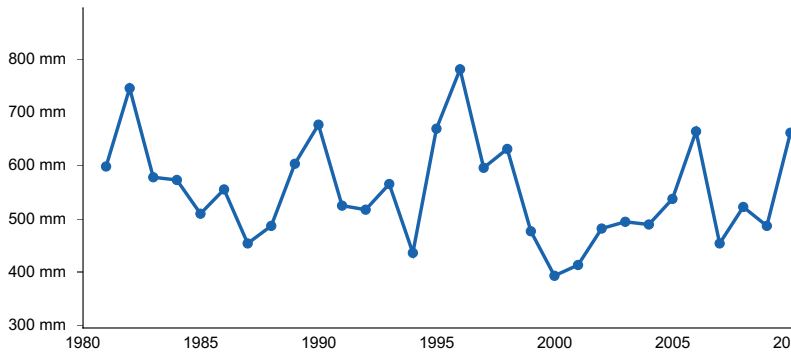


Figure 5. Annual precipitation pattern

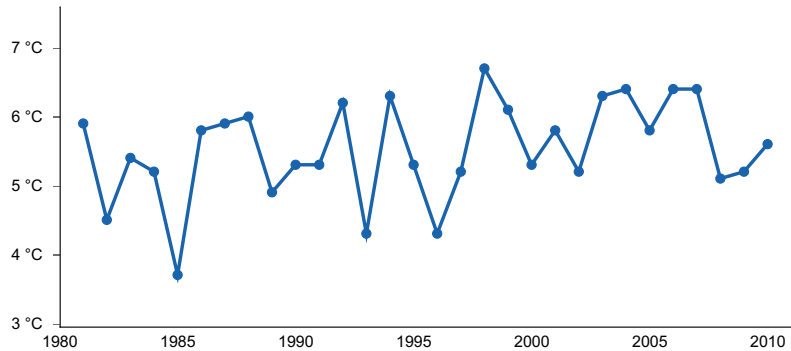


Figure 6. Annual average temperature pattern

Climate stations used

- (1) YAAK 9NNE [USC00249187], Troy, MT
- (2) POLEBRIDGE 1 N [USC00246618], Essex, MT
- (3) POLEBRIDGE [USC00246615], Essex, MT
- (4) WEST GLACIER [USC00248809], Kalispell, MT
- (5) HUNGRY HORSE DAM [USC00244328], Kalispell, MT
- (6) WHITEFISH [USC00248902], Whitefish, MT
- (7) PLEASANT VALLEY 5 SE [USC00246580], Marion, MT
- (8) LIBBY 32 SSE [USC00245020], Libby, MT
- (9) LIBBY DAM BASE [USC00245011], Libby, MT
- (10) LIBBY 1 NE RS [USC00245015], Libby, MT
- (11) LINDBERGH LAKE [USC00245043], Seeley Lake, MT

Influencing water features

no water feature

Wetland description

does not apply

Soil features

- Soils are
 - o Generally not limy (limited extent)
 - o Shallow (less than 50cm deep to bedrock, lithic, or paralithic root restrictive layer)
 - o Not ashy or medial textural family
 - o Typically less than 5% stone and boulder surface cover (<15% max)
- Soil surface texture stony silt loam or loam in surface mineral 4"
- Parent material is loamy till over residuum
- Drainage class is well drained; no flooding frequency

Table 4. Representative soil features

Parent material	(1) Till (2) Residuum
Surface texture	(1) Stony silt loam (2) Stony loam
Drainage class	Well drained
Soil depth	51 cm

Ecological dynamics

STATE 1: Historic reference state with presence of western white pine as a major seral tree species. These sites may have a less productive understory due to shallow soils than the counterpart 43A Cold Woodland.

Community Phase 1.1: Reference phase of multi-storied forest canopy dominated by subalpine fir and Engelmann spruce.

Community Phase 1.2: Post fire disturbance community of herb and shrub species.

Community Phase 1.3: Intermediate aged forest, dense thick pole sized trees.

Community Phase 1.4: Maturing forest phase of seral tree species and subalpine fir and Engelmann spruce.

Community Phase 1.5: Mature forest with some small gap dynamics, remnant seral trees species and subalpine fir and Engelmann spruce.

STATE 2: Current reference state with minor or none presence of western white pine as a seral tree species.

Community Phase 1.1: Reference phase of multi-storied forest canopy dominated by subalpine fir and Engelmann spruce.

Community Phase 1.2: Post fire disturbance community of herb and shrub species.

Community Phase 1.3: Intermediate aged forest, dense thick pole sized trees.

Community Phase 1.4: Maturing forest phase of seral tree species and subalpine fir and Engelmann spruce.

Community Phase 1.5: Mature forest with some small gap dynamics, remnant seral trees species and subalpine fir and Engelmann spruce.

STATE 3: Armillaria root rot induced shrubland state.

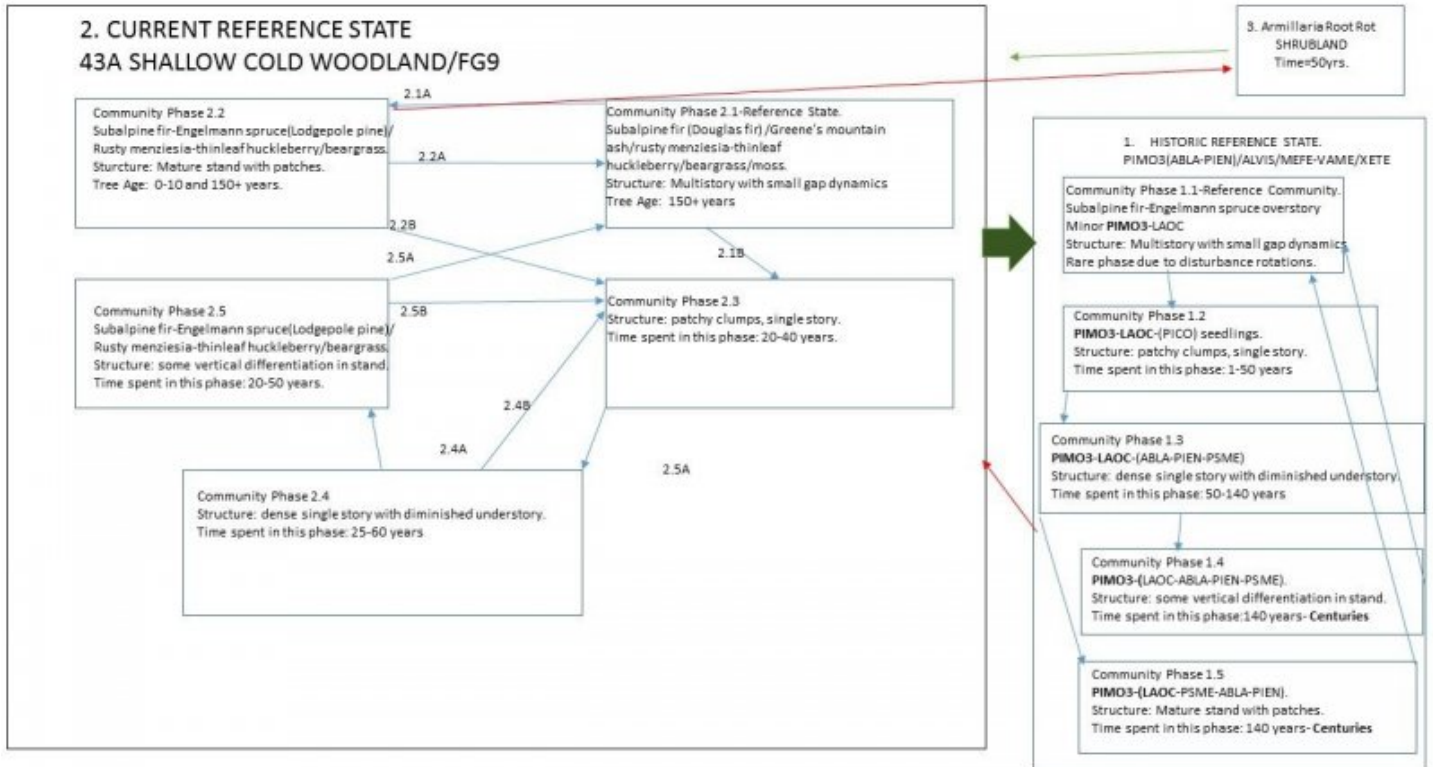
Transition from State 1 to State 2: Substantial loss of western white pine as a major seral tree species.

Restoration from State 2 to State 1: Western white pine restored as a major seral tree species.

Transition from State 2 to State 3: Significant loss of susceptible tree species at a site due to Armillaria root rot and conversion of the forest to a shrubland.

Restoration from State 3 to State 2: Conversion of the Armillaria root rot induced shrubland to forest, generally of less susceptible seral tree species and eventually to climax tree species.

State and transition model



Animal community

wildlife uses

summer and fall use of this site by elk for both cover and forage.

No potential for livestock

Hydrological functions

watershed value is high

Recreational uses

hiking, biking, photography limited due to dense shrubs

Wood products

Timber productivity is moderate to high, but due to high shrub cover at this site, preparation and management need to take into account shrub species present and their regeneration potential.

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

Kirt Walstad, 9/09/2023

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	Kirt Walstad
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):**
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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):**
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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:**
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17. **Perennial plant reproductive capability:**
-