USDA Natural Resources Conservation Service

Ecological site F043BP903MT
Shallow Cool Woodland Group

Last updated: 3/01/2024
Accessed: 05/17/2024

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): 043B–Central Rocky Mountains

The Central Rocky Mountains (MLRA 43B) of Montana occupy some 28,850 square miles and exist primarily in Central and SW portions of the state. The climate is extremely variable with precipitation lows of 9 to 100 inches per year and frost-free days of less than 30 to over 110 days. The geology of the region is also highly variable. The combination of variable climate and geology create a complex relationship of plant communities. MLRA 43B elevations typically exist between 6000 and 12,799 at Granite Peak (the highest point in Montana).

The Continental Divide runs through this MLRA effectively splitting its watershed to contribute to either the Missouri River to the East and the Columbia River to the West.

Ecological site concept

• Dominant Cover: Forest (both conifer and deciduous)
• Site does not receive any additional water
• Soils are
o Not saline or saline-sodic
o Not strongly or violently effervescent within surface mineral 4”
o Soil is shallow (less than 20in (50cm) to bedrock, lithic, or paralithic root restriction)
o Soil is not ashy or medial textural family
o Stones and boulders cover <15% surface area
• Soil surface texture variable from loam to sandy loam (often cobbly or gravelly)
• Site Landforms: Mountain slopes, escarpments, ridges
• Area of rugged mountain, hills, plateaus, and valleys of the Central Rocky Mountains in Southwest Montana
• Parent material is colluvium, colluvium over residuum, residuum
• Moisture Regime: ustic to udic
• Temperature Regime: cryic and frigid, cool
• Elevation Range: 3800-9050 ft
• Slope: 2-30% (typically less than 15%)

Associated sites

F043BP910MT	**Upland Cool Woodland Group** The Upland Cool Woodland site is adjacent to the Shallow Cool Woodland however tending to be lower on the landscape where soils tend to be deeper. These two sites share similar plant communities and state and transition models.

Similar sites

F043BP910MT	**Upland Cool Woodland Group** The Upland Cool Woodland site is adjacent to the Shallow Cool Woodland however tending to be lower on the landscape where soils tend to be deeper. These two sites share similar plant communities and state and transition models.

Table 1. Dominant plant species

Tree	(1) *Pseudotsuga menziesii* (2) *Abies lasiocarpa*
Shrub	(1) *Vaccinium membranaceum* (2) *Symphoricarpos oreophilus*
Herbaceous	(1) *Calamagrostis rubescens* (2) *Carex geyeri*

Physiographic features

Site is shallow to bedrock that exists on mountain slopes, ridges, and escarpments. Typically site exists on the upper third of the landform. Site is quite variable in slope from 2 to 30 percent; however, slope is rarely greater than 15 percent. The site has a root restrictive layer within 20 inches of the soil surface. Geology is mixed.

Table 2. Representative physiographic features

Landforms	(1) Mountains > Mountain slope (2) Mountains > Escarpment (3) Mountains > Ridge
Runoff class	Medium to low
Elevation	1,158–2,286 m
Slope	2–30%
Water table depth	381 cm
Aspect	W, NW, N, NE, E, SE, S, SW

Climatic features

The site is located within frigid, cool to cryic temperature regime in the typic ustic to udic moisture regime with Relative Effective Annual Precipitation quite variable from 17 to 40 inches. Frost-free days range from 50 to 90. This site exists across a large area with a majority existing outside of the climate station coverage however multiple sites exist nearby.

Table 3. Representative climatic features

Frost-free period (characteristic range)	8-56 days
Freeze-free period (characteristic range)	42-103 days
Precipitation total (characteristic range)	457-660 mm
Frost-free period (actual range)	3-78 days
Freeze-free period (actual range)	40-109 days
Precipitation total (actual range)	305-762 mm
Frost-free period (average)	50 days
Freeze-free period (average)	90 days
Precipitation total (average)	660 mm

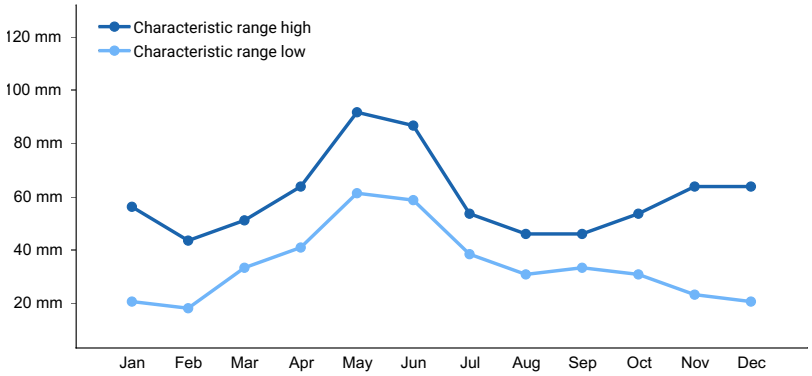


Figure 1. Monthly precipitation range

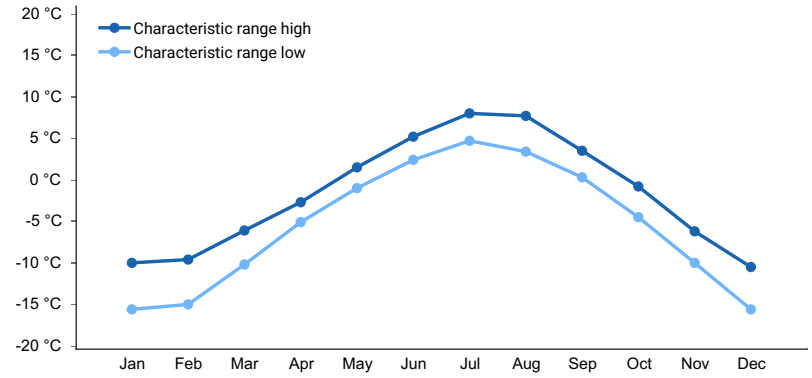


Figure 2. Monthly minimum temperature range

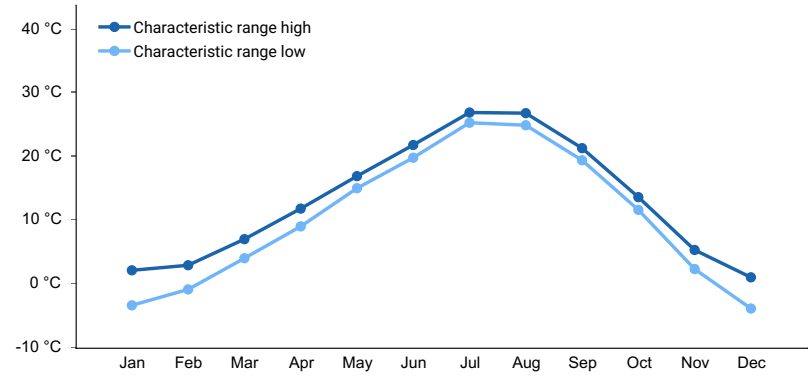


Figure 3. Monthly maximum temperature range

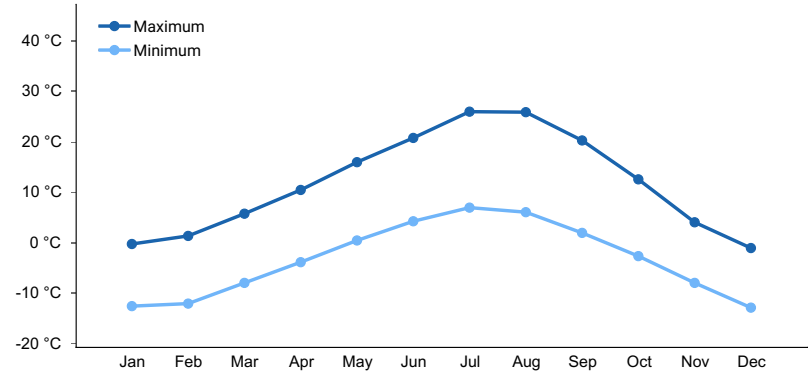


Figure 4. Monthly average minimum and maximum temperature

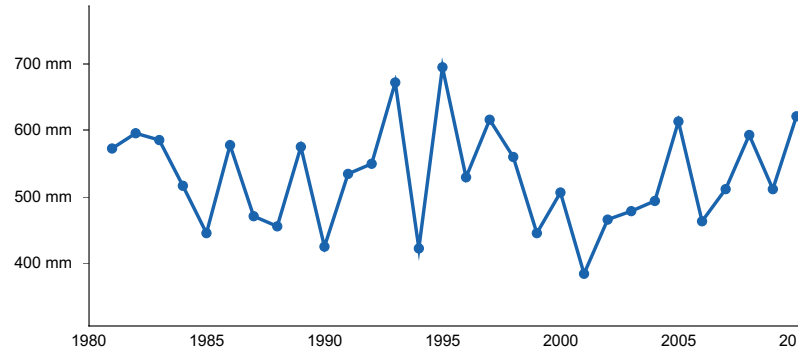


Figure 5. Annual precipitation pattern

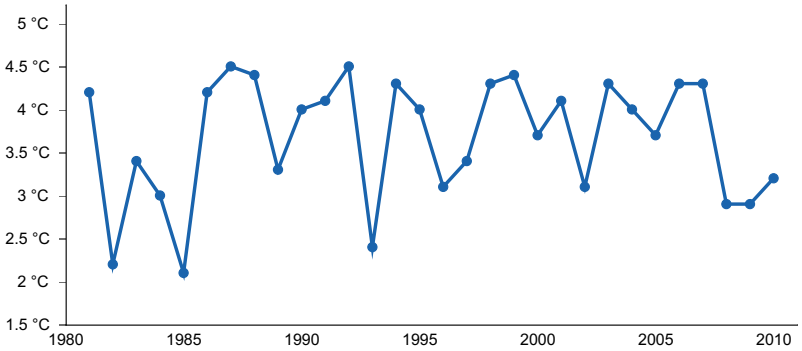


Figure 6. Annual average temperature pattern

Climate stations used

- (1) MYSTIC LAKE [USC00245961], Fishtail, MT
- (2) RED LODGE [USC00246918], Red Lodge, MT
- (3) DIVIDE [USC00242421], Wise River, MT
- (4) WISE RIVER 3 WNW [USC00249082], Wise River, MT
- (5) LAKEVIEW [USC00244820], Lima, MT
- (6) HEBGEN DAM [USC00244038], West Yellowstone, MT
- (7) ISLAND PARK [USC00104598], Island Park, ID
- (8) WEST YELLOWSTONE [USC00248857], West Yellowstone, MT
- (9) WILSALL 8 ENE [USC00249023], Wilsall, MT
- (10) BOZEMAN 12 NE [USC00241050], Bozeman, MT
- (11) MILLEGAN 14 SE [USC00245712], White Sulphur Springs, MT
- (12) NEIHART 8 NNW [USC00246008], Monarch, MT

Influencing water features

Site is not associated with water features

Wetland description

Site is not associated with wetlands

Soil features

Soil textures are variable based on local geology; however, textures trend loamy, often with gravelly, cobbly or stony modifiers. Parent material is colluvium, colluvium over residuum, and residuum.

Table 4. Representative soil features

Parent material	(1) Colluvium–igneous, metamorphic and sedimentary rock (2) Residuum–igneous, metamorphic and sedimentary rock

Surface texture	(1) Cobbly, gravelly loam (2) Gravelly sandy loam
Drainage class	Moderately well drained to well drained
Permeability class	Moderate to moderately rapid
Depth to restrictive layer	25–51 cm
Soil depth	25–51 cm
Surface fragment cover <=3"	0–30%
Surface fragment cover >3"	0–22%
Available water capacity (0-50.8cm)	2.79–9.65 cm
Soil reaction (1:1 water) (0-50.8cm)	4.8–7.8
Subsurface fragment volume <=3" (0-50.8cm)	0–50%
Subsurface fragment volume >3" (0-50.8cm)	0–45%

Ecological dynamics

1 - Reference State
1.1 Douglas fir dominated forest with lodgepole pine and minor components of subalpine fir and Englemann's spruce. Grasses and sedges tend to be limited. Forbs and shrubs dominate understory canopy.

T1A Post-disturbance includes stand replacement fire, insect pestilence and disease. Fire frequency is long but fire is intense.

2 - Post-disturbance State
2.1 Shrub dominant condition post disturbance. Saplings of multiple trees present. Forbs increase in composition particularly colonizing species like fireweed and coneflower

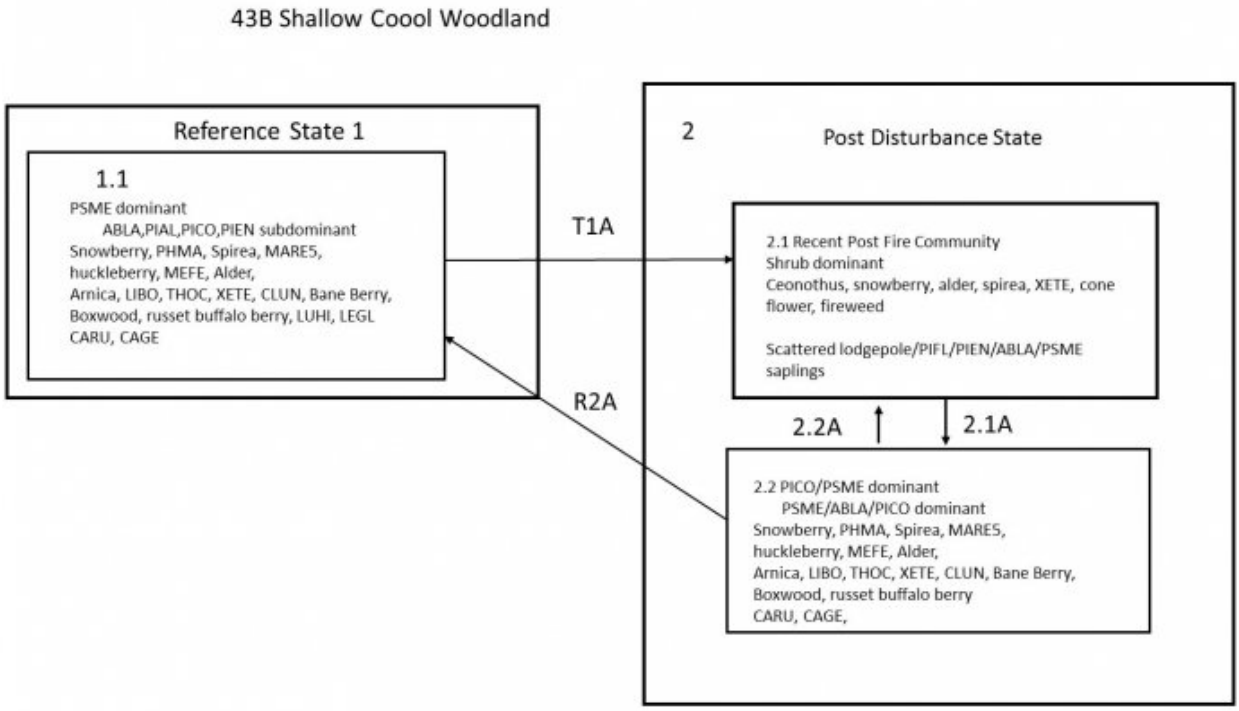
2.1A Time where trees start to re-establish

2.2 Lodgepole pine dominant community with saplings of Douglas fir and minor subalpine fir component

2.2A Community phase shift is due to fire, insect pestilence and disease. Fire frequency is long but fire is intense.

R2A Restoration pathway where the site, over time, without fire, insect pestilence, or disease moves back to the reference state. Douglas fir with some subalpine fir comes back in and shades out the other tree species. This process can take over 150 years.

State and transition model



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Animal community

This ecological site is considered important habitat for large wild game such as deer, elk, and moose as well as upland birds such as ruffed, dusky, and spruce grouse.

Typically this site is considered good for livestock grazing. If the tree canopy is open it will often contain grazeable forage.

Recreational uses

Site frequently used by many outdoor recreationists such as bird watchers, campers, hikers, bikers, and hunters.

Wood products

The dominant forest type is typically suited to forest products of different types. Harvest of this site may prove challenging due to slope and remote location.

Inventory data references

Information presented was derived from NRCS inventory data, literature, field observations, and personal contacts with range-trained personnel (i.e., used professional opinion of agency specialists, observations of land managers, and outside scientists).

Other references

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Contributors

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Approval

Kirt Walstad, 3/01/2024

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	05/17/2024
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):**

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:**