USDA Natural Resources Conservation Service

Ecological site F043BP901MT
Rubbly Cool 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): 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 Moderately deep, deep, or very deep
o Not strongly or violently effervescent within surface mineral 4”
o Soil is not ashy or medial textural family
o Stones and/or boulders cover 50% surface area or fragmental textural class
• Soil surface texture sandy loam to loam (typically very gravelly)
• Area of rugged mountain, hills, plateaus, and valleys of the Central Rocky Mountains in Southwest Montana.
• Site landform: mountain slope, avalanche chutes
• Parent material is recent colluvium
• Moisture Regime: ustic to udic
• Temperature Regime: cryic and frigid, cool
• Elevation Range: 4590-8530 ft
• Slope: 4-70%

Associated sites

F043BP903MT	**Shallow Cool Woodland Group** Shallow Cool Woodland is often above the Rubbly Cool Woodland on the landscape however variation in landforms can result in these two sites being on the same landscape position. These two sites share similar plant species however have significantly different state and transition models.
F043BP910MT	**Upland Cool Woodland Group** The Upland Cool Woodland is a neighboring site that shares landscape position. These two sites share similar plant species however have significantly different state and transition models.

Similar sites

F043BP903MT	**Shallow Cool Woodland Group** Shallow Cool Woodland is often above the Rubbly Cool Woodland on the landscape however variation in landforms can result in these two sites being on the same landscape position. These two sites share similar plant species however have significantly different state and transition models
F043BP910MT	**Upland Cool Woodland Group** The Upland Cool Woodland is a neighboring site that shares landscape position. These two sites share similar plant species however have significantly different state and transition models

Table 1. Dominant plant species

Tree	(1) *Populus tremuloides* (2) *Pseudotsuga menziesii*
Shrub	(1) *Alnus incana* (2) *Symphoricarpos oreophilus*
Herbaceous	(1) *Achnatherum richardsonii*

Physiographic features

Site exists on steep mountain slopes and more commonly avalanche chutes. Slopes vary from 4 to 70 percent with dominant slopes exceeding 45 percent.

Table 2. Representative physiographic features

Landforms	(1) Mountains > Hillside or mountainside (2) Mountains > Slide
Runoff class	Medium
Elevation	1,399–2,600 m
Slope	4–70%
Aspect	W, NW, N, NE, E, SE, S, SW

Climatic features

A majority of MLRA 43B does not have climate station data. The Rubbly Cool Woodland covers a very large area of precipitation ranges and varies from approximately 16 inches to 40 inches with an average of just over 21 inches. Frost Free Days (FFD) follow a similar variable pattern with a low of 20 Frost Free Days and a high of 70 days with an average of 40 FFD.

Table 3. Representative climatic features

Frost-free period (characteristic range)	3-23 days
Freeze-free period (characteristic range)	40-74 days
Precipitation total (characteristic range)	406-660 mm
Frost-free period (actual range)	2-32 days
Freeze-free period (actual range)	40-91 days
Precipitation total (actual range)	330-686 mm
Frost-free period (average)	14 days
Freeze-free period (average)	59 days
Precipitation total (average)	533 mm

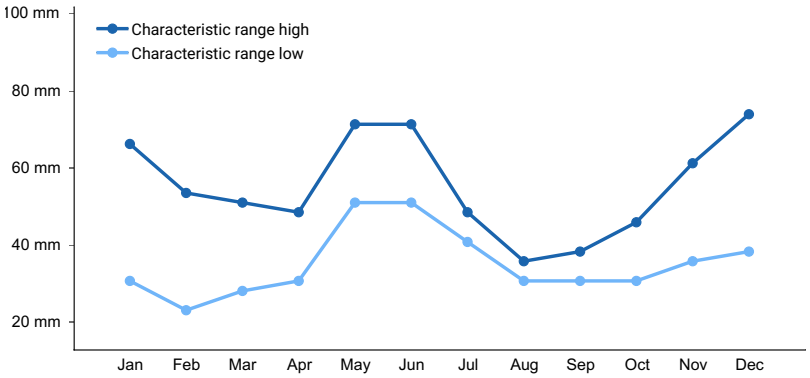


Figure 1. Monthly precipitation range

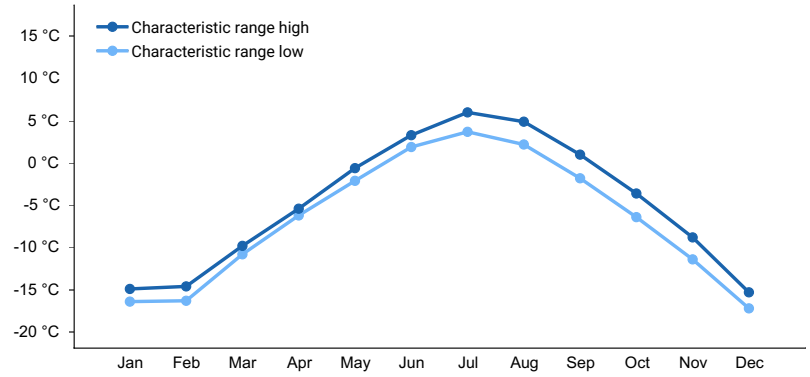


Figure 2. Monthly minimum temperature range

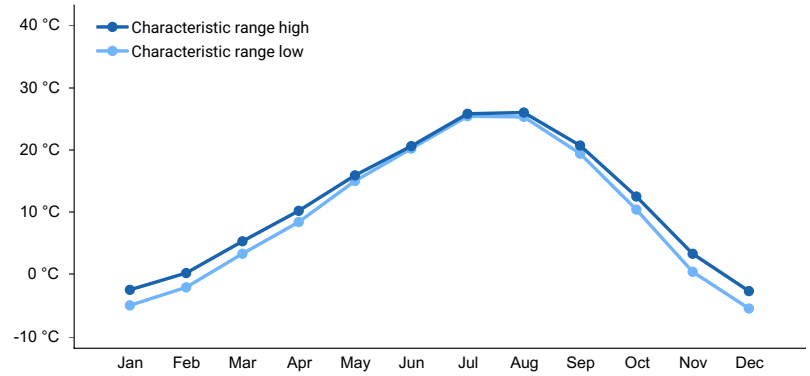


Figure 3. Monthly maximum temperature range

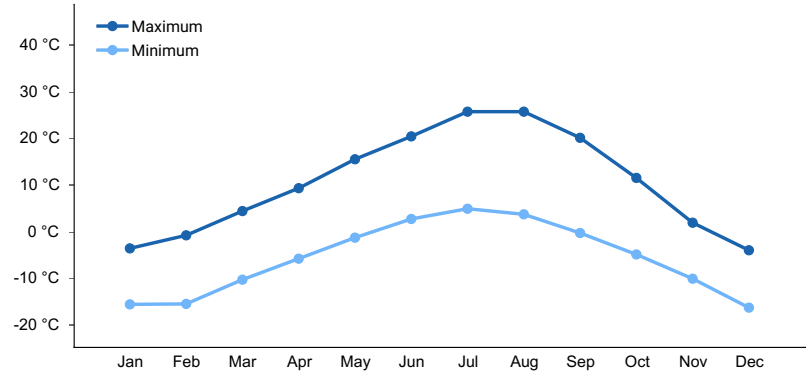


Figure 4. Monthly average minimum and maximum temperature

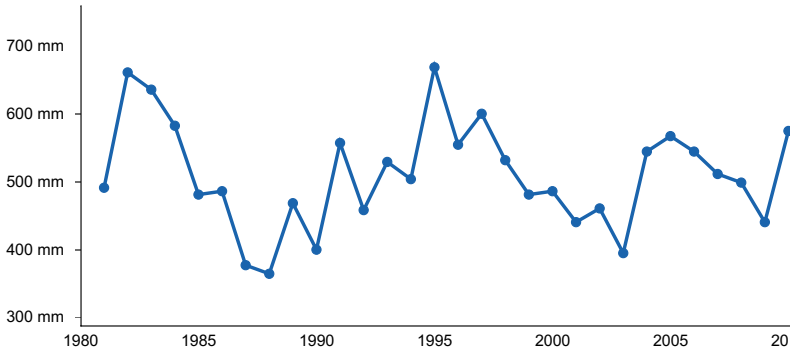


Figure 5. Annual precipitation pattern

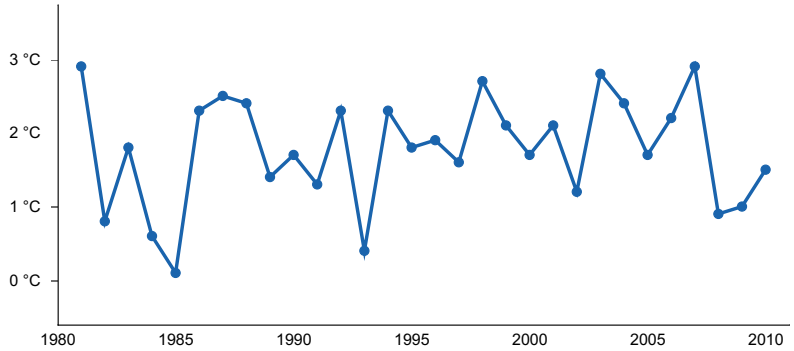


Figure 6. Annual average temperature pattern

Climate stations used

- (1) WEST YELLOWSTONE [USC00248857], West Yellowstone, MT
- (2) WISE RIVER 3 WNW [USC00249082], Wise River, MT
- (3) HEBGEN DAM [USC00244038], West Yellowstone, MT

Influencing water features

N/A

Wetland description

N/A

Soil features

Soils of this site tend to be mixed as a result of mass movement. Surface textures are sandy loam to loam and often have a cobbly or gravelly modifier

Table 4. Representative soil features

Parent material	(1) Colluvium–igneous, metamorphic and sedimentary rock
Surface texture	(1) Very cobbly loam (2) Cobbly sandy loam (3) Gravelly loam
Drainage class	Moderately well drained to excessively drained
Permeability class	Moderate to very rapid
Depth to restrictive layer	51 cm
Soil depth	51 cm

Surface fragment cover <=3"	0–50%
Surface fragment cover >3"	30–50%
Available water capacity (0-101.6cm)	3.81–12.7 cm
Soil reaction (1:1 water) (0-25.4cm)	4.5–7.8
Subsurface fragment volume <=3" (25.4-50.8cm)	10–50%
Subsurface fragment volume >3" (25.4-50.8cm)	0–65%

Ecological dynamics

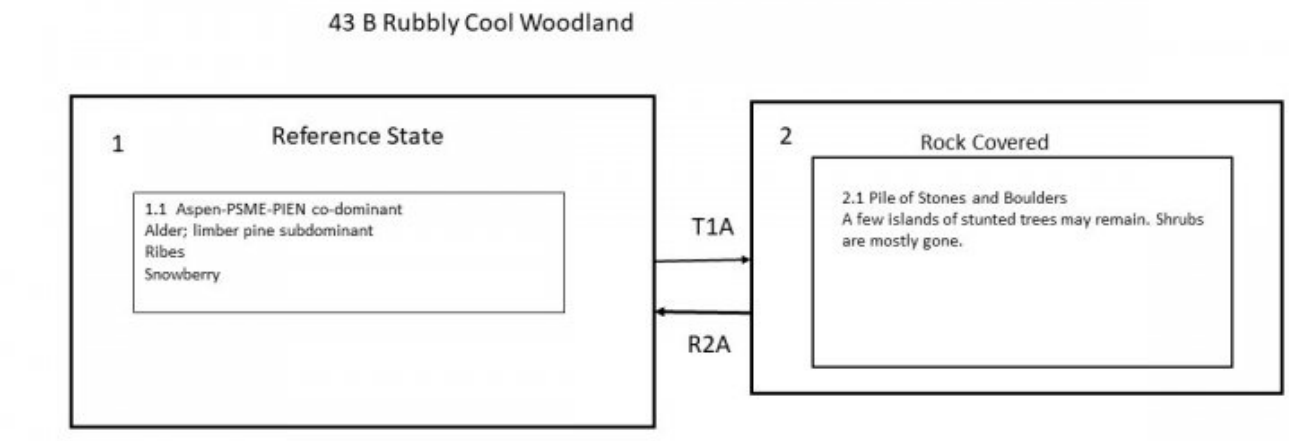
This ecological site grouping typically exists as only two states and on a very limited acreage in MLRA 43B.

The Reference State (1) is a Aspen, Douglas fir and Englemann Spruce dominated forest with interspaced Alder, Limber pine, Currant, and Snowberry. Aspen trees growing between boulders are most common. This site tends to be relatively unstable with the trees remaining stunted and widely spaced. Limited herbaceous cover does exist. The Reference State is resistant to most disturbance due to the sparse nature of vegetation and slope prevents grazing animals from utilizing this area. The spare vegetation and high boulder/rubble rock cover resists fire.

State 2 (Rock Covered) is in response to a mass wasting or avalanche event. Mass wasting would likely be due to extreme rainfall or rapid snowmelt. The area is devoid of most herbaceous and shrub vegetation. Limited trees with broken limbs remain.

State 2 will return to the Reference State over time. Due to the poor site conditions, this transition will take several decades.

State and transition model



Rubbly Cool Woodland: Surface Frags >50%
1.1 Reference Community Phase: Aspen-PSME-PIEN co-dominant; Trees remain small and stunted, and widely spaced. Grass cover is spotty. Community is resistant to most disturbance (ie fire, grazing).

T1A Mass movement often due to avalanche or rockslide.
R2A Time and stability for trees and shrubs to re-establish

2.1 Plant community is generally devoid of most shrubs and grasses. Few trees remain as a result of mass movement (either avalanche or rockslide)

Animal community

This site is often utilized by large herbivores as escape habitat. Domestic livestock tend to avoid these sites due to steep terrain and low forage availability.

Hydrological functions

Site tends to have high in infiltration and runoff due to large spaces between rocks as well as this site is often associated with bedrock relatively close to the surface.

Recreational uses

A form of rock climbing known as Bouldering often takes place in these areas.

Wood products

This site is not suitable for commercial timber harvest.

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	05/13/2025
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:

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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):**

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

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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:**
