USDA Natural Resources
Conservation Service

Ecological site F043BP910MT
Upland 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 12,799ft 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

• Site does not receive any additional water
• Dominant Cover: Coniferous Forest
• Soils are
o Generally not saline or saline-sodic (limited extent)
o Moderately deep, deep, or very deep
o Typically less than 5% stone and boulder cover (<15% max)
• Soil surface texture ranges from sandy loam to clay loam in surface mineral 4”
• Site Landform: mountain slopes, ridges, escarpments
• 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
• Elevation Range: 3800-6850ft
• Slope: 0-60%

Associated sites

F043BP903MT	**Shallow 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

F043BP903MT	**Shallow 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) *Pinus contorta*
Shrub	(1) *Symphoricarpos albus* (2) *Mahonia repens*
Herbaceous	(1) *Calamagrostis rubescens* (2) *Arnica*

Physiographic features

Site exists on mountain slopes, ridges, and escarpments. Slopes vary, ranging up to 60 percent with dominant slopes rarely exceeding 40 percent.

Table 2. Representative physiographic features

Landforms	(1) Mountains > Hillside or mountainside (2) Mountains > Ridge (3) Escarpment
Runoff class	Negligible to low
Flooding frequency	None
Elevation	1,158–2,088 m
Slope	0–70%
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 20 to 45 inches. Frost-free days range from 50 to 90 days.

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

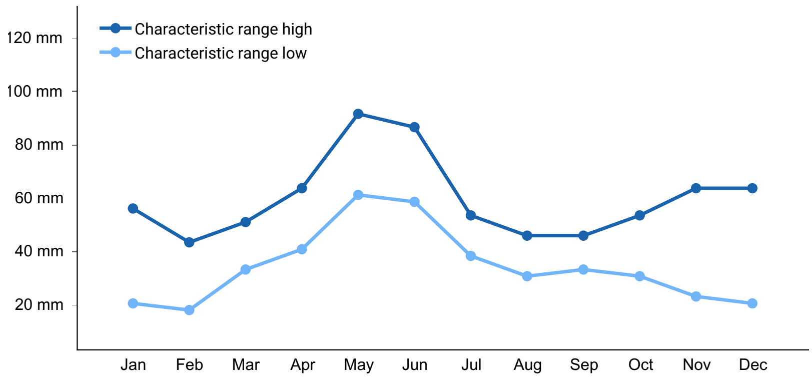


Figure 1. Monthly precipitation range

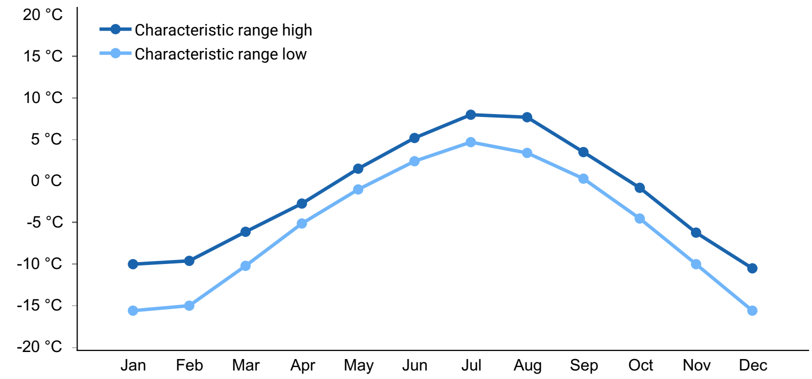


Figure 2. Monthly minimum temperature range

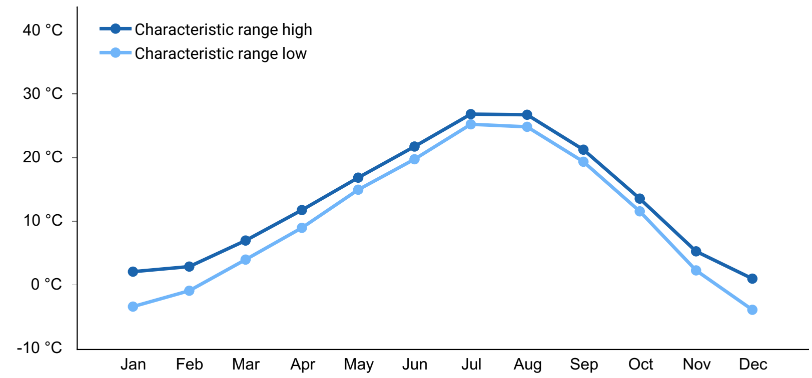


Figure 3. Monthly maximum temperature range

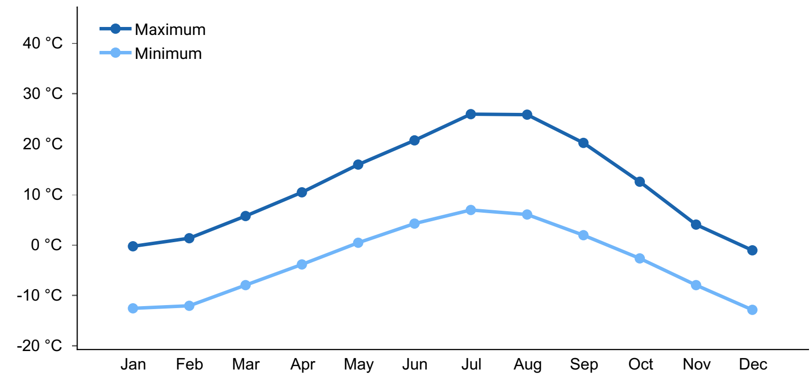


Figure 4. Monthly average minimum and maximum temperature

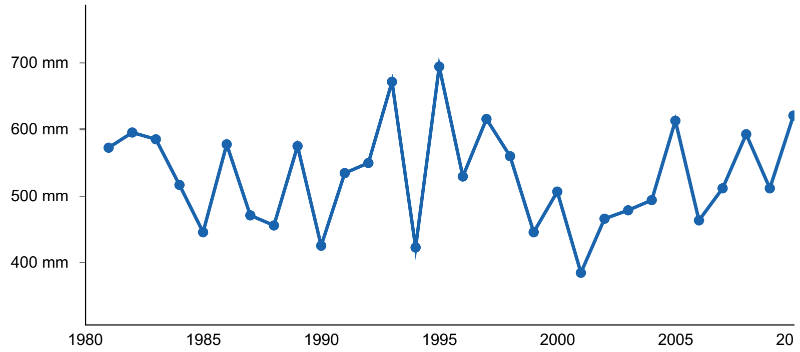


Figure 5. Annual precipitation pattern

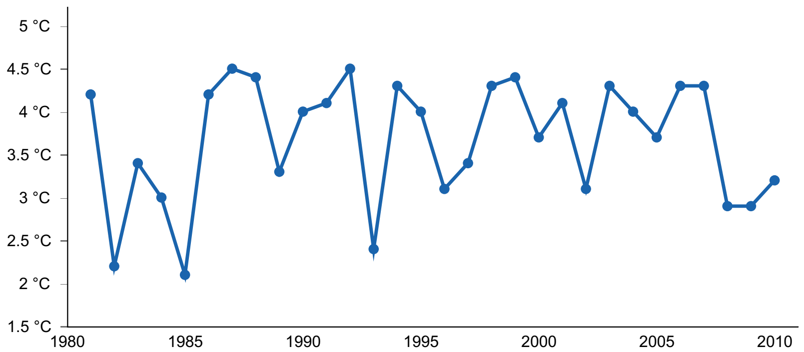


Figure 6. Annual average temperature pattern

Climate stations used

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

Influencing water features

N/A

Wetland description

N/A

Soil features

Soils are formed from colluvium, colluvium over residuum, or residuum. Textures will vary based on local geology; however, they tend to be silt loam to sandy loam with mixed amounts of rock fragments in the soil profile. Gravelly soil texture modifier is common.

Table 4. Representative soil features

Parent material	(1) Colluvium–igneous, metamorphic and sedimentary rock (2) Residuum–igneous, metamorphic and sedimentary rock
Surface texture	(1) Loam (2) Gravelly sandy loam (3) Silt loam (4) Silty clay loam
Drainage class	Moderately well drained to well drained
Permeability class	Moderately slow to moderately rapid
Depth to restrictive layer	51 cm
Soil depth	51–254 cm
Surface fragment cover <=3"	0–15%
Surface fragment cover >3"	0–10%
Available water capacity (0-101.6cm)	9.4–18.54 cm
Soil reaction (1:1 water) (0-50.8cm)	5.6–7.3
Subsurface fragment volume <=3" (25.4-50.8cm)	0–25%
Subsurface fragment volume >3" (25.4-50.8cm)	0–25%

Ecological dynamics

1 - Reference State
1.1 Douglas fir dominated forest with understory of shrubs and mixed grasses. Lodgepole pine and Englemann's spruce throughout the forest but sparsely spaced.

T1A Post-disturbance includes stand replacement fire, insect pestilence, disease, and clear cut

2- Post-disturbance State
2.1 Post-fire shrub dominated community with saplings of lodgepole pine being common. Fireweed dominant forb. Grasses may increase outside of fireweed patches.

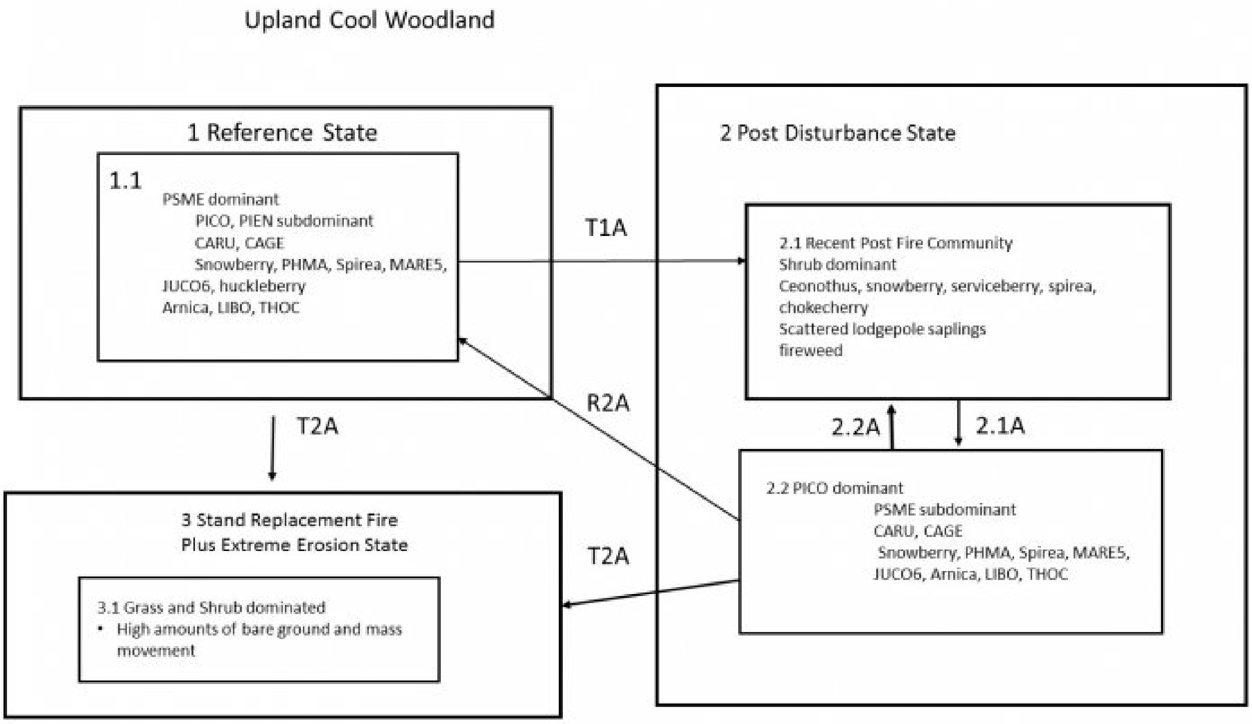
2.1A Over time lodgepole pine saplings increase with some Douglas fir and Englemann's spruce saplings increasing. Forbs and shrubs decrease as tree canopy increases.

2.2 Post Fire forest dominated by lodgepole pine with Douglas fire and Englemann's spruce increasing. Shrubs and grasses returning to pre-fire positions.

2.2A Community Pathway includes stand replacement fire, insect pestilence, disease, and clear cut
R2A Restoration pathway where the site, over time, without fire, insect pestilence, or disease moves back to the Reference State. Douglas fir comes back in and shades out lodgepole pine.
T2A: It occurs when intense precipitation events follow extreme stand replacement fires. Due to loss of seed source coupled with extreme surface erosion trees struggle to establish. Grasses and shrubs become dominant.

3 - Stand Replacement Fire Plus Extreme Erosion State
This State is rare in its extent within the MLRA. It occurs when intense precipitation events follow extreme stand replacement fires.
3.1 Grass and shrub dominated community, with high amounts of bare ground and mass movement.

State and transition model



43B Upland Cool Woodland F043BP910MT
Legend

1.1 Douglas fir dominated forest with understory of shrubs and mixed grasses. Lodgepole pine and Englemann's Spruce throughout the forest but sparsely spaced.
T1A Post Disturbance includes stand replacement fire, insect pestilence, disease, and clear cut

2.1 Post fire shrub dominant community with saplings of lodgepole being common. Fireweed dominant forb. Grasses may increase outside of fireweed patches.
2.1A Over time PICO saplings increase with some PSME and PIEN saplings increasing. Forbs and shrubs decrease as tree canopy increases.
2.2A Community Pathway includes stand replacement fire, insect pestilence, disease, and clear cut
2.2 Post Fire forest dominated by lodgepole pine with Douglas fire and Englemann spruce increasing. Shrubs and grasses returning to pre-fire positions.
R2A Restoration pathway where the site, over time, without fire, insect pestilence, or disease moves back to the reference state. Douglas fir comes back in and shades out lodgepole.

T2A: It occurs when intense precipitation events follow extreme stand replacement fires. Due to loss of seed source coupled with extreme surface erosion trees struggle to establish. Grasses and shrubs become dominant.
3 Stand Replacement Fire Plus Extreme Erosion State: This State is rare in its extent within the MLRA. It occurs when intense precipitation events follow extreme stand replacement fires.

Animal community

This ecological site is considered important habitat for large game animals 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	10/22/2019
Approved by	Kirt Walstad
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

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

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

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

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

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

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

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

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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:**