Ecological site F044BP910MT
Upland Cool Woodland

Last updated: 9/07/2023
Accessed: 06/18/2026

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): 044B–Central Rocky Mountain Valleys

This MLRA is nearly 3.7 million acres of Southwest Montana and borders two MLRAs, 43B Central Rocky Mountains and Foothills and MLRA 46X Northern and Central Rocky Mountain Foothills. The major watersheds of this MLRA are those of the Missouri and Yellowstone Rivers along with their associated headwaters such as the Beaverhead, Big Hole, Jefferson, Ruby, Madison, Gallatin, and Shields Rivers. These waters allow for extensive irrigation for crop production in an area that would generally be only compatible with rangeland and grazing. The Missouri River and its headwaters are contained behind several reservoirs used for irrigation water, hydroelectric power, and municipal water. Limited portions of the MLRA are west of the Continental Divide along the Clark Fork River. The primary land use of this MLRA is production agriculture (grazing, small grain production, and hay), but there is some limited mining. Urban development is also extensive. MRLA 44B consists of one Land Resource Unit (LRU) and seven climate-based LRU subsets. Annual precipitation ranges from a low of 9 inches to a high near 24 inches. The driest areas tend to be in the valley bottoms of southwest Montana in the rain shadow of the mountains. The wettest areas tend to be near the edges of the MLRA where it borders with MLRA 43B. Frost-free periods also vary greatly with from less than 30 days in the Big Hole Valley to approximately 110 days in the warm valleys along the Yellowstone River and Missouri River Headwaters. The plant communities of the MLRA 44B are highly variable, but cool-season grass and shrub steppe communities on rangeland and a mixed coniferous forest in the mountains are dominant. Warm-season grasses occupy an extremely limited extent in this MLRA. Most subspecies of big sagebrush are present to some extent across the MLRA.

LRU notes

LRU 01 Subset A: - Soil Moisture Regime: Ustic, dry (bordering Aridic) - Soil Temperature REgime: Frigid - Dominant Cover: Rangeland (mixed grassland and sagebrush steppe) - Representative Value (RV) range of Effective Precipitation: 9-14 inches (228 - 355 mm) - Representative Value (RV) range of Frost-free Days: 70-110 days

Classification relationships

EPA Ecoregions of Montana, Second Edition: Level I: Northwestern Forested Mountains Level II: Western Cordillera Level III: Middle Rockies & Northern Great Plains Level IV: Paradise Valley Townsend Basin National Hierarchical Framework of Ecological Units: Domain: Dry Division: M330 – Temperate Steppe Division – Mountain Provinces Province: M332 –Middle Rocky Mountain Steppe – Coniferous Forest – Alpine Meadow Section: M332D – Belt Mountains Section M332E – Beaverhead Mountains Section Subsection: M332Ej – Southwest Montana Intermontane Basins and Valleys M332Dk – Central Montana Broad Valleys

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” • Parent material is tertiary valley fill and recent alluvium • An area of dissected mountain valleys. The valleys are typically bordered by mountains trending north to south. • Site landform: hillslope, escarpments, fan remnants • Moisture Regime: ustic • Temperature Regime: cryic • Elevation Range: 3800-6850 • Slope: 0-60% (typically less than 25%)

Associated sites

F044BP903MT	**Shallow Cool Woodland** Shallow Cool Woodland is adjacent to this site often higher on the landscape

Similar sites

F044BP903MT	**Shallow Cool Woodland** Shallow Cool Woodland expresses a similarly structured forest lower production in the kinds and amounts of species.

Table 1. Dominant plant species

Tree	(1) *Pseudotsuga menziesii*
Shrub	(1) *Symphoricarpos albus* (2) *Spiraea betulifolia*
Herbaceous	(1) *Pseudoroegneria spicata* (2) *Festuca idahoensis*

Physiographic features

This ecological site exists in valleys on escarpments, hillslopes, and fan remnants. Landform positions are often gently sloping, but steep slopes may exist.

Table 2. Representative physiographic features

Landforms	(1) Valley > Escarpment (2) Valley > Hillslope (3) Valley > Fan remnant
Elevation	1,070 – 2,090 m
Slope	0 – 60 %
Aspect	Aspect is not a significant factor

Climatic features

The climate of this ecological site is highly variable and located where few climate stations exist. Relative effective annual precipitation is 15 to 20 inches with an average of 38 frost-free days (FFD) though can vary from 30 to 50 frost-free days.

For more climate information, see the Climatic Data Sheet in Section II of the Field Office Technical Guide for more details the Western Regional Climate Center’s website.

Table 3 Representative climatic features

Frost-free period (characteristic range)	30-40 days
Freeze-free period (characteristic range)	60-90 days
Precipitation total (characteristic range)	430-460 mm
Frost-free period (actual range)	20-40 days
Freeze-free period (actual range)	40-100 days
Precipitation total (actual range)	430-480 mm
Frost-free period (average)	30 days
Freeze-free period (average)	70 days
Precipitation total (average)	460 mm

- (1) MILLEGAN 14 SE [USC00245712], White Sulphur Springs, MT
- (2) LAKEVIEW [USC00244820], Lima, MT
- (3) LENNEP 5 SW [USC00244954], White Sulphur Springs, MT

Influencing water features

Ecological site is not influenced by additional effective water.

Wetland description

No wetland descriptions.

Soil features

Soil textures are variable but dominated by loamy texture class. The soils of this ecological site often have high rock fragments that increase with depth. Soils are considered moderately deep to deep with minimum depth to root restrictive layer greater than 20 inches. Surface pH trends strongly acid to slightly alkaline depending on parent material and canopy cover influence of trees.

Table 4. Representative soil features

Parent material	(1) Colluvium – igneous, metamorphic and sedimentary rock (2) Alluvium – igneous, metamorphic and sedimentary rock
Surface texture	(1) Gravelly, cobbly loam
Family particle size	(1) Coarse-loamy

Drainage class	Moderately well drained to well drained
Depth to restrictive layer	50 cm
Soil depth	50 cm
Surface fragment cover <=3"	0 – 20 %
Surface fragment cover >3"	0 – 10 %
Available water capacity (0-101.6cm)	9.14 – 19.56 cm
Soil reaction (1:1 water) (0-25.4cm)	4.5 – 6.6
Subsurface fragment volume <=3" (25.4-50.8cm)	10 – 50 %
Subsurface fragment volume >3" (25.4-50.8cm)	0 – 30 %

Ecological dynamics

1.1 Douglas-fir dominated forest with understory of shrubs and mixed grasses. Lodgepole pine and Englemann Spruce occur throughout but very 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 pine being common. Fireweed is the dominant forb. Grasses will increase outside of fireweed patches and area may resemble rangeland for the short-term.

2.1A Over time lodgepole pine saplings increase with PSME saplings increasing rapidly. 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 Douglas fire with Lodgepole 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.

3.1 This site strongly resembles the Pseudotsuga menzeisii/Symphoricarpos albus (Douglas-Fir/Common Snowberry) Habitat Type in Montana.

State and transition model

Additional community tables

Animal community

This ecological site is considered good habitat for multiple wildlife species as well as offers limited forage for livestock.

Hydrological functions

Not detailed at this time.

Recreational uses

hunting, hiking, camping, photography

Wood products

Ecological site produces opportunities for timber, post-and-pole, and firewood industries.

Inventory data references

Site information was obtained from local knowledge of NRCS staff, NRI data, and knowledge from partners such as BLM and Forest Service.

Other references

Alexander, R. R. 1985. Major habitat types, community types, and plant communities in the Rocky Mountains. USDA- Forest Service Rocky Mountain Forest and Range Experiment Station. General technical report RM-123. 105p.

Alexander 1988. Forest vegetation on National Forests in the Rocky Mountain and Intermountain Regions: Habitat types and community types. USDA- Forest Service Rocky Mountain Forest and Range Experiment Station. General technical report RM-162. 47p.

Galatowitsch, S.M. 1990. Using the original land survey notes to reconstruct pre-settlement landscapes in the American West. Great Basin Naturalist: 50(2): 181-191. Keywords: [Western U.S., conservation, history, human impact]

Parson, R. E. 1996. A History of Rich County. Utah State Historical Society, County Commission, Rich County, Utah. Keywords: [Rich County, Utah, Historic land use, European settlements]

USDA-NRCS. 2003. National Range and Pasture Handbook. in USDA, editor, USDA-Natural Resources Conservation Service-Grazing Lands Technology Institute. Keywords: [Western US, Federal guidelines, Range pasture management]

Western Regional Climate Center, Western U.S. Climate Historical Summaries. Available at: http://www.wrcc.dri.edu/summary/Climsmut.html. Accessed 15 June 2009.

Web Soil Survey, Official Soil Series Descriptions. Available at: http://soils.usda.gov/technical/classification/osd/index.html. Accessed 15 June 2009.

Contributors

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Approval

Kirt Walstad, 9/07/2023

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	06/18/2026
Approved by	
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):**

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

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

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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:

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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:**
