USDA Natural Resources
Conservation Service

Ecological site F044BP912MT
Limy Cool Woodland

Last updated: 8/26/2019
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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.

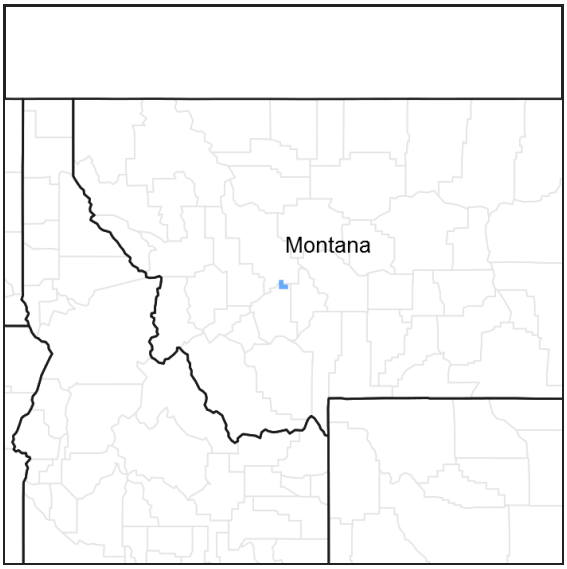


Figure 1. Mapped extent

Areas shown in blue indicate the maximum mapped extent of this ecological site. Other ecological sites likely occur within the highlighted areas. It is also possible for this ecological site to occur outside of highlighted areas if detailed soil survey has not been completed or recently updated.

MLRA notes

Major Land Resource Area (MLRA): 044B–Central Rocky Mountain Valleys

44B Central Rocky Mountain Valleys
Major Land Resource Area (MLRA) 44B, Central Rocky Mountain Valleys, is nearly 3.7 million acres of Southwest Montana. This MLRA borders 2 MLRAs: 43B Central Rocky Mountains and Foothills, and MLRA 46 Northern and Central Rocky Mountain Foothills.

The major watersheds of this MLRA are the Missouri and Yellowstone Rivers along with their associated headwaters such as the Beaverhead, Big Hole, Jefferson, Ruby, Madison, Gallatin, and Shields Rivers. Limited portions of the MLRA are west of the Continental Divide along the Clark Fork River. 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.

The primary land use of this MLRA is production agriculture (grazing, small grain production, and hay) with limited mining. Urban Development is also high.

MRLA 44B consists of 7 Climate based Land Resource Units (LRUs). Annual precipitation ranges from a low of 9” to a high near 24”. 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.

MLRA 44B's plant communities are highly variable however are dominated by a cool season grass and shrub steppe community on the rangeland and a mixed coniferous forest in the mountains. Warm season grasses occupy an extremely limited extent in this MLRA. Most subspecies of Big Sagebrush are present, to some extent, across the MLRA.

Ecological site concept

• Site does not receive any additional water
• Dominant Cover: Coniferous Forest
• Soils are
o Not saline or saline-sodic
o Strongly or violently effervescent ($CaCO_3$ > 14%) in surface mineral 18cm
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: Hillslopes, fan remnants, escarpments
• Moisture Regime: ustic
• Temperature Regime: cryic to frigid
• Elevation Range: 4800-5850
• Slope: 0-60 (typically less than 25%)

Table 1. Dominant plant species

Tree	(1) *Pseudotsuga menziesii* (2) *Pinus contorta*
Shrub	(1) *Symphoricarpos albus* (2) *Juniperus communis*
Herbaceous	(1) *Calamagrostis rubescens* (2) *Festuca idahoensis*

Physiographic features

Table 2. Representative physiographic features

Landforms	(1) Valley > Hillslope (2) Valley > Escarpment (3) Valley > Fan remnant
Elevation	1,463–1,783 m
Slope	0–60%

Climatic features

Table 3. Representative climatic features

Frost-free period (characteristic range)	21-82 days
Freeze-free period (characteristic range)	60-121 days
Precipitation total (characteristic range)	279-356 mm
Frost-free period (actual range)	5-93 days
Freeze-free period (actual range)	25-132 days

Precipitation total (actual range)	279-406 mm
Frost-free period (average)	49 days
Freeze-free period (average)	88 days
Precipitation total (average)	330 mm

Climate stations used

- (1) BOULDER [USC00241008], Boulder, MT
- (2) WISDOM [USC00249067], Wisdom, MT
- (3) LIMA [USC00245030], Lima, MT
- (4) BOZEMAN 6 W EXP FARM [USC00241047], Bozeman, MT
- (5) HOLTER DAM [USC00244241], Wolf Creek, MT

Influencing water features

n/a

Wetland description

n/a

Soil features

Table 4. Representative soil features

Parent material	(1) Colluvium
Surface fragment cover >3"	0–5%
Calcium carbonate equivalent (0-25.4cm)	14%

Ecological dynamics

The Limy Cool Woodland is similar to the other cool forests of MLRA 44B. The Reference state tends to be an relatively open overstory of Douglas fir with Lodgepole pine and Englemann's Spruce scattered throughout. The open nature of the canopy allows for a relatively productive understory of pinegrass, snowberry, spirea, common juniper, and arnica.

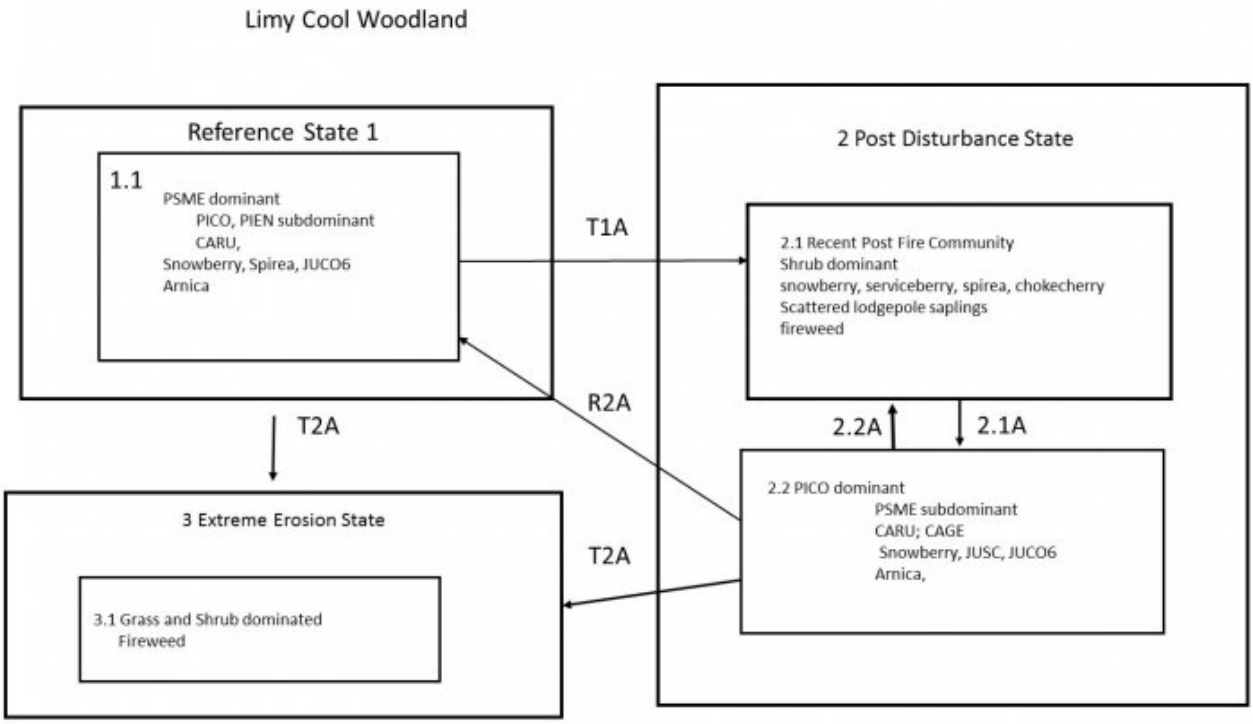
The Reference State transitions to the Post Disturbance State which consists of 2 communities: The Recent Post Fire Community (2.1) and the Lodgepole Community (2.2). The transition is primarily driven by fire however insect, disease, and clear cutting can all influence the change.

Community 2.1 is a lodgepole pine sapling dominated community will an early successional forb component which is mostly fireweed. Grasses tend to increase in this community as a result of increased sunlight interception. Over time this community will mature into the Lodgepole Community (2.2). Lodgepole trees with some Douglas fir and Englemann's Spruce saplings slowly increasing. Forbs, shrubs and grass all decrease as a result of the increased tree canopy. The understory will resemble the reference understory however the forest is almost exclusively Lodgepole pine. Community 2.2 may return to Community 2.1 as a result of another stand replacing fire, insects, disease, or clear cut.

Typically Community 2.2, with enough time, will transition back to the Reference State. This can take up to 100 years to fully transition.

The Extreme Erosion State (3) is a result of a catastrophic stand replacing fire followed by intense precipitation event cause mass movement, gullies, and loss of soil. This event is extremely rare in this MLRA. This condition is considered a terminal state and will not return to previous states.

State and transition model



44B Limy Cool Woodland F044BP912MT
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 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 site offers good forage availability for most large wildlife species as well as offers marginal to good grazing of domestic livestock.

Recreational uses

Site offers multiple opportunities for outdoor recreation, landscape viewing, and other outdoor sports.

Wood products

Site offers poor to good lumber opportunities however post and pole and firewood industry opportunities are good.

Approval

Scott Woodall, 8/26/2019

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	
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:**
