USDA **Natural Resources**
**Conservation Service**

# Ecological site F044BP909MT
# Upland Cold 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.

## 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 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, fan remnant, escarpments

• Moisture Regime: ustic
• Temperature Regime: cryic
• Elevation Range: 6800-8600
• Slope: 0-60% (typically less than 25%)

**Table 1. Dominant plant species**

| Tree | (1) *Abies lasiocarpa*<br>(2) *Pseudotsuga menziesii* |
|---|---|
| Shrub | (1) *Symphoricarpos albus*<br>(2) *Vaccinium membranaceum* |
| Herbaceous | (1) *Calamagrostis rubescens*<br>(2) *Carex geyeri* |

# Physiographic features

**Table 2. Representative physiographic features**

| Landforms | (1) Valley > Hillslope<br>(2) Valley > Fan remnant<br>(3) Valley > Escarpment |
|---|---|
| Elevation | 6,800–8,600 ft |
| Slope | 0–60% |

# Climatic features

**Table 3. Representative climatic features**

| Frost-free period (characteristic range) | 12 days |
|---|---|
| Freeze-free period (characteristic range) | 35 days |
| Precipitation total (characteristic range) | 21-22 in |
| Frost-free period (actual range) | 12 days |
| Freeze-free period (actual range) | 35 days |
| Precipitation total (actual range) | 20-22 in |
| Frost-free period (average) | 12 days |
| Freeze-free period (average) | 35 days |
| Precipitation total (average) | 21 in |
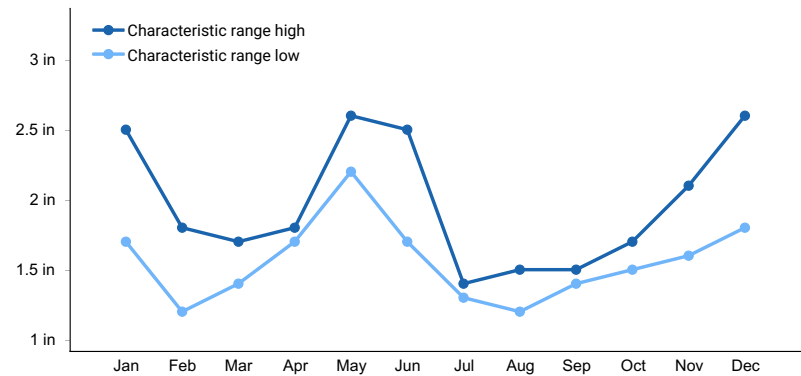


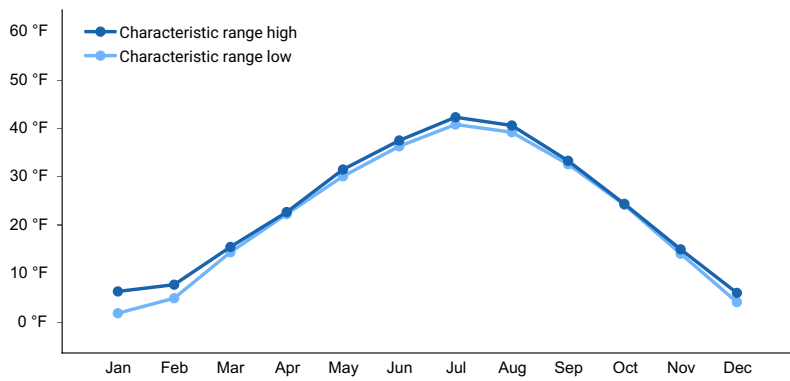**Figure 1. Monthly precipitation range**

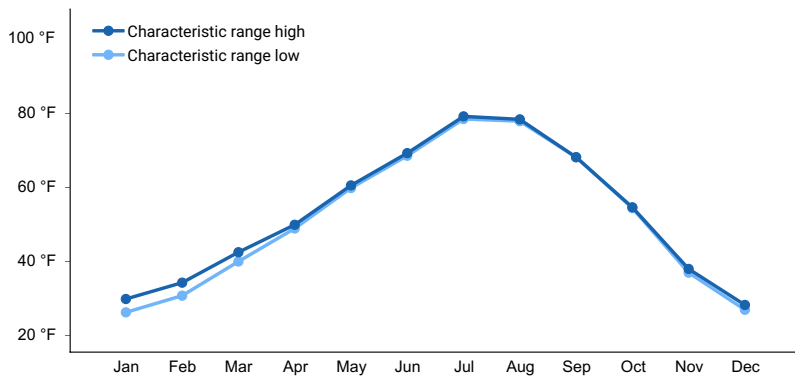**Figure 2. Monthly minimum temperature range**



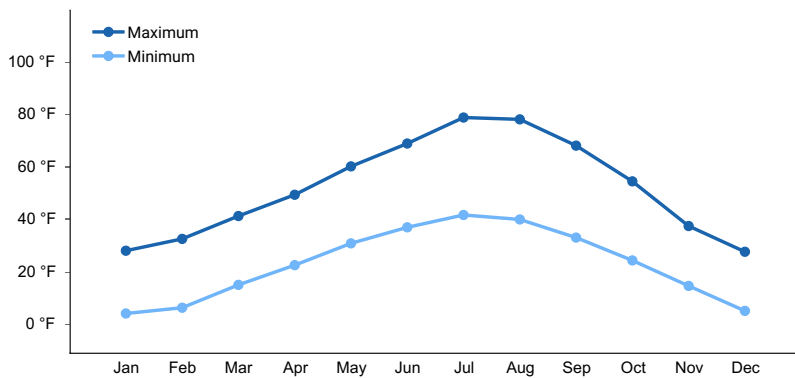**Figure 3. Monthly maximum temperature range**



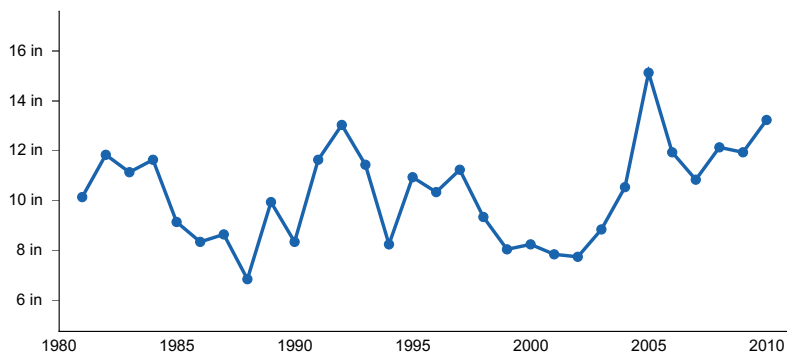**Figure 4. Monthly average minimum and maximum temperature**



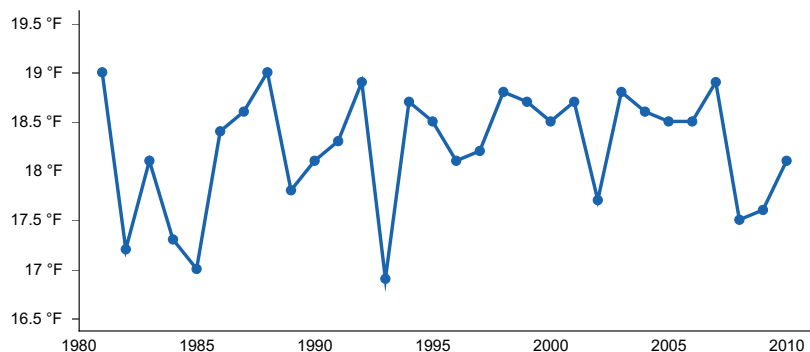**Figure 5. Annual precipitation pattern**

**Figure 6. Annual average temperature pattern**

## Climate stations used

- (1) BIG SKY 2WNW [USC00240775], Gallatin Gateway, MT
- (2) MOOSE 1 NNE [USW00004131], Jackson, WY

## Influencing water features

n/a

## Wetland description

n/a

## Soil features

**Table 4. Representative soil features**

| Parent material | (1) Alluvium<br>(2) Colluvium |
|---|---|
| Surface fragment cover >3" | 0–5% |

## Ecological dynamics

The Upland Cold Woodland and Shallow Cold Woodland Sites share State and Transition Models however the Upland Cold Woodland expresses an increase in both herbaceous and timber production. The Upland Cold Woodland tends to also be more resilient and resistant to disturbance.

The Reference State consists of a Douglas fir dominated forest with Lodgepole and minor amounts of Subalpine fir and Englemann's Spruce. The Reference state produces limited grasses and sedges. The understory is often dominated by heavy amounts of shrubs with the exact composition being quite variable. Shrub species include snowberry, spirea, huckleberry, menziesia, alder, ninebark, Russett buffaloberry, and Oregon grape. The limited grass and sedge are those typically associated with dark forest cover such as Pinegrass and Elk sedge. The Reference state offers little in the way of livestock forage. This is one of the coldest and wettest forest in MLRA 44B which allows for limited Subalpine fir compared to other potential forest in this MLRA. These sites are often north face.

The Post Disturbance State (2) consists of 2 communities: 2.1 Recent Post Fire and 2.2 Lodgepole Seral Community

Community 2.1 Recent Post Fire community is a result of a moderate fire in the Reference state. This community is dominated by shrubs and forbs. Snowberry, Ceanothus, alder, and spirea. Fireweed is the most abundant forb with limited beargrass. Scattered lodgepole saplings will begin to sprout as a result of the increased light interception.

Community 2.2 Lodgepole Seral Community is a Lodgepole pine dominated forest with scattered Douglas fir and

possibly very limited subalpine fir saplings growing on the coldest, wettest of these sites. Understory of shrubs returns to a snowberry, Spirea, Bearberry community. Limited grasses and sedges begin to reduce as a result of less light interception.

Fire is the integral driver of this community as this site tends to not produce commercial timber and has very limited grazeable forage. Communities 2.1 and 2.2 can be caught in a feedback loop if fire frequency increases. Extended fire return interval will allow State 2 to return to the Reference State however this could take 100-150 years.

## State and transition model

### 43 B Upland Cold Woodland



**1 Reference State**

1.1
ABLA dominant
    PICO;PIAL;PSME;PIEN subdominant
Snowberry; PHMA; Spirea; MARE5;
huckleberry; MEFE; Alder;
Arnica; LIBO; THOC; XETE; CLUN; Bane
Berry; Boxwood; russet buffalo berry;
LUHI; LEGL
CARU; CAGE;

T1A

R2A

**2 Post Disturbance State**

2.1 Recent Post Fire Community
Shrub dominant
Ceonothus; snowberry, alder; spirea, XETE, cone flower, fireweed

Scattered lodgepole/PICO/PIEN/ABLA/PSME saplings

2.2A    2.1A

2.2 PICO/PSME dominant
    PSME/ABLA/PICO dominant
Snowberry; PHMA; Spirea; MARE5;
huckleberry; MEFE; Alder;
Arnica; LIBO; THOC; XETE; CLUN; Bane Berry;
Boxwood; russet buffalo berry
CARU; CAGE;

1.1 Subalpine Fir dominated forest with limited douglas fir and lodgepole pine. Community relatively resilient.
T1A Post Disturbance includes stand replacement fire, insect pestilence and disease. Fire frequency is long but fire is intense.
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 Time where trees start to re-establish
2.2A Community phase shift is due to fire, insect pestilence and disease. Fire frequency is long but fire is intense.
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. Subalpine fir comes back in and shades out the other tree species. This process takes over 150 years.

## Animal community

This site offers multiple habitat types for wildlife as well as limited forage opportunities for livestock.

## Recreational uses

hunting, camping, wildlife viewing, landscape/viewshed,

## Wood products

This site offers multiple potentials for different lumber, post-and-pole, and firewood industries.

## 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):**

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:**