

## **Ecological site F044BP908MT Upland Aspen Woodland**

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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.

MLRA 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: Deciduous Forest
- Soils are
  - Generally not saline or saline-sodic (limited extent)
  - Moderately deep, deep, or very deep
  - 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
- Site landforms: Hillslopes
- An area of dissected mountain valleys. The valleys are typically bordered by mountains trending north to south.

- Moisture Regime: ustic
- Temperature Regime: frigid to cryic
- Elevation Range: 4100-5800
- Slope: 5-15%

Table 1. Dominant plant species

Tree	(1) <i>Populus tremuloides</i>
Shrub	(1) <i>Symphoricarpos albus</i>
Herbaceous	(1) <i>Elymus</i> (2) <i>Thalictrum occidentale</i>

Physiographic features

Table 2. Representative physiographic features

Landforms	(1) Valley > Rotational slide (2) Valley > Hillslope
Elevation	1,250–1,768 m
Slope	5–15%

Climatic features

Table 3. Representative climatic features

Frost-free period (characteristic range)	23-86 days
Freeze-free period (characteristic range)	50-119 days
Precipitation total (characteristic range)	279-432 mm
Frost-free period (actual range)	8-102 days
Freeze-free period (actual range)	23-136 days
Precipitation total (actual range)	254-483 mm
Frost-free period (average)	55 days
Freeze-free period (average)	89 days
Precipitation total (average)	356 mm

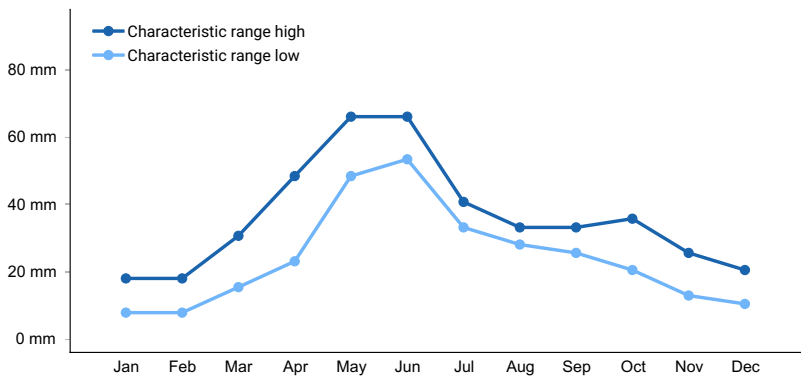


Figure 1. Monthly precipitation range

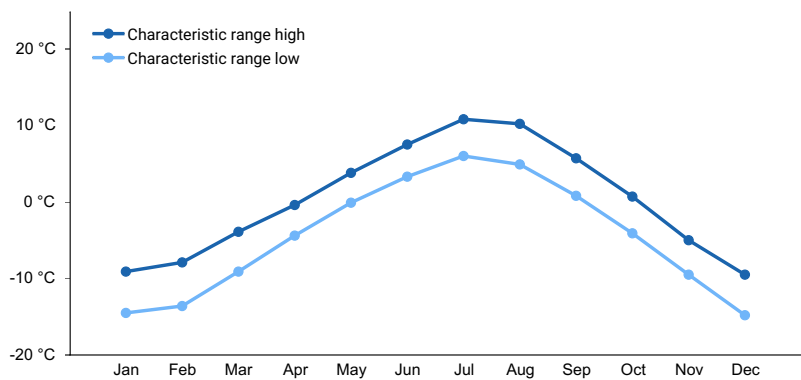


Figure 2. Monthly minimum temperature range

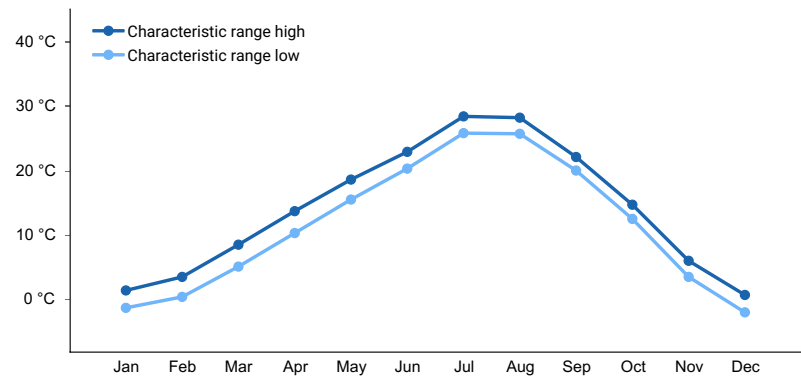


Figure 3. Monthly maximum temperature range

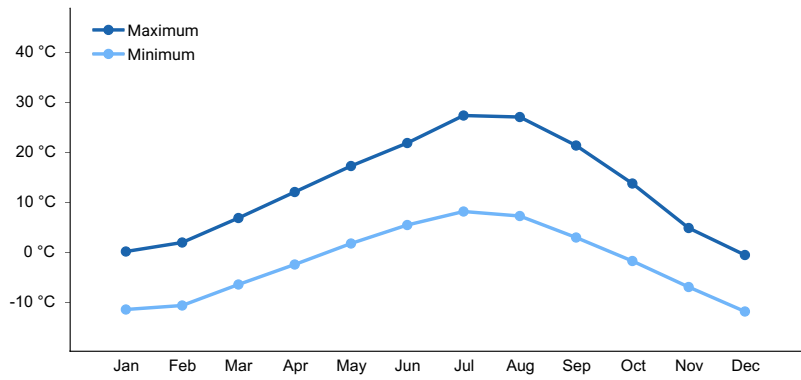


Figure 4. Monthly average minimum and maximum temperature

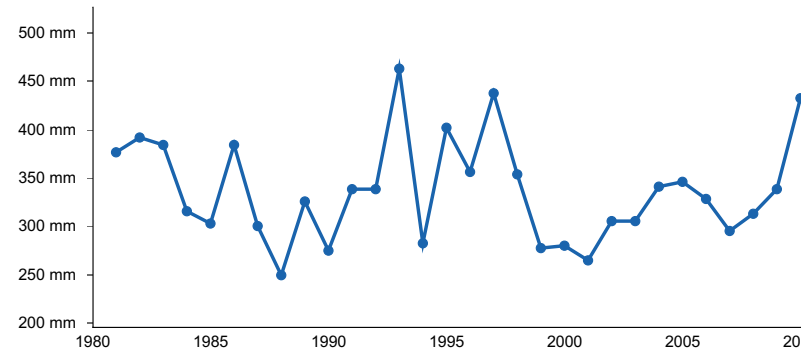
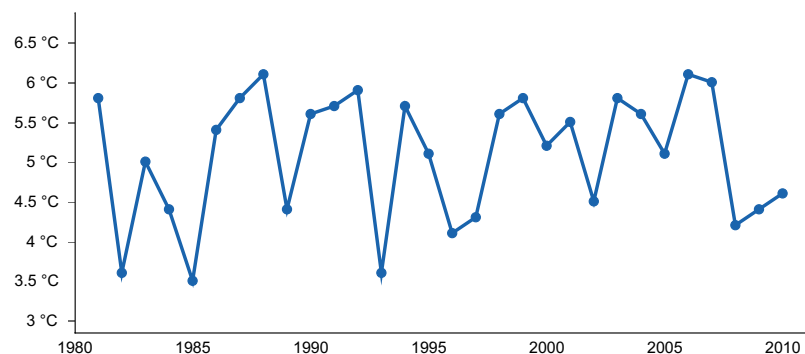


Figure 5. Annual precipitation pattern



**Figure 6. Annual average temperature pattern**

## Climate stations used

- (1) WHITE SULPHUR SPRNGS 2 [USC00248930], White Sulphur Springs, MT
- (2) BOZEMAN 6 W EXP FARM [USC00241047], Bozeman, MT
- (3) LAKEVIEW [USC00244820], Lima, MT
- (4) WISDOM [USC00249067], Wisdom, MT
- (5) DEER LODGE 3 W [USC00242275], Deer Lodge, MT
- (6) CANYON FERRY DAM [USC00241470], Helena, MT
- (7) WILLSALL 8 ENE [USC00249023], Willsall, MT
- (8) GARDINER [USC00243378], Gardiner, MT

## Influencing water features

n/a

## Wetland description

n/a

## Soil features

**Table 4. Representative soil features**

Parent material	(1) Alluvium
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## Ecological dynamics

The Upland Aspen Woodland site is a complex system consisting of 4 potential Reference communities and possibly 3 alternate states.

The Reference State exists in 4 dynamic communities. The Aspen/Herbaceous Community 1.1 of the Reference State is considered a mature stand of Aspen with an herbaceous understory. The aspens tend to be an even aged colony with some trees expressing decadence to a small degree. The understory is almost exclusively grass with the primary species being Canada and Blue wildrye.

Herbaceous/Aspen Community 1.2 exists when Community 1.1 is stressed by disease or extended drought which reduces the Aspen Canopy. The herbaceous components of this community increase in response to more sunlight interception. Grasses continue to dominate. Limited younger aspen clones may grow rapidly with this increase of light.

Aspen Sprouts Community 1.3 exists when Community 1.1 experiences a stand regenerating fire or a timber harvesting removes most of the canopy. This disturbance initiates the Aspen colony into cloning. Forbs such as fireweed are typically first to respond with grasses following. Often the increase in herbaceous growth and new stems invites browsing from wildlife and livestock. Aspen clones may also expand beyond current constraints of the

stand.

Community 1.4 exists as a mixed age class of aspen (30-70 years). The larger aspen are all healthy and the tree canopy is relatively dense (70-90% closed). Grasses and forbs production is high allowing for no bare ground. Communities 1.2 and 1.3 transition to this phase over time assuming grazing animals do not overutilize the herbaceous forage and browse young aspen.

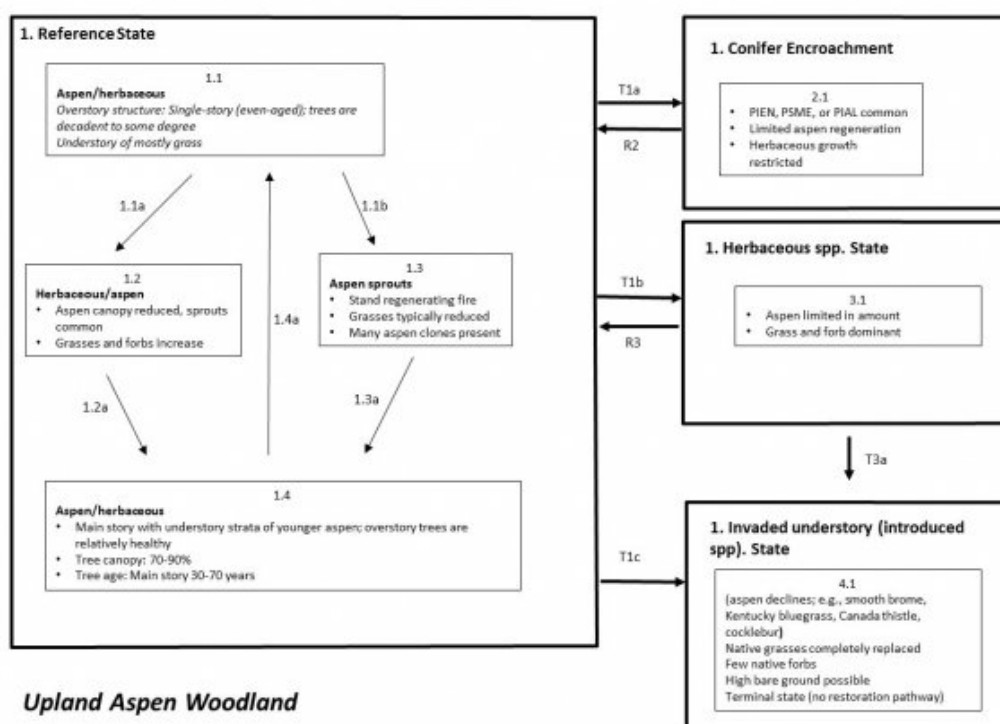
The Reference State transitions to the Conifer Encroached State (2.1) as a result of improper grazing and browsing by livestock and wildlife as well as suppression of fire. These combined allow for increased light infiltration and bare ground which allows conifers (often Rocky Mountain Juniper, Douglas fir, and/or Englemann's Spruce) to rapidly grow. Herbaceous production is reduced and Aspen clones are absent as a result of fire suppression and overbrowsing.

Restoration (Pathway R2) needed to transition from the Conifer Encroached State to the Reference State includes Prescribed Grazing (primarily increased rest), prescribed fire to initiate aspen cloning, and removal of conifers. Temporary exclusion of browsing animals may be necessary.

State 1 transitions to State 3 when long term overgrazing occurs by both livestock and wildlife. Herbaceous species dominate as the canopy opens. Diversity of the grass species tends to stall and become a monoculture (species variable). Restoration (R3) of this State to the Reference typically requires extended rest from grazing animals as well as prescribed fire to initiate aspen regeneration and reduce herbaceous competition. Temporary exclusion of animals may be necessary.

The Reference State (1) and Herbaceous State (3) may both transition to the Invaded State (4) as a result of long term overgrazing and the introduction of non-native herbaceous species. The primary invader in this system is Kentucky bluegrass however Canada thistle, Houndstongue, and Cocklebur are also common. These invaders have taken advantage of the more open canopy and increased bare ground. The Invaded State (4) is considered a terminal state due to the resilience of the invading species and control measure may not exist or they may also negatively impact the Aspen stand. In this condition, the Aspen stand growth will likely stall and regeneration will fail.

## State and transition model



## Upland Aspen Woodland F044BP908MT

1.1 Aspen community mature. Shade-tolerant conifers may be present in understory. Herbaceous understory of Blue and Canada wildrye, multiple sedges, Pinegrass. THOC, Arnica, Sweet cicely, Fleabanes common

1.1a – Insects, disease and/or drought reduce Aspen canopy. Herbaceous understory from 1.1 increase. Aspen cloning may occur as a result of increased light accessing understory

1.1b – Stand reducing fire and/or timber harvesting removes most of canopy. Aspen sprouting occurs. Forbs typically respond first to open canopy with grasses following.

1.2 Aspen canopy is reduced significantly due to disease or drought. Herbaceous component increases in productivity. Grasses tend to dominate. Some aspen cloning occurs due to increased light accessing lower canopies.

1.2a Time and proper grazing allow for aspen to increase in size

1.3 Young aspen clones increase dramatically as overstory is mostly gone. Some forbs may “colonize” quickly

1.3a Time and Proper grazing allow for aspen to increase in size. Many of the smaller aspen clones fail with stronger surviving beyond saplings.

1.4 Young aspens increase in size and canopy begins to close in overstory canopy. Herbaceous component reduces slightly

1.4a Time and proper grazing allow for aspen to increase in size

T1a – Fire suppression, improper grazing

2.1 Fire suppression and overgrazing (both wildlife and livestock) promote conifer encroachment. JUSC, PSME, PIEN, and limited PIAL present. Herbaceous production reduced. Aspen clones nonexistent.

R2 Grazing management rest suggested. Removal of coniferous trees. Prescribed fire triggers aspen regeneration

T1b Improper grazing management, Fire Suppression

3.1 Long term overgrazing by livestock and wildlife have reduced understory aspen and herbaceous diversity is typically reduced to few species.

R3 Prescribed grazing and time allow for aspen regeneration (temporary exclusion of herbivores may be necessary). Prescribed fire may reduce competitive herbaceous component and allow for aspen regeneration

T1c Improper grazing management, catastrophic fire

T3a Improper grazing management, catastrophic fire

4.1 Long term overgrazing by livestock and wildlife have reduced understory aspen and herbaceous diversity is typically reduced to few species. Noxious and other invasive weeds take advantage of open spaces in invade. This is a terminal state as control measure normally do not exist. Aspen stand will likely stall in condition and regeneration fails.

## Animal community

This community provides important cover and forage to most native wildlife species as well as domestic livestock.

## Recreational uses

Site offer viewshed and landscape view opportunities as well as hunting, hiking, camping.

## Wood products

Aspen wood products for furniture are common

## 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:**

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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):**

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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:**

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