USDA Natural Resources Conservation Service

# Ecological site F046XP910MT
# Upland Cool Woodland Group

Last updated: 9/07/2023
Accessed: 05/11/2025

## 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): 046X–Northern and Central Rocky Mountain Foothills

The Provisional ESD Initiative was established to expedite the development of ecological site descriptions through the development of provisional ESDs. While Provisional ESDs are not complete, the intent is to produce an ESD complete enough for land managers to use while approved ESDs are being developed. This project area has mixed ownership falling primarily under private ownership or lands managed by the Blackfeet Nation. This PES project is contained within MLRA 46.
Major Land Resource Area (MLRA) 46, Rocky Mountain Foothills, is approximately 11.6 million acres. MLRA 46's extent has changed over recent years and is now primarily located in Montana and Wyoming with limited acres in Utah and Colorado. It spans from the Canadian border south to the Uinta Mountains of Northwest Colorado. MLRA 46 is a transitional MLRA between the plains and mountains of primarily non-forested rangeland. In Montana, three LRUs exist based on differences in geology, landscape, soils, water resources, and plant communities. Elevations for this MLRA in Montana vary from a low of 3200 to 6500 feet (975 to 1981 m) however the elevations on the fringes of this MLRA may fall outside of that range in extremely small isolated areas where the boundaries between LRU C and MLRA 43B LRU G are not easily defined. Annual precipitation ranges from 8 inches (254 mm) to, in very isolated areas, 42 inches (1083 mm). In general precipitation rarely exceeds 24 inches (610 mm). Frost-free days are variable from 50 days near the Crazy and Beartooth Mountains to 130 days in the foothills south of the Bear's Paw Mountains of Central Montana. The geology of MLRA 46 is generally Cretaceous and Jurassic marine sediments

MLRA 46's plant communities are dominated by cool season bunchgrasses with mixed shrubs. This MLRA is rarely forested however Ponderosa and Limber pine do occupy areas. Portions of this MRLA may have a sub dominance of warm season mid-statured bunchgrasses like Little bluestem, however the general concept of the MLRA does not have a large component of warm season species. Wyoming big sagebrush, Mountain big sagebrush, Silver sagebrush, and Shrubby cinquefoil tend to be the dominant shrub component. The kind and presences of shrubs tends to be driven by a combination of soils and climate. Due to the variable nature of the Land Resources Units, Climatic subsets will be necessary to describe the ecological sites and the variation of plant communities for this 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”
• Transitional area of foothills separating plains and mountains
• Site landform: Hillslope, escarpments, fan remnants

• Moisture Regime: ustic
• Temperature Regime: frigid, cool
• Elevation Range: 3800-4800
• Slope: 0-60% (Typically less than 25%)

## Associated sites

| | |
|---|---|
| F046XP903MT | **Shallow Cool Woodland Group**<br>The Shallow Cool Woodland is typically located nearby and often slightly higher on the landscape on the shoulder of the landform. |

## Similar sites

| | |
|---|---|
| F046XP903MT | **Shallow Cool Woodland Group**<br>The Shallow Cool Woodland is typically located nearby and often slightly higher on the landscape on the shoulder of the landform. The Shallow Cool site expresses a similar plant community with a similar STM |

**Table 1. Dominant plant species**

| | |
|---|---|
| Tree | (1) *Pseudotsuga menziesii*<br>(2) *Pinus ponderosa* |
| Shrub | (1) *Symphoricarpos albus*<br>(2) *Juniperus scopulorum* |
| Herbaceous | (1) *Pseudoroegneria spicata*<br>(2) *Calamagrostis rubescens* |

## Physiographic features

The Upland Cool Woodland is an upland site that occupies steeper buttes and escarpments on igneous or sedimentary parent materials. Slopes are variable from nearly level to over 45 percent. The site is less than 20 inches deep to lithic or paralithic root restriction. Sites are generally located on buttes, escarpments, and hills.

**Table 2. Representative physiographic features**

| | |
|---|---|
| Landforms | (1) Foothills > Butte<br>(2) Foothills > Hillslope<br>(3) Foothills > Escarpment |
| Elevation | 3,800–4,800 ft |
| Slope | 0–60% |
| Aspect | Aspect is not a significant factor |

## Climatic features

The climate in the cool woodland designation averages 16 inches of precipitation with approximately 80 frost-free days.

**Table 3. Representative climatic features**

| | |
|---|---|
| Frost-free period (characteristic range) | 69-90 days |
| Freeze-free period (characteristic range) | 111-124 days |
| Precipitation total (characteristic range) | 15-17 in |
| Frost-free period (actual range) | 54-98 days |
| Freeze-free period (actual range) | 104-126 days |
| Precipitation total (actual range) | 14-19 in |

| | |
|---|---|
| Frost-free period (average) | 80 days |
| Freeze-free period (average) | 116 days |
| Precipitation total (average) | 16 in |

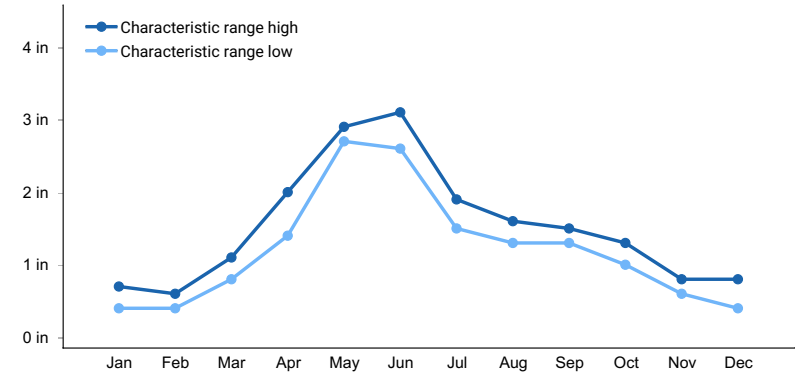



**Figure 1. Monthly precipitation range**

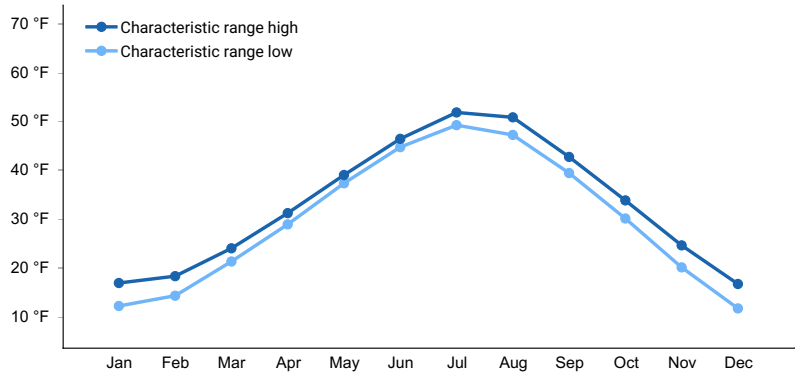



**Figure 2. Monthly minimum temperature range**

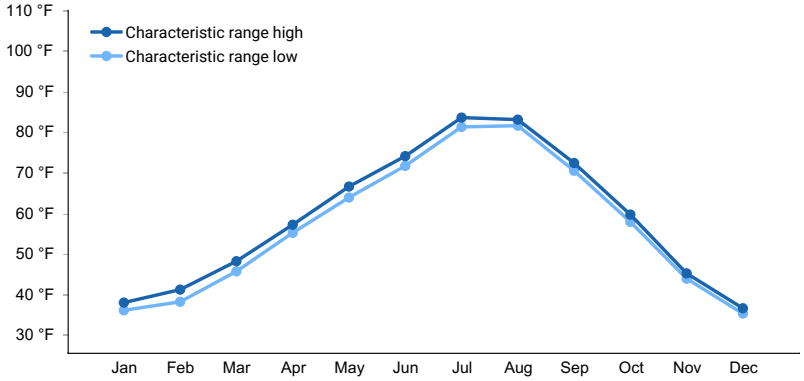



**Figure 3. Monthly maximum temperature range**

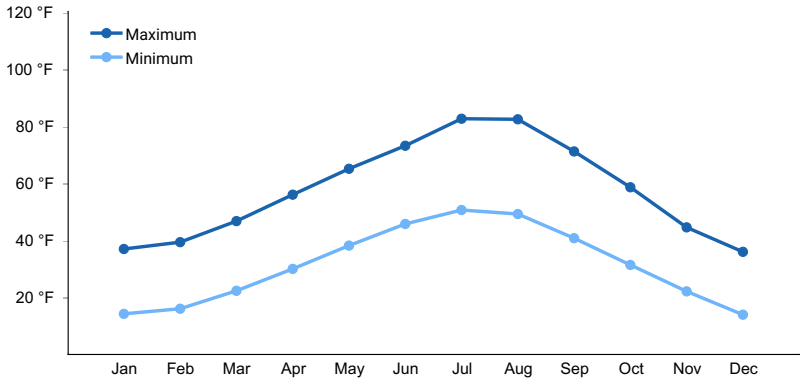



**Figure 4. Monthly average minimum and maximum temperature**

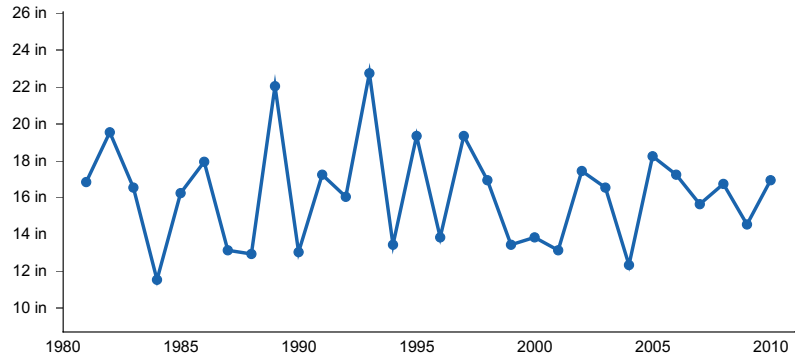



**Figure 5. Annual precipitation pattern**

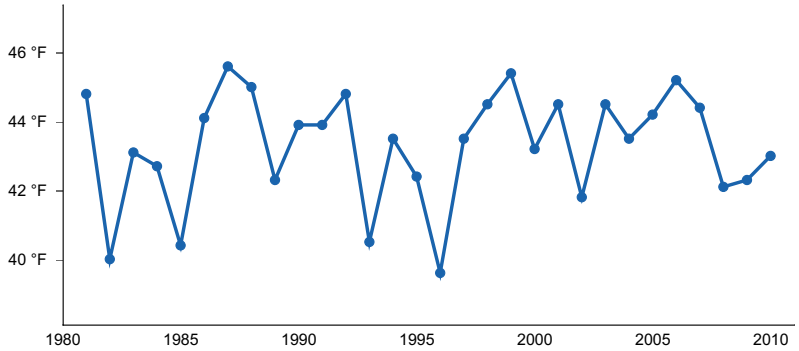



**Figure 6. Annual average temperature pattern**

## Climate stations used

- (1) AUGUSTA [USC00240364], Augusta, MT
- (2) BIG TIMBER [USC00240780], Big Timber, MT
- (3) DENTON [USC00242347], Denton, MT
- (4) RAYNESFORD 2 NNW [USC00246902], Raynesford, MT
- (5) LEWISTOWN MUNI AP [USW00024036], Lewistown, MT

## Influencing water features

n/a

## Wetland description

n/a

## Soil features

Soils of the Upland Cold Woodland are moderately deep to deep with a minimum of 20 inches deep to lithic or paralithic root restrictive layer. Soils will often have high amounts of rock fragments throughout the profile, generally increasing with depth. Soils are well drained with often less than 20 percent clay in the surface 4 inches.

Common soil series include Babb, Elve, and Whitore

**Table 4. Representative soil features**

| | |
|---|---|
| Parent material | (1) Residuum–volcanic and sedimentary rock |
| Surface texture | (1) Cobbly loam<br>(2) Gravelly loam<br>(3) Stony loam |
| Drainage class | Well drained |

| | |
|---|---|
| Permeability class | Slow to moderately rapid |
| Depth to restrictive layer | 20–100 in |
| Soil depth | 20–100 in |
| Surface fragment cover <=3" | 0–10% |
| Surface fragment cover >3" | 0–5% |
| Available water capacity (0-40in) | 3.1–6.5 in |
| Soil reaction (1:1 water) (0-10in) | 6.1–7.3 |
| Subsurface fragment volume <=3" (0-20in) | 0–65% |
| Subsurface fragment volume >3" (0-20in) | 0–15% |

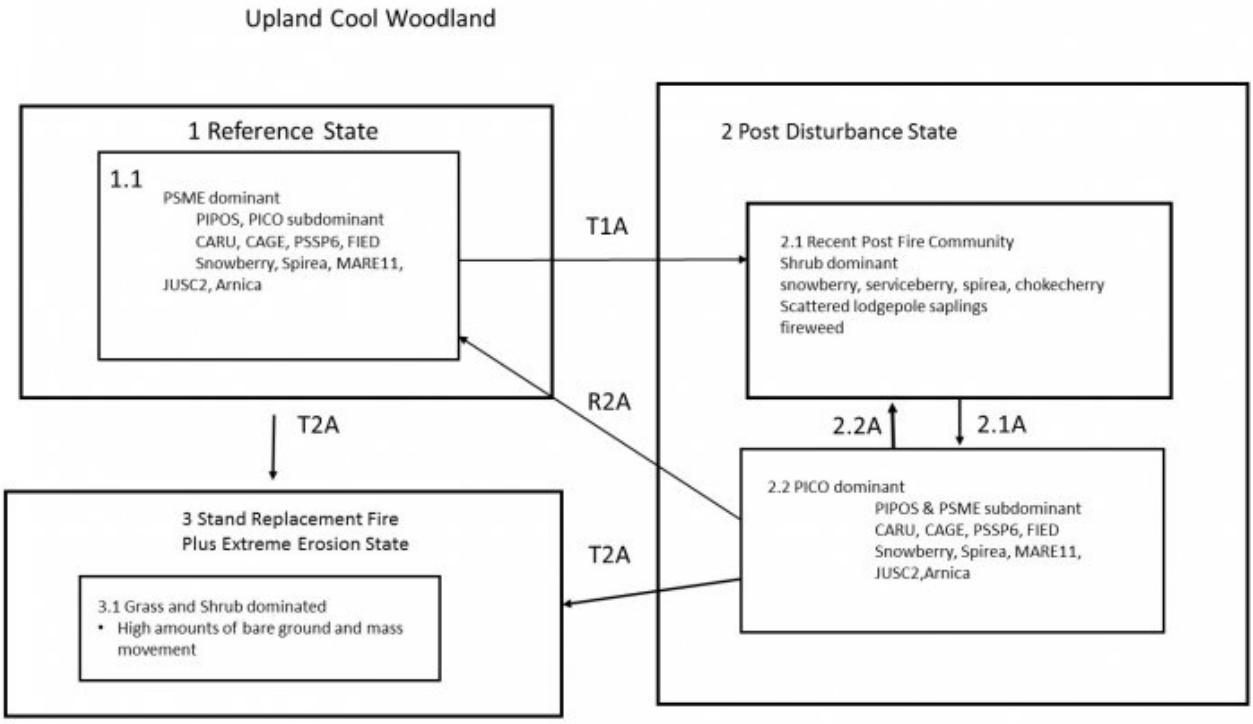
## Ecological dynamics

1.1 Douglas fir dominated forest with understory of shrubs and mixed grasses. Lodgepole pine and Ponderosa Pine 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 PIPOS 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 Ponderosa pine 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.

## State and transition model




46X Upland Cool Woodland F046XP910MT
Legend

1.1 Douglas fir dominated forest with understory of shrubs and mixed grasses. Lodgepole pine and Ponderosa Pine 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.
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## Animal community

Site is good to excellent for grazing livestock and wildlife.

## Recreational uses

Site suitable for multiple outdoor recreational uses such as hunting, hiking, landscape/viewshed, and photography

## Wood products

Limited wood products available. Smaller post-and-pole and firewood product operations may be best suited to this site.

## Inventory data references

Information presented was derived from NRCS inventory data, National Resources Inventory (NRI) 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

Petersen, Grant

## 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 | 05/11/2025 |
| Approved by | Kirt Walstad |
| 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:**