

# Ecological site F043BP916MT

## Ashy Cold Woodland Group

Last updated: 3/01/2024  
Accessed: 05/02/2024

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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): 043B–Central Rocky Mountains

The Central Rocky Mountains (MLRA 43B) of Montana occupy some 28,850 square miles and exist primarily in Central and SW portions of the state. The climate is extremely variable with precipitation lows of 9 to 100 inches per year and frost free days of less than 30 to over 110 days. The geology of the region is also highly variable. The combination of variable climate and geology create a complex relationship of plant communities. MLRA 43B elevations typically exist between 6000 and 12,799ft at Granite Peak (the highest point in Montana).

The Continental Divide runs through this MLRA effectively splitting its watershed to contribute to either the Missouri River to the East and the Columbia River to the West.

### Ecological site concept

- Site does not receive any additional water
- Dominant Cover: Coniferous Forest
- Soils are
  - o Generally not saline or saline-sodic
  - o Soils not strongly or violently effervescent in surface mineral 18cm
  - o Moderately deep, deep, or very deep
  - o Typically less than 5% stone and boulder cover (<15% max)
  - o Soil ashy or medial textural family
- Soil surface texture is silt loam with ashy modifier
- Site Landform: ridges, swales, plateaus, moraines on cirque floors
- Area of rugged mountain, hills, plateaus, and valleys of the Central Rocky Mountains in Southwest Montana.
- Parent material is volcanic ash over till (igneous derived) or loess and alluvium derived from tephra
- Moisture Regime: ustic to udic
- Temperature Regime: cryic
- Elevation Range: 4700-8300ft
- Slope: 8-60% (typically less than 40%)

### Site Development and Testing Plan

This Provisional Ecological Site Description was developed to meet the criteria as defined in Soil Survey National Instruction part 306 (430-306-NI, April 2015) as interpreted by Regional Ecological Site Specialist. Information in this description are first approximations based on broad groupings of soil properties and vegetation characteristics associated with those groupings. Although this description has been through the quality control and quality assurance review process it has not been certified for use in conservation planning.

### Associated sites

F043BP909MT	<p><b>Upland Cold Woodland Group</b></p> <p>The Upland Cold Woodland site is a neighboring site that shares landscape position. The Upland Cold Woodland is commonly on all slope aspects while the Ashy Cold Woodland exists on East and Northeast slopes as a result of ash settlement and prevailing winds at the time. These two sites may have similar forest types</p>
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## Similar sites

F043BP909MT	<p><b>Upland Cold Woodland Group</b></p> <p>The Upland Cold Woodland site is a neighboring site that shares landscape position. The Upland Cold Woodland is commonly on all slope aspects while the Ashy Cold Woodland exists on East and Northeast slopes as a result of ash settlement and prevailing winds at the time. These two sites may have similar forest types however the Ashy Cold Woodland will tend to express higher amounts of alder and have a slightly different hydrology associated with ash layers.</p>
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**Table 1. Dominant plant species**

Tree	(1) <i>Abies lasiocarpa</i> (2) <i>Pinus contorta</i>
Shrub	(1) <i>Alnus incana</i> (2) <i>Symphoricarpos oreophilus</i>
Herbaceous	(1) <i>Calamagrostis canadensis</i> (2) <i>Xerophyllum tenax</i>

## Physiographic features

This ecological site exists on ridges, swales, plateaus, and moraines on cirque floors. Typically slopes are less than 40 percent; however, they may reach up to 60 percent in extremely limited areas.

**Table 2. Representative physiographic features**

Landforms	(1) Mountains > Cirque floor (2) Mountains > Ridge (3) Mountains > Swale (4) Mountains > Moraine
Runoff class	Negligible to low
Flooding frequency	None
Elevation	4,700–8,300 ft
Slope	8–80%
Aspect	NE, E

## Climatic features

The climate of this site tends to be cold and wet; receiving up to 80 inches of precipitation with 10 to 60 frost-free days. A majority of the precipitation on this site comes from winter snowfall.

**Table 3. Representative climatic features**

Frost-free period (characteristic range)	2-42 days
Freeze-free period (characteristic range)	55-99 days
Precipitation total (characteristic range)	20-25 in
Frost-free period (actual range)	1-48 days
Freeze-free period (actual range)	45-99 days
Precipitation total (actual range)	18-27 in

Frost-free period (average)	26 days
Freeze-free period (average)	81 days
Precipitation total (average)	23 in

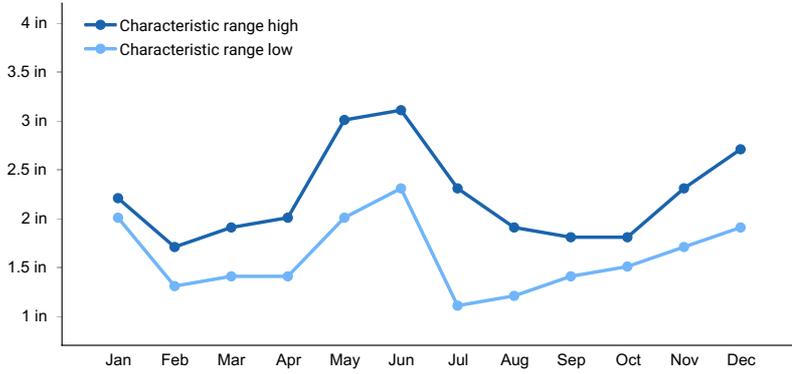


Figure 1. Monthly precipitation range

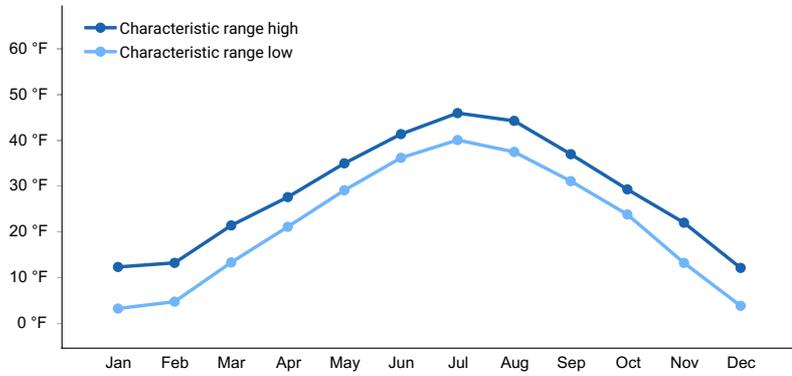


Figure 2. Monthly minimum temperature range

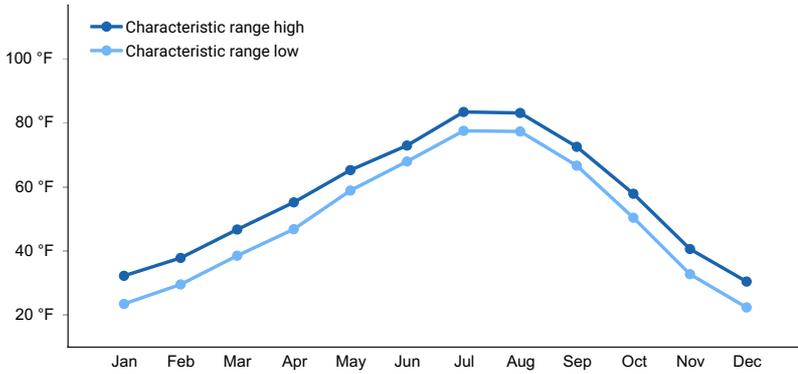


Figure 3. Monthly maximum temperature range

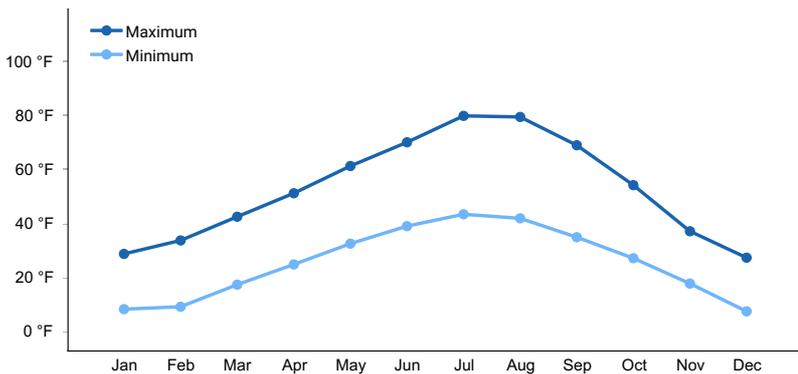


Figure 4. Monthly average minimum and maximum temperature

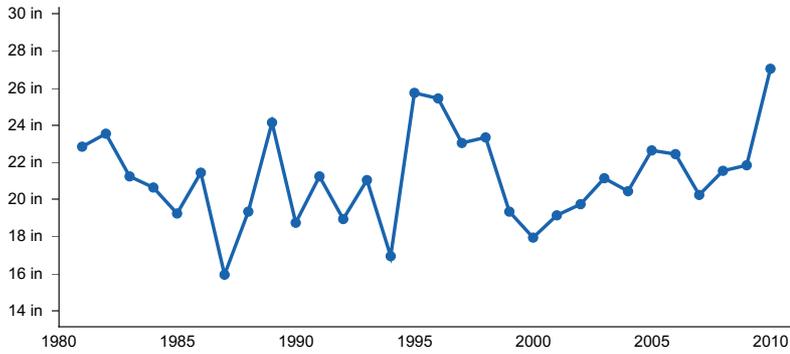


Figure 5. Annual precipitation pattern

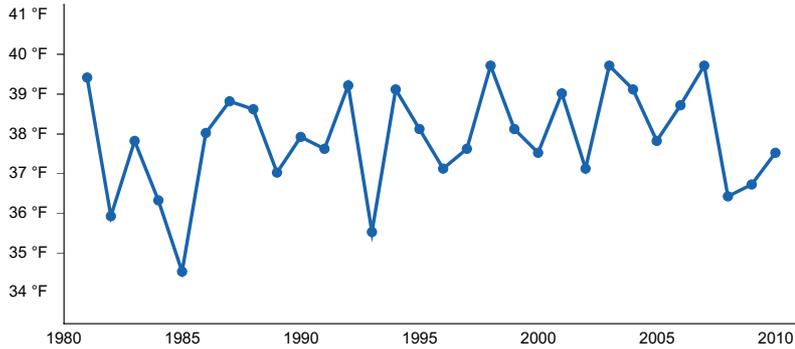


Figure 6. Annual average temperature pattern

### Climate stations used

- (1) WEST YELLOWSTONE [USC00248857], West Yellowstone, MT
- (2) GIBBONSVILLE [USC00103554], Gibbonsville, ID
- (3) HEBGEN DAM [USC00244038], West Yellowstone, MT
- (4) COOKE CITY 2 W [USC00241995], Gardiner, MT
- (5) NEIHART 8 NNW [USC00246008], Monarch, MT
- (6) SEELEY LAKE RS [USC00247448], Bonner, MT

### Influencing water features

n/a

### Wetland description

n/a

### Soil features

Soils are moderately deep to very deep and not strongly or violently effervescent in the soil surface mineral 18cm. Typically less than 15 percent stone or boulder cover (often less). Soil has andic properties formed by weathering of tephra or parent material that has significant content of volcanic glass. Volcanic ash is typically the source for this volcanic glass in MLRA 43B in Montana. Ashy or medial textural families may be used in the taxonomic description of the soil. This means, among other properties, that there is greater than or equal to 5 percent volcanic glass in the horizon. Soil textures are often silt loams with the ashy texture modifier. Parent material in MLRA 43B will be volcanic ash over till or loess and alluvium derived from tephra. pH of these soils tends to be moderately acidic to very strongly acidic with pH from 4.5 to 6.

Table 4. Representative soil features

Parent material	(1) Alluvium–igneous, metamorphic and sedimentary rock (2) Loess–volcanic rock
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Surface texture	(1) Ashy silt loam
Family particle size	(1) Ashy (2) Medial
Drainage class	Well drained
Permeability class	Moderately rapid
Depth to restrictive layer	20–100 in
Soil depth	20–100 in
Surface fragment cover <=3"	0–10%
Surface fragment cover >3"	0–15%
Available water capacity (0-40in)	5.8–7.3 in
Soil reaction (1:1 water) (0-20in)	4.5–6
Subsurface fragment volume <=3" (10-20in)	0–20%
Subsurface fragment volume >3" (10-20in)	0–10%

## Ecological dynamics

### 1 - Reference State

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 - Post-disturbance State

2.1 Post-fire shrub dominated community (primarily alder and menziesia) with saplings of lodgepole pine common. Fireweed dominant forb. Grasses may increase outside of fireweed patches

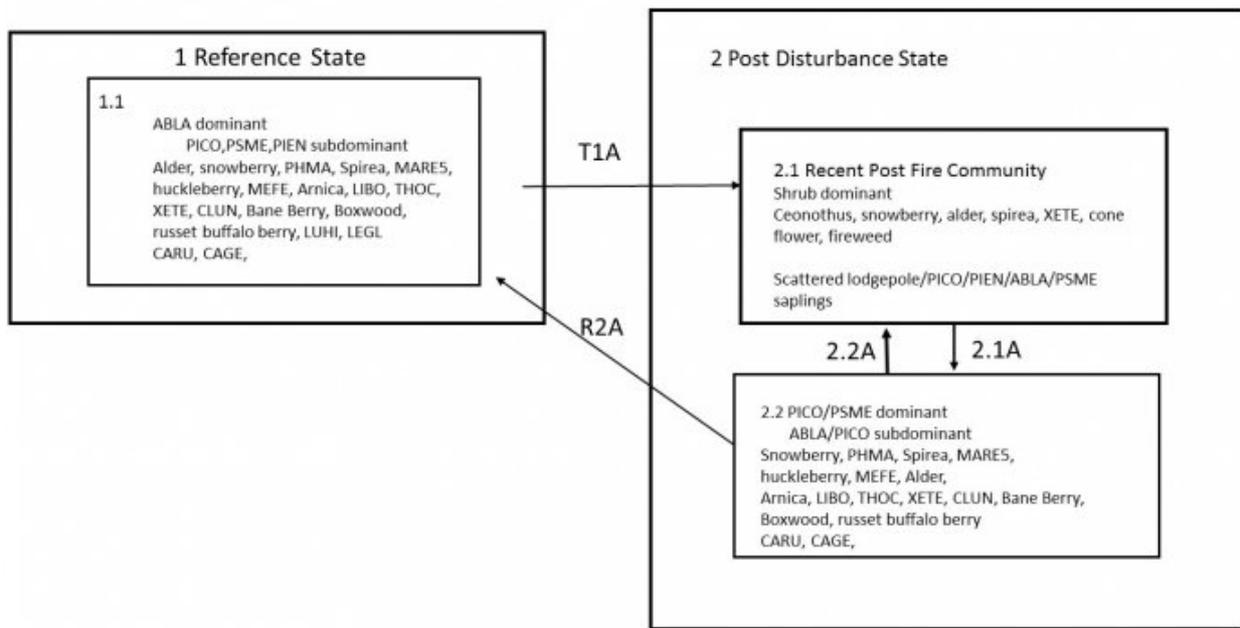
2.1A Time where trees start to re-establish

2.2 Post-fire forest dominated by lodgepole pine with Douglas fir and Englemann's spruce increasing. Shrubs and grasses returning to pre-fire positions.

2.2A Community phase shift is due to fire, insect pestilence and disease. Fire frequency is long but fire is intense. 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.

## State and transition model

## 43B Ashy Cold Woodland



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.

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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 ecological site is considered important habitat for large game animals such as deer, elk, and moose as well as upland birds such as ruffed, dusky, and spruce grouse.

Typically this site is considered unsuitable to marginal for livestock grazing.

### Recreational uses

Site frequently used by many outdoor recreationists such as bird watchers, campers, hikers, bikers, and hunters.

## Wood products

The dominant forest type is typically not suited for forest products; however, subordinate species such as Douglas fir and lodgepole pine have many uses. Harvest of this site will prove challenging as this site is typically located on the middle to upper third of the landscape/landform.

## Inventory data references

Information presented was derived from NRCS inventory 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

- Barrett, H. 2007. *Western Juniper Management: A Field Guide*.
- Bestelmeyer, B., J.R. Brown, J.E. Herrick, D.A. Trujillo, and K.M. Havstad. 2004. Land Management in the American Southwest: a state-and-transition approach to ecosystem complexity. *Environmental Management* 34:38–51.
- Bestelmeyer, B. and J. Brown. 2005. State-and-Transition Models 101: A Fresh look at vegetation change.
- Blaisdell, J.P. 1958. Seasonal development and yield of native plants on the Upper Snake River Plains and their relation to certain climate factors.
- Colberg, T.J. and J.T. Romo. 2003. Clubmoss effects on plant water status and standing crop. *Journal of Range Management* 56:489–495.
- DiTomaso, J.M. 2000. Invasive weeds in Rangelands: Species, Impacts, and Management. *Weed Science* 48:255–265.
- Dormaar, J.F., B.W. Adams, and W.D. Willms. 1997. Impacts of rotational grazing on mixed prairie soils and vegetation. *Journal of Range Management* 50:647–651.
- Hobbs, J.R. and S.E. Humphries. 1995. An integrated approach to the ecology and management of plant invasions. *Conservation Biology* 9:761–770.
- Humphrey, L. David. 1984. Patterns and mechanisms of plant succession after fire on *Artemisia*-grass sites in southeastern Idaho *Vegetation*. 57: 91-101.
- Masters, R. and R. Sheley. 2001. Principles and practices for managing rangeland invasive plants. *Journal of Range Management* 38:21–26.
- McLean, A. and S. Wikeem. 1985. Influence of season and intensity of defoliation on bluebunch wheatgrass survival and vigor in southern British Columbia. *Journal of Range Management* 38:21–26.
- Miller, R.F., T.J. Svejcar, and J.A. Rose. 2000. Impacts of western juniper on plant community composition and structure. *Journal of Range Management* 53:574–585.
- Ross, R.L., E.P. Murray, and J.G. Haigh. July 1973. Soil and Vegetation of Near-pristine sites in Montana.
- Smoliak, S., R.L. Ditterlin, J.D. Scheetz, L.K. Holzworth, J.R. Sims, L.E. Wiesner, D.E. Baldrige, and G.L. Tibke. 2006. *Montana Interagency Plant Materials Handbook*.
- Stavi, I. 2012. The potential use of biochar in reclaiming degraded rangelands. *Journal of Environmental Planning and Management* 55:1–9.
- Stringham, T.K., W.C. Kreuger, and P.L. Shaver. 2003. State and Transition Modeling: an ecological process approach. *Journal of Range Management* 56:106–113.
- Stringham, T.K. and W.C. Krueger. 2001. States, Transitions, and Thresholds: Further refinement for rangeland applications.
- Tirmenstein, D. 1999. *Gutierrezia sarothrae*. In: *Fire Effects Information System*, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). <https://www.fs.fed.us/database/feis/plants/shrub/gutsar/all.html> [2022, March 30].
- Walker, L.R. and S.D. Smith. 1997. Impacts of invasive plants on community and ecosystem properties. Pages 69–86 in *Assessment and management of plant invasions*. Springer, New York, NY.
- Whitford, W.G., E.F. Aldon, D.W. Freckman, Y. Steinberger, and L.W. Parker. 1989. Effects of Organic Amendments on Soil Biota on a Degraded Rangeland. *Journal of Range Management* 41:56–60.
- Wilson, A.M., G.A. Harris, and D.H. Gates. 1966. Cumulative Effects of Clipping on Yield of Bluebunch wheatgrass. *Journal of Range Management* 19:90–91.

## Contributors

Petersen, Grant

## Approval

Kirt Walstad, 3/01/2024

## 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	05/02/2024
Approved by	Kirt Walstad
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):**
- 
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:**
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17. **Perennial plant reproductive capability:**
-