

Ecological site R043BP824MT

Subirrigated Alpine Group

Last updated: 3/01/2024
Accessed: 05/20/2025

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): 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 12,799 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 receives additional water
- Soils are
 - o Generally not saline or saline-sodic
 - o Not strongly or violently effervescent within surface mineral 4"
 - o Soil is not ashy or medial textural family
 - o Stones and boulders cover <15% surface area
 - o Water table within 40 inches of soil surface.
- Moisture Regime: Udic
- Temperature Regime: Cryic
- Dominant Cover: Non-forested land (typically associated with Krummholz vegetation)
- Elevation Range: 5000-10000 ft

- Slope Range: 0-20%

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

F043BP906MT	Subirrigated Cold Woodland Group The Subirrigated Cold Woodland is a neighboring forested site that exists on the same landscape position
R043BP821MT	Upland Alpine Group The Upland Alpine is a neighboring site that exists higher on the landscape. The Upland Alpine site has a distinctively different plant community and no water table.

Similar sites

F043BP906MT	Subirrigated Cold Woodland Group The Subirrigated Cold Woodland is a neighboring forested site that exists on the same landscape position but lower on the landscape
-------------	--

Table 1. Dominant plant species

Tree	(1) <i>Pinus albicaulis</i> (2) <i>Abies lasiocarpa</i>
Shrub	(1) <i>Salix petrophila</i> (2) <i>Betula pumila</i>
Herbaceous	(1) <i>Deschampsia cespitosa</i> (2) <i>Sisyrinchium</i>

Physiographic features

Site exists at the top of mountain on ridges, escarpments and plateaus. It also exists in cirque floors. Landform shape tends to be a bigger influence than the actual landform consisting of a linear or concave vertical shape and concave horizontal shape where perched water (via impermeable layer of bedrock or permafrost) is allowed to move through the soil subsurface. The water table will be within 40 inches of the surface. Slope is generally less than 4 percent.

Table 2. Representative physiographic features

Landforms	(1) Mountains > Plateau (2) Mountains > Escarpment (3) Mountains > Ridge (4) Mountains > Cirque floor
Runoff class	Low to high
Elevation	1,524–3,048 m
Slope	0–20%
Water table depth	102 cm
Aspect	Aspect is not a significant factor

Climatic features

- Representative Value (RV) of range of Effective Precipitation: 24+ inches
- Representative Value (RV) of range of Frost Free Days: <30 days

Site does not have climate stations but often receives high amounts of precipitation though due to short growing season plant production can be very low. Very little data exists outside of raster models.

Table 3. Representative climatic features

Frost-free period (average)	4 days
Freeze-free period (average)	30 days
Precipitation total (average)	889 mm

Influencing water features

Site has a perched water table within 40 inches of soil surface as a result of restrictive layer such as bed rock or permafrost. Water table depth is variable and can be seasonal as a result of snow melt.

Wetland description

Soils may express hydric characteristics such as reduction and oxidation.

Soil features

Soil depth is variable. Soil texture is variable based on local geology. Parent material is typically residuum however areas of alluvium and colluvium exist.

Table 4. Representative soil features

Parent material	(1) Residuum–igneous, metamorphic and sedimentary rock (2) Colluvium–igneous, metamorphic and sedimentary rock (3) Alluvium–igneous, metamorphic and sedimentary rock
Surface texture	(1) Silt loam (2) Silty clay loam (3) Loam
Drainage class	Somewhat poorly drained to very poorly drained
Permeability class	Moderate to moderately slow
Depth to restrictive layer	102–254 cm
Soil depth	51–102 cm
Surface fragment cover ≤3"	0–5%
Surface fragment cover >3"	0–5%
Available water capacity (0-101.6cm)	11.43–20.07 cm
Soil reaction (1:1 water) (0-25.4cm)	4.5–8.2
Subsurface fragment volume ≤3" (25.4-50.8cm)	0–22%
Subsurface fragment volume >3" (25.4-50.8cm)	0–5%

Ecological dynamics

Subirrigated Alpine 43B (R043BP824MT)

1.1 Reference Community Phase: Grasses and sedges share nearly equal dominance of this site. Species include Tufted hairgrass, basin wildrye, reedgrass (multiple species), pinegrass, Nebraska sedge, bluejoint and others. Field mint, blue-eyed grass, bedstraw, cow-parsnip, twisted-stalk and green false hellebore are common forbs. Grouse whortleberry, huckleberry, Oregon grape, bog birch, and dwarf willow species are the most common shrubs. Minimal tree cover exists in the form of Krummholz Limber pine, Whitebark pine, and Subalpine fir. Community is resistant to most disturbance (fire, grazing) due to remote locations and wet nature of the soil creating a resistance to change.

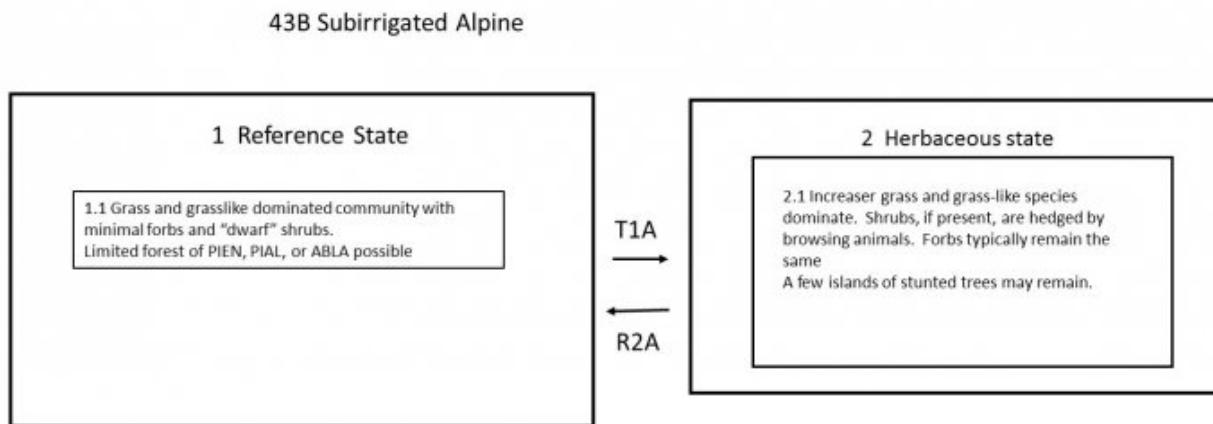
T1A Vegetation removal due to catastrophic event; namely grazing however fire, drought, and climate change are other factors.

R2A Time and stability for vegetation to re-establish.

2.1 Plant community is primarily grasses and grass-likes. Few trees and shrubs remain as

hedged plants. Soil hummocked by livestock or wildlife.

State and transition model



Subirrigated Alpine 43B (R043BP824MT)

1.1 Reference Community Phase: Grasses and sedges share nearly equal dominance of this site. Species include Tufted hairgrass, basin wildrye, reedgrass (multiple species), pinegrass, Nebraska sedge, bluejoint and others. Field mint, blue-eyed grass, bedstraw, cowparsnip, twistedstalk and green false hellebore are common forbs. Grouse whortleberry, huckleberry, Oregon grape, bog birch, dwarf willow species most common shrubs. Minimal tree cover in form of Krummholz Limber pine, Whitebark pine, and Subalpine fir. Community is resistant to most disturbance (ie fire, grazing) due to remote locations and wet nature of the soil creating resistance to change

T1A Vegetation removal due to catastrophic event; namely grazing however fire, drought, climate change are other factors

R2A Time and stability for vegetation to re-establish

2.1 Plant community is primarily grasses and grass-like. Few trees and shrubs remain as hedged plants. Soil hummocked by livestock and/or wildlife.

Animal community

Site is not suited to livestock grazing as this is an ecologically fragile system. Wildlife will

utilize this site for many ecosystem services such as food and shelter.

Recreational uses

wildlife viewing

Wood products

n/a

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	05/20/2025
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:
