USDA Natural Resources Conservation Service

Ecological site R043BP810MT
Shallow Grassland Group

Last updated: 3/01/2024
Accessed: 05/12/2025

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 12,799ft 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
• Soils are
o Not saline or saline-sodic
o Not strongly or violently effervescent in surface mineral 18cm
o Shallow depth: less than 50cm (20 in) to bedrock, lithic, or paralithic root restrictive layer
o Less than 5% stone and boulder cover (<15% max)
• Soil surface texture ranges from sandy loam to clay loam in surface mineral 4”
• Moisture Regime: ustic
• Temperature Regime: frigid to cryic
• Dominant Cover: rangeland (grass dominated)
• Elevation Range: 3800-8500ft (Representative Range 4500-7000ft)
• Slope range: 2-60% (often less than 25%)

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

EX043B18H036	**Droughty 15-19" PZ Cryic Beaverhead Mountains** The Droughty Site of LRU 18 Climate Subset D (15-19
EX043B18I036	**Droughty 19-24" PZ Cryic Beaverhead Mountains** The Droughty Site of LRU 18 Climate Subset E (19-24

R043BP811MT	**Shallow Sagebrush Shrubland Group** The Shallow Sagebrush Shrubland shares landscape position and hydrological processes with the Shallow Grassland.
R043BP812MT	**Shallow Shrubland Group** The Shallow Shrubland shares landscape position and hydrological processes with the Shallow Grassland.

Similar sites

EX043B18H038	**Droughty Steep 15-19" PZ Cryic Beaverhead Mountains** Droughty Site produces a similar plant community however does not have a root restrictive layer which allows for greater production and a slightly more resilient plant community
EX043B18I038	**Droughty Steep 19-24" PZ Cryic Beaverhead Mountains** Droughty Site produces a similar plant community however does not have a root restrictive layer which allows for greater production and a slightly more resilient plant community
R043BP811MT	**Shallow Sagebrush Shrubland Group** The Shallow Sagebrush Shrubland shares landscape position and hydrological processes with the Shallow Grassland. The Shallow Sagebrush Shrubland expresses a higher amount of big sagebrush. The Shallow Sagebrush Shrubland shares a State and Transition model
R043BP812MT	**Shallow Shrubland Group** The Shallow Shrubland shares landscape position and hydrological processes with the Shallow Grassland. The Shallow Shrubland expresses a higher amount of deciduous shrubs. The Shallow Shrubland shares a State and Transition model

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Symphoricarpos albus* (2) *Artemisia tridentata*
Herbaceous	(1) *Pseudoroegneria spicata* (2) *Festuca campestris*

Physiographic features

This ecological site occurs on nearly level to very steep hills, escarpments, and buttes. It often occurs in complex with other ecological sites. This site occurs on most slopes and exposures; however, the slopes are typically less than 25 percent. Aspect sometimes becomes significant, especially on steep and very steep slopes. Variations in plant community composition and production can result due to aspect. Runoff and potential for water erosion are important features of this site. The amount of rock outcrop tend to increase as slopes increase.

Table 2. Representative physiographic features

Geomorphic position, hills	(1) Crest
Landforms	(1) Mountains > Escarpment (2) Mountains > Butte (3) Mountains > Cuesta (4) Mountains > Ridge
Runoff class	Medium to high
Elevation	3,800–8,500 ft
Slope	2–45%
Water table depth	100 in
Aspect	Aspect is not a significant factor

Climatic features

Climate is quite variable on this site but will typically receive between 10 to 30 inches with approximately 20 to 100 frost-free days. The climate of this site makes it ideal for a herbaceous dominated system with little or no shrub production.

Table 3. Representative climatic features

Frost-free period (characteristic range)	10-51 days
Freeze-free period (characteristic range)	50-100 days
Precipitation total (characteristic range)	14-20 in
Frost-free period (actual range)	6-63 days
Freeze-free period (actual range)	40-107 days
Precipitation total (actual range)	12-21 in
Frost-free period (average)	34 days
Freeze-free period (average)	80 days
Precipitation total (average)	17 in

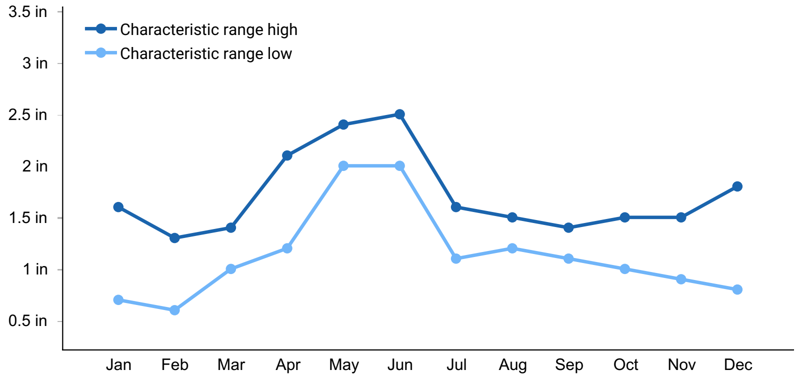


Figure 1. Monthly precipitation range

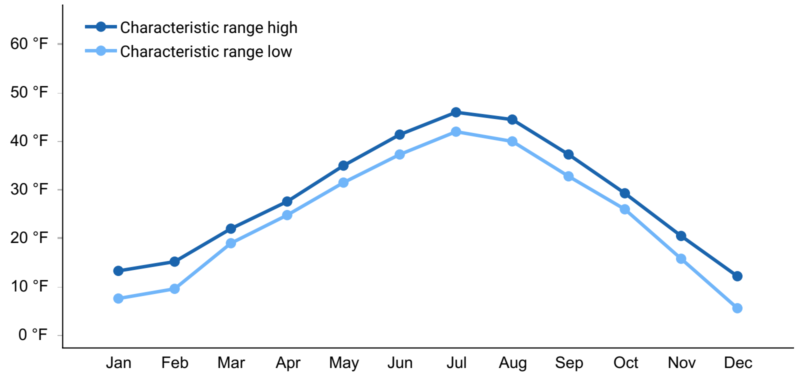


Figure 2. Monthly minimum temperature range

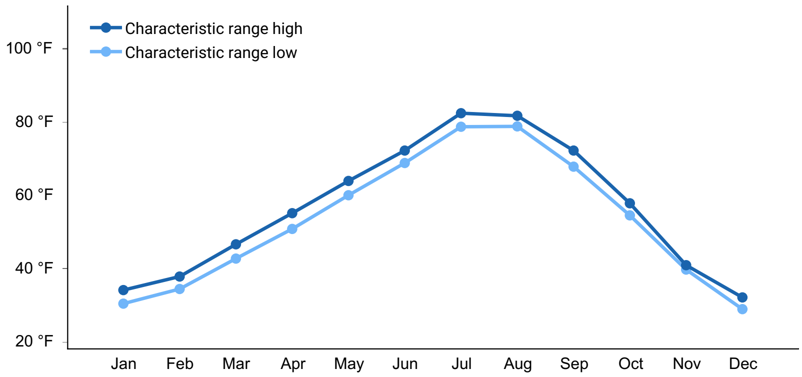


Figure 3. Monthly maximum temperature range

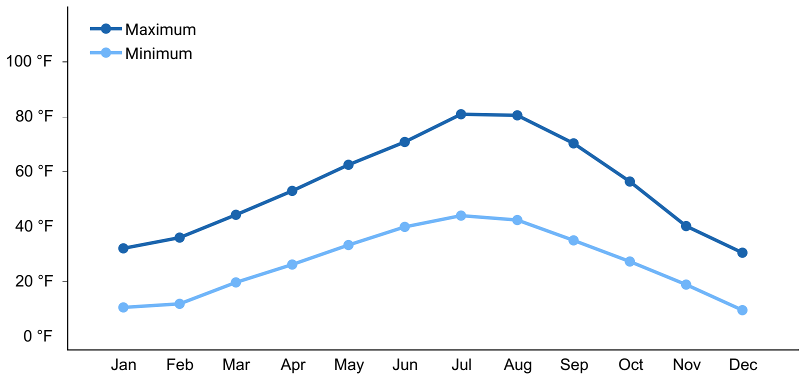


Figure 4. Monthly average minimum and maximum temperature

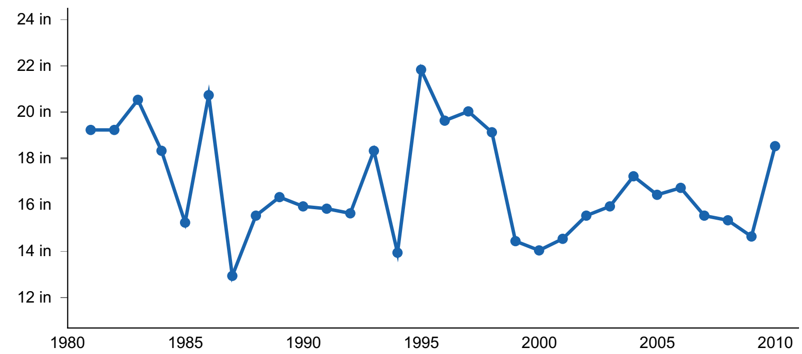


Figure 5. Annual precipitation pattern

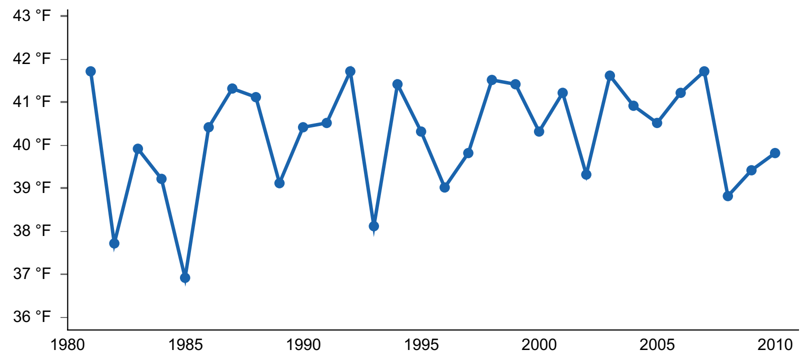


Figure 6. Annual average temperature pattern

Climate stations used

- (1) SEELEY LAKE RS [USC00247448], Bonner, MT
- (2) LINCOLN RS [USC00245040], Lincoln, MT
- (3) BUTTE BERT MOONEY AP [USW00024135], Butte, MT

- (4) YELLOWSTONE PK MAMMOTH [USC00489905], Yellowstone National Park, WY
- (5) NEIHART 8 NNW [USC00246008], Monarch, MT
- (6) GIBBONSVILLE [USC00103554], Gibbonsville, ID
- (7) LAKEVIEW [USC00244820], Lima, MT
- (8) WILSALL 8 ENE [USC00249023], Wilsall, MT
- (9) WISE RIVER 3 WNW [USC00249082], Wise River, MT
- (10) SULA 14 NE [USC00247967], Sula, MT
- (11) SULA 3 ENE [USC00247964], Sula, MT

Influencing water features

Site has root restrictive layer that may affect water infiltration however site is considered water limited with low available water-holding capacity (AWC). Runoff is medium to high.

Wetland description

n/a

Soil features

These soils are shallow, moderate to moderately rapid permeability, and are well to somewhat excessively drained. These soils formed from residuum of mixed origins, primarily from non-calcareous geology. Typically soil surface textures consist of loam, clay loam, and silt loam textures. Soils commonly have a gravelly surface texture modifier; however, the surface will vary depending on its association with neighboring sites.

Table 4. Representative soil features

Parent material	(1) Residuum–igneous, metamorphic and sedimentary rock
Surface texture	(1) Gravelly loam (2) Silt loam (3) Clay loam
Drainage class	Well drained to somewhat excessively drained
Permeability class	Moderate to moderately rapid
Depth to restrictive layer	10–20 in
Soil depth	10–20 in
Surface fragment cover <=3"	0–30%
Surface fragment cover >3"	0–10%
Available water capacity (0-20in)	0.8–2.9 in
Soil reaction (1:1 water) (0-20in)	6.6–9
Subsurface fragment volume <=3" (10-20in)	0–45%
Subsurface fragment volume >3" (10-20in)	0–22%

Ecological dynamics

1 - Reference State - Bunchgrass State
1.1 Mid-statured bunchgrasses dominant (bluebunch wheatgrass, rough fescue, and spike fescue), Shrubs are a relatively small component.

1.1a extended drought, improper grazing, climate change, catastrophic fire (limited on this site)

1.2 Mid-statured bunchgrasses subdominant to increaser bunchgrasses such as needle and thread or Idaho fescue.

Shrubs increasing, clubmoss possible (limited extent), mat forming forbs increasing

1.2a proper grazing management, favorable growing conditions, time
T1A poor grazing, drought with improper grazing, multiple spring grazing, fire suppression
T1B sod-busting, introduction of tame pasture species and other invasive plants, overgrazing, drought, heavy human disturbance, extreme fire (multiple years or very intense)
T1C poor grazing, drought with improper grazing, multiple spring grazing or long-term overgrazing, fire suppression

2 - Altered State - Bunchgrass State
2.1 Mixed grass dominated site (needle and thread and Idaho fescue), mid-statured bunchgrasses existent under shrub canopy, possible conifer encroachment, forbs (scarlet globemallow, hoods phlox, mat forming forbs) and shrubs increase (broom snakeweed, big sagebrush)

2.1a improper grazing management, drought, fire, climate change

2.2 Needle and thread and Idaho fescue losing dominance to Sandberg bluegrass and prairie Junegrass. Decreaser bunchgrasses very rare and limited under shrub canopy. Broom snakeweed and fringed sagewort beginning to replace shrub component

2.2a proper grazing management, time, Integrated Pest Management, brush management
T2A overgrazing, introduction of weeds, drought, heavy human disturbance
T2B sod-busting, introduction of tame pasture species and other invasive plants, overgrazing, extended drought, adjacent to construction or disturbance event, extreme fire (multiple years or very intense)
R2A fire, range seeding, timely moisture, proper grazing management, IPM

3 - Degraded State - Short-statured Grass State
3.1 Short-statured Grass State lacks mid-statured bunchgrasses, Sandberg bluegrass and prairie Junegrass are the dominant grasses, increaser shrubs nearly replace larger shrub species. Remaining larger shrub species heavily hedged.

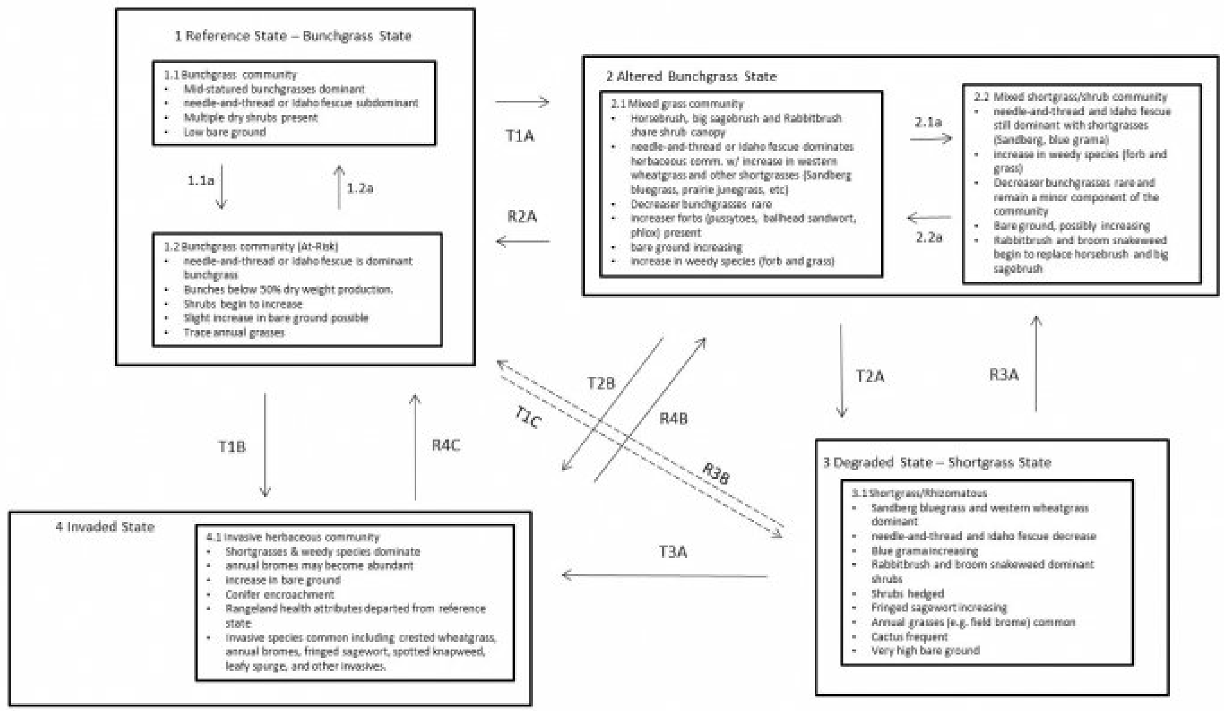
T3A sod-busting, invasive plants, overgrazing, extended drought, adjacent to construction or disturbance event
R3A range seeding, time, proper grazing management, IPM
R3B Possibly not feasible, range seeding, time, proper grazing management, IPM

4 - Invaded State
4.1 Invaded State may resemble reference however contains noxious or invasive weeds such as cheatgrass or knapweed. Conifer encroachment common.

R4A IPM, timely moisture, grazing management, brush management, range seeding
R4B IPM, range seeding, timely moisture, grazing management, brush management, range seeding

State and transition model

Shallow Grassland R043BP810MT



MLRA 43B Shallow Grassland R043BP810MT

1.1 Midstatured bunchgrasses dominant (bluebunch, rough fescue, and/or spike fescue), Shrubs are a relatively small component.
- 1.1a extended drought, improper grazing, climate change, catastrophic fire (limited on this site)

1.2 Midstatured bunchgrasses subdominant to increaser bunchgrasses such as needle-and-thread or Idaho fescue. Shrubs increasing, clubmoss possible (limited extent), mat forming forbs increasing
- 1.2a proper grazing management, favorable growing conditions, time

- T1A poor grazing, drought with improper grazing, multiple spring grazing, fire suppression
- T1B sodbusting, introduction of tame pasture species and other invasive plants, overgrazing, drought, heavy human disturbance, extreme fire (multiple years or very intense)
- T1C poor grazing, drought with improper grazing, multiple spring grazing and/or long term overgrazing, fire suppression
- T3A sodbusting, invasive plants, overgrazing, extended drought, adjacent to construction or disturbance event

2.1 Mixed grass dominated site (needle-and-thread and Idaho fescue), midstatured bunchgrasses existent under shrub canopy, possible conifer encroachment, forbs (scarlet globemallow, hoods phlox, mat forming forbs) and shrubs increase (broom snakeweed, big sagebrush)
- 2.1a improper grazing management, drought, fire, climate change

2.2 Needle-and-thread and Idaho fescue losing dominance to Sandberg bluegrass and Junegrass. Decreaser bunchgrasses very rare and limited under shrub canopy. Broom snakeweed and Fringed sagewort beginning to replace shrub component
- 2.2a proper grazing management, time, Integrated Pest Management, brush management

3.1 Shortgrass State lacks midstatured bunchgrasses, Sandberg bluegrass and Junegrass dominant grasses, increaser shrubs nearly replace larger shrub species. Remaining larger shrub species heavily hedged.
- T2A overgrazing, introduction of weeds, drought, heavy human disturbance
- R2A fire, range seeding, timely moisture, proper grazing management, IPM
- R3B Possibly not feasible, range seeding, time, proper grazing management, IPM
- T2B sodbusting, introduction of tame pasture species and other invasive plants, overgrazing, extended drought, adjacent to construction or disturbance event, extreme fire (multiple years or very intense)

4.1 Invaded State may resemble reference however contains noxious or invasive weeds such as cheatgrass or knapweed. Conifer encroachment common.
- R3A range seeding, time, proper grazing management, IPM
- R4A IPM, timely moisture, grazing management, brush management, range seeding
- R4B IPM, range seeding, timely moisture, grazing management, brush management, range seeding

Animal community

This site provides for a variety of wildlife habitat for an array of species. Prior to the settlement of this area, large herds of antelope, elk and bison roamed. Though the bison have been replaced, mostly with domesticated livestock, elk and antelope still frequently utilize this largely intact landscape for winter habitat in areas adjacent to forest. Sites with large quantities of curlleaf mountain mahogany are considered important winter range for mule deer, elk, and moose. In some areas it may even be considered critical habitat for dwindling wild ungulate populations.

Managed livestock grazing is suitable on this site due to the potential to produce an abundance of high quality forage. This is often a preferred site for grazing by livestock, and animals tend to congregate in these areas. In order to maintain the productivity of the site, grazing on adjoining sites with less production must be managed carefully to be sure utilization on this site is not excessive. Management objectives should include maintenance or improvement of the native plant community. Careful management of timing and duration of grazing is important. Shorter grazing periods and adequate deferment during the growing season are recommended for plant maintenance, health, and recovery. According to McLean et al, early season defoliation of bluebunch wheatgrass can result in high mortality and reduced vigor of plants. They also suggest, based on prior studies, that the opportunity for regrowth is necessary before dormancy to reduce injury to bluebunch wheatgrass.

Since needle and thread normally matures earlier than bluebunch wheatgrass and produces a sharp awn this species is usually avoided after seed set. Changing grazing season of use will help utilize needle and thread more efficiently.

Continual non-prescribed grazing of this site will be injurious, will alter the plant composition and production over time, and will result in transition to the Altered State. Transition to other states will depend on duration of poorly managed grazing as well as other circumstances such as weather conditions and fire frequency.

The Altered State is subject to further degradation to the Degraded Short-statured Grass State or Invaded State. Management should focus on grazing management strategies that will prevent further degradation, such as seasonal grazing deferment or winter grazing where feasible. Communities within this state are still stable and healthy under proper management. Forage quantity and quality may be substantially decreased from the Reference State.

Grazing is possible in the Invaded State. Invasive species are generally less palatable than native grasses. Forage production is typically greatly reduced in this state. Due to the aggressive nature of invasive species, sites in the Invaded State face increased risk for further degradation to the Invasive Dominated Communities. Grazing has to be carefully managed to avoid further soil loss and degradation and possible livestock health issues.

Prescriptive grazing can be used to manage invasive species. In some instances, carefully targeted grazing (sometimes in combination with other treatments) can reduce or maintain species composition of invasive species. In the Degraded Shortgrass State, grazing may be possible but is generally not economically or environmentally sustainable.

Hydrological functions

The hydrologic cycle functions best in the Reference State (1) with good infiltration and deep percolation of rainfall; however, the cycle degrades as the vegetation community declines. Rapid rainfall infiltration, high soil organic matter, good soil structure, and good porosity accompany high bunchgrass canopy cover. High ground cover reduces rain drop impact on the soil surface, which keeps erosion and sedimentation transport low. Water leaving the site will have minimal sediment load, which allows for high water quality in associated streams. High rates of infiltration will allow water to move below the rooting zone during periods of heavy rainfall. The Bluebunch Wheatgrass Community (1.1) should have no rills or gullies present and drainage ways should be vegetated and stable. Water flow patterns, if present, will be barely observable. Plant pedestals are essentially non-existent. Plant litter remains in place and is not moved by wind or water.

Improper grazing management results in a community shift to the Mixed Bunchgrass Community (1.2). This plant community has a similar canopy cover, but bare ground will be less than 15 percent. Therefore, the hydrologic cycle is functioning at a level similar to the water cycle in the Bluebunch Wheatgrass Community/Needle and thread (1.1). Compared to the Reference Community (1.1) infiltration rates are slightly reduced and surface runoff is slightly higher.

In the Degraded State (3) and the Invaded State (4) canopy and ground cover are greatly reduced compared to the Reference State (1), which impedes the hydrologic cycle. Infiltration will decrease and runoff will increase due to reduced ground cover, presence of shallow-rooted species, rainfall splash, soil capping, reduced organic matter, and poor structure. Sparse ground cover and decreased infiltration can combine to increase frequency and severity of flooding within a watershed. Soil erosion is accelerated, quality of surface runoff is poor, and sedimentation increases.

Recreational uses

This site is often utilized for photography, hiking, hunting, bird watching, and flower collecting.

Inventory data references

Information presented here has been derived from NRCS clipping data and other inventory data. Field observations from range trained personnel were also used.

References

. Fire Effects Information System. http://www.fs.fed.us/database/feis/.

. 2021 (Date accessed). USDA PLANTS Database. http://plants.usda.gov.

Arno, S.F. and G.E. Gruell. 1982. Fire History at the Forest-Grassland Ecotone in Southwestern Montana. Journal of Range Management 36:332–336.

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.

Blaisdell, J.P. and R.C. Holmgren. 1984. Managing Intermountain Rangelands--Salt-Desert Shrub Ranges. General Tech Report INT-163. USDA Forest Service, Intermountain Forest and Range Experiment Station, Ogden, UT. 52.

Bunting, S.C., B.M. Kilgore, and C.L. Bushey. 1987. Guidelines for Prescribe burning sagebrush-grass rangelands in the Northern Great Basin. General Technical Report INT-231. USDA Forest Service Intermountain Research Station, Ogden, UT. 33.

Colberg, T.J. and J.T. Romo. 2003. Clubmoss effects on plant water status and standing crop. Journal of Range Management 56:489–495.

Daubenmire, R. 1970. Steppe vegetation of Washington.

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.

Kuchler, A.W. 1964. Potential natural vegetation of the conterminous United States.

Lacey, J.R., C.B. Marlow, and J.R. Lane. 1989. Influence of Spotted knapweed (Centaurea maculosa) on surface runoff and sediment yield.. Weed Technology 3:627–630.

Lesica, P. and S.V. Cooper. 1997. Presettlement vegetation of Southern Beaverhead County, MT.

Manske, L.L. 1980. Habitat, phenology, and growth of selected sandhills range plants.

Masters, R. and R. Sheley. 2001. Principles and practices for managing rangeland invasive plants. Journal of Range Management 38:21–26.

McCalla, G.R., W.H. Blackburn, and L.B. Merrill. 1984. Effects of Livestock Grazing on Infiltration Rates of the Edwards Plateau of Texas. Journal of Range Management 37:265–269.

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.

Moulton, G.E. and T.W. Dunlay. 1988. The Journals of the Lewis and Clark Expedition. Pages in University of Nebraska Press.

Mueggler, W.F. and W.L. Stewart. 1980. Grassland and Shrubland Habitat Types of Western Montana.

Pelant, M., P. Shaver, D.A. Pyke, and J.E. Herrick. 2005. Interpreting Indicators of Rangeland Health.

Pellant, M. and L. Reichert. 1984. Management and Rehabilitation of a burned winterfat community in Southwestern Idaho. Proceedings--Symposium on the biology of Atriplex and related Chenopods. 1983 May 2-6; Provo UT General Technical Report INT-172.. USDA Forest Service Intermountain Forest and Range Experiment Station. 281–285.

Pitt, M.D. and B.M. Wikeem. 1990. Phenological patterns and adaptations in an Artemisia/Agropyron plant community. Journal of Range Management 43:350–357.

Pokorny, M.L., R. Sheley, C.A. Zabinski, R. Engel, T.J. Svejcar, and J.J. Borkowski. 2005. Plant Functional Group Diversity as a Mechanism for Invasion Resistance.

Ross, R.L., E.P. Murray, and J.G. Haigh. July 1973. Soil and Vegetation of Near-pristine sites in Montana.

Schoeneberger, P.J. and D.A. Wysocki. 2017. Geomorphic Description System, Version 5.0..

Smoliak, S., R.L. Ditterlin, J.D. Scheetz, L.K. Holzworth, J.R. Sims, L.E. Wiesner, D.E. Baldridge, 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 fro rangeland applications.

Sturm, J.J. 1954. A study of a relict area in Northern Montana. University of Wyoming, Laramie 37.

Thurow, T.L., Blackburn W. H., and L.B. Merrill. 1986. Impacts of Livestock Grazing Systems on Watershed. Page in Rangelands: A Resource Under Siege: Proceedings of the Second International Rangeland Congress.

Various NRCS Staff. 2013. National Range and Pasture Handbook.

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.

Wambolt, C. and G. Payne. 1986. An 18-Year Comparison of Control Methods for Wyoming Big Sagebrush in Southwestern Montana. Journal of Range Management 39:314–319.

West, N.E. 1994. Effects of Fire on Salt-Desert shrub rangelands. Proceedings--Ecology and Management of Annual Rangelands: 1992 May 18-22. Boise ID General Technical Report INT-GTR-313.. USDA Forest Service Intermountain Research Station. 71–74.

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

Kirt Walstad
Benjamin Moore
Braden Pitcher
Ken Scalzone
Eve Wills

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	05/12/2025
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:**