

Ecological site R034AY330CO

Sandy Land

Last updated: 9/07/2023
Accessed: 05/18/2024

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): 034A–Cool Central Desertic Basins and Plateaus

Major Land Resource Area (MLRA): 34A-Cool Central Desertic Basins and Plateaus

For further information regarding MLRAs, refer to:

<http://soils.usda.gov/survey/geography/mlra/index.html>

LRU notes

Land Resource Unit (LRU) 34A-10:

- Moisture Regime: aridic ustic
- Temperature Regime: frigid
- Dominant Cover: rangeland
- Representative Value (RV) Effective Precipitation: 11-13 inches
- RV Frost-Free Days: 75-95 days

Classification relationships

Relationship to Other Established Classification Systems

National Vegetation Classification System (NVC):

3 Semi-Desert

3.B.1 Cool Semi-Desert Scrub & Grassland

D040 Western North American Cool Semi-Desert Scrub & Grassland

M169 Great Basin & Intermountain Tall Sagebrush Shrubland & Steppe Group

A3184 Wyoming big sagebrush Dry Steppe and Shrubland Alliance

CEGL001043 *Artemisia tridentata* ssp. *wyomingensis*/*Elymus elymoides* Shrubland Association

Ecoregions (EPA):

Level I: 10 North American Deserts

Level II: 10.1 Cold Deserts

Level III: 10.1.4 Wyoming Basin

Ecological site concept

- Site does not receive any additional water.
- Soils are:
 - o may be slightly saline or saline-sodic.
 - o deep to very deep

- o not skeletal within 20" of soil surface, minimal rock fragments at the soil surface
- o not strongly or violently effervescent in surface mineral 10".
- o surface textures usually range from loamy fine sand to fine sandy loam in surface mineral 4".
- Slope is < 40%.
- Clay content is < 18% in mineral soil surface 1-2".

Associated sites

R034AY293CO	Sandhills
-------------	-----------

Similar sites

R034AY293CO	<p>Sandhills The differences are that the Sandhills #293 occurs on rolling and often steep sandhills which give the impression of sand dunes, with the soils being psammments usuallyformed from the Browns Park geologic formation. The Sandhills are dominated by antelope bitterbrush with only scattered Wyoming big sagebrush and silver sagebrush.</p>
-------------	--

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) <i>Artemisia tridentata ssp. wyomingensis</i>
Herbaceous	(1) <i>Hesperostipa comata</i> (2) <i>Achnatherum hymenoides</i>

Physiographic features

This site occurs on hills, alluvial fans, benches, and toe slopes. Slope for the site ranges from 3 to 40 percent. Elevations range from 6200 to 7300 feet. This site occurs on all exposures.

Table 2. Representative physiographic features

Landforms	(1) Hill (2) Plateau (3) Alluvial fan
Runoff class	Low to very high
Flooding frequency	None
Ponding frequency	None
Elevation	1,890–2,225 m
Slope	3–40%
Aspect	Aspect is not a significant factor

Climatic features

The climate is arid to semi-arid. Winters are cold and summers are warm. The average annual precipitation ranges from 11 to 13 inches.

About half of this precipitation comes in the form of winter snow and spring rain. Spring and fall are peak periods of precipitation. July is usually the driest month. The distribution of precipitation and relatively low spring temperatures favor production of cool season plants.

Plants begin growth in late April. The optimum growth period is from mid-May to late June unless summer rains occur and are effective in maintaining plant growth. The growing season for native plants is about 110 days. There

may be a second growth period in the fall due to a fall precipitation peak.

The average annual temperature ranges from 42 to 45 degrees Fahrenheit. The frost-free period ranges from 75 to 95 days.

Table 3. Representative climatic features

Frost-free period (characteristic range)	57-67 days
Freeze-free period (characteristic range)	88-92 days
Precipitation total (characteristic range)	279-330 mm
Frost-free period (actual range)	54-75 days
Freeze-free period (actual range)	87-95 days
Precipitation total (actual range)	279-406 mm
Frost-free period (average)	62 days
Freeze-free period (average)	90 days
Precipitation total (average)	330 mm

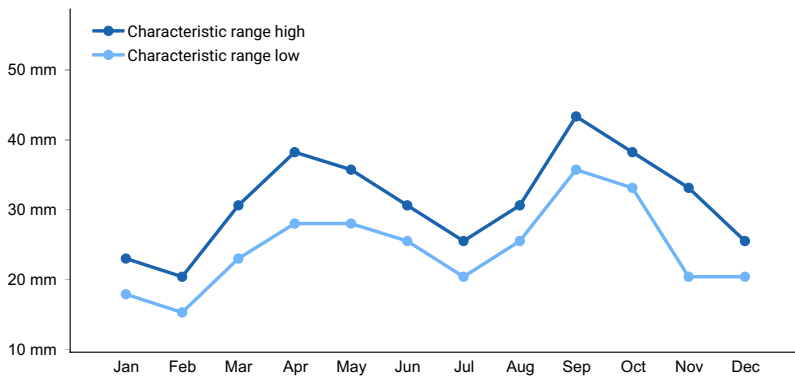


Figure 1. Monthly precipitation range

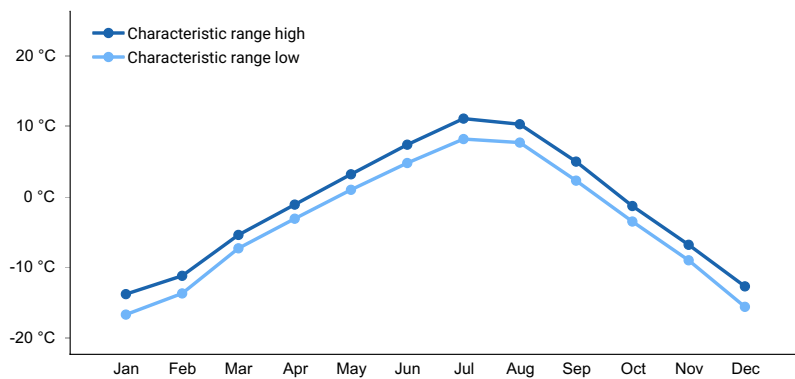


Figure 2. Monthly minimum temperature range

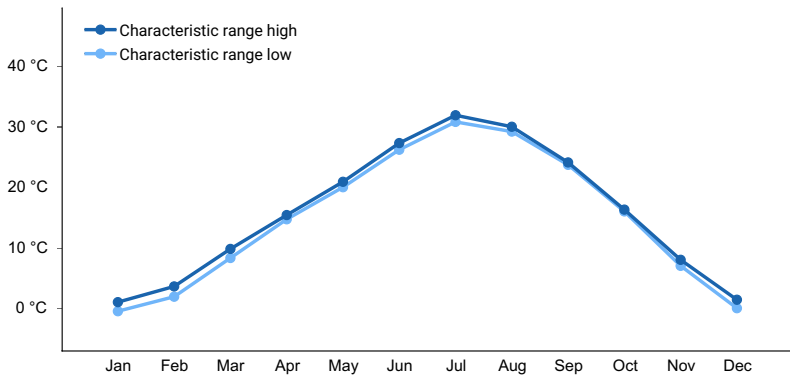


Figure 3. Monthly maximum temperature range

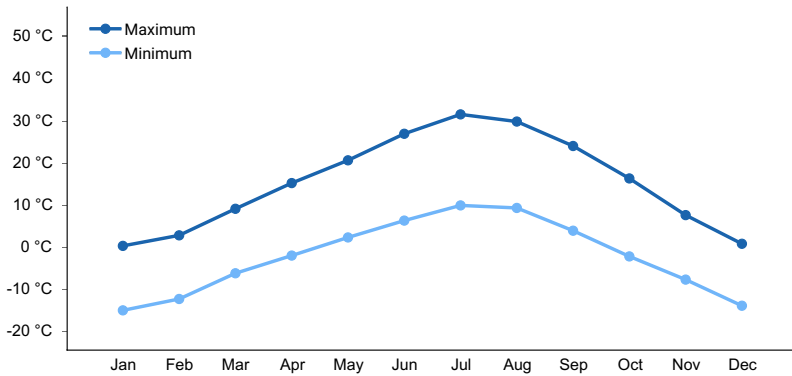


Figure 4. Monthly average minimum and maximum temperature

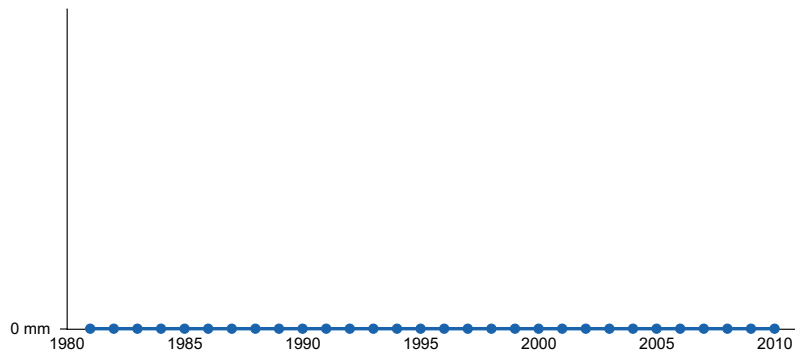


Figure 5. Annual precipitation pattern

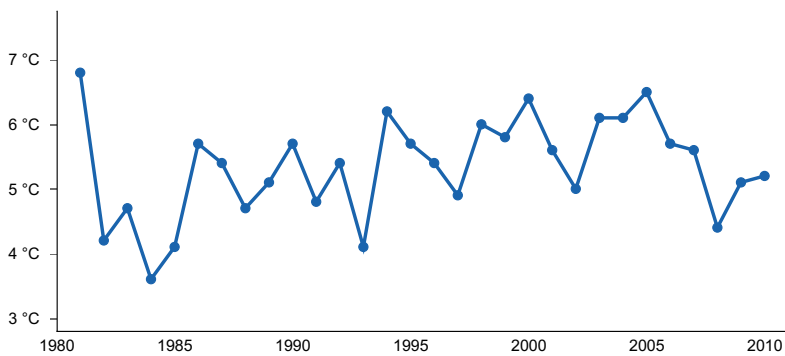


Figure 6. Annual average temperature pattern

Climate stations used

- (1) MAYBELL [USC00055446], Maybell, CO
- (2) CRAIG MOFFAT CO AP [USW00024046], Craig, CO
- (3) BROWNS PARK STORE [USC00051018], Maybell, CO

Influencing water features

None

Wetland description

None

Soil features

The soil is of this site are deep and well drained to excessively drained, except for the Spool soils which are shallow. The soils formed in residium or colluvium derived dominantly from sandstone. The surface textures will range from loamy sands to loamy coarse sand, sandy loams, and loamy fine sands. Surface layers are 2 to 14 inches thick, and are underlain by loamy sands, loamy coarse sands, sandy loams, and loamy fine sands to depths of 60 inches or more, except for the Spool soil which is shallow to bedrock between 10 to 20 inches. The available water capacity for these soils is low to moderate, runoff is slow to rapid, hazard for water erosion is slight to high, and hazard for soil blowing is moderate to high. Effective rooting depth is 60 inches or more except for the Spool soil which is 10 to 20 inches.

Soils corrulated to this site are:

Gretnid Loamy sand 10-20%

Gretnid Loamy coarse sand 10-20%

Gretnid Loamy coarse sand 10-20%

Ironsprings Loamy coarse sand 10-20%

Relsob Loamy sand 10-20%

Relsob Sandy loam 5-20%

Relsob Loamy coarse sand 10-20%

Spool Loamy fine sand 5-40%

Table 4. Representative soil features

Parent material	(1) Colluvium–sandstone (2) Residuum–sandstone (3) Alluvium–sandstone
Surface texture	(1) Loamy sand (2) Loamy coarse sand (3) Sandy loam
Family particle size	(1) Sandy
Drainage class	Well drained to excessively drained
Permeability class	Moderate to rapid
Soil depth	25–152 cm
Surface fragment cover <=3"	0–15%
Surface fragment cover >3"	0–30%
Available water capacity (0-101.6cm)	2.54–14.22 cm
Calcium carbonate equivalent (0-101.6cm)	0–5%
Soil reaction (1:1 water) (Depth not specified)	6.6–8.4
Subsurface fragment volume <=3" (Depth not specified)	0–20%
Subsurface fragment volume >3" (Depth not specified)	0–35%

Ecological dynamics

The production is predominantly made up of antelope bitterbrush and Wyoming big sagebrush. Its aspect is a grass-shrub community dominated by antelope bitterbrush, Wyoming big sagebrush, Indian ricegrass, and needle and thread grass.

The dominant grasses are Indian ricegrass and needle and thread. Other abundant grasses are Nevada bluegrass and prairie Junegrass. Less abundant grasses are bottlebrush squirreltail, thickspike wheatgrass, and basin wildrye. Forbs that make up the plant community include arrowleaf balsamroot, foothills death camas, and sulphur buckwheat.

Shrubs that occur on this site are antelope bitterbrush, Wyoming big sagebrush, silver sagebrush, rubber rabbitbrush, and small low rabbitbrush.

If ecological retrogression is cattle induced, the production of desirable plants such as Indian ricegrass, needleandthread, prairie junegrass, Nevada bluegrass, and antelope bitterbrush will decrease. If retrogression is sheep induced, the percentage and production of desirable plants such as Indian ricegrass, Nevada bluegrass, prairie junegrass, arrowleaf balsamroot, antelope bitterbrush, gray horsebrush, silver sagebrush, and Wyoming big sagebrush will decrease. Along with the decrease in desirable plants, there will be an increase in plants such as bottlebrush squirreltail, galleta, sand dropseed, foothills death camas, hairy goldaster, wooly locoweed, sand lupine, rubber rabbitbrush, plains prickly pear, and small rabbitbrush; and annuals such as Russian thistle, cheatgrass, and annual mustard.

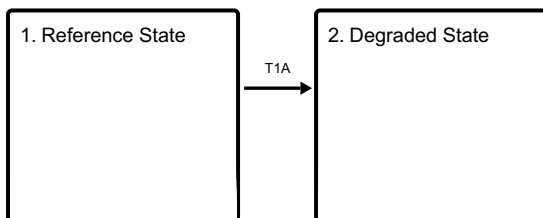
Further evidence of retrogression may be "hedging" of shrubs, particularly antelope bitterbrush, blowouts, a large increase in annuals, absence of plant litter and new seedlings, and highly unstable forage production from year to year.

During winters of severe temperatures and snows, there will be heavy use in local areas of Wyoming big sagebrush, silver sagebrush, gray horsebrush, and rubber rabbitbrush by deer, antelope, livestock, and any elk which occupy the site. Wildlife and livestock will make use of low palatable species to avoid starvation.

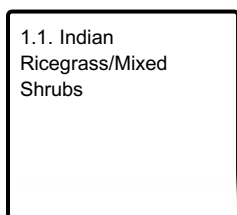
Generally there is adequate fuel on this site to carry fire. Should a fire burn across the site, the grasses will be benefited. Shrubs, particularly antelope bitterbrush, will be severely affected and will be several years in recovering, except rabbitbrush and horsebrush species which will flourish. Production on the site will decline the first year and, thereafter, grasses and forbs will increase, while most shrub species will have a long-term increase. This site will recover slowly from prolonged and severe drought. Grasses and forbs will show signs of stress and recovery earlier than shrubs because of their shallow root systems.

State and transition model

Ecosystem states



State 1 submodel, plant communities



State 1

Reference State

Community 1.1

Indian Ricegrass/Mixed Shrubs

The plant community is about 30 to 50 percent grasses, 10 to 15 percent forbs, and 40 to 55 percent shrubs. Of this production, 35 percent will likely be unpalatable or out of reach of grazing animals. Basal area (the area of ground surface covered by the perennial vegetation measured one inch above the soil) is approximately 25 percent.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	336	381	639
Shrub/Vine	247	454	560
Forb	90	118	146
Total	673	953	1345

State 2

Degraded State

This State is result of soil-disturbing activities such as hoof-action, anthropogenic activity, and rodent activity. It can also occur after brush management followed by improper grazing techniques that usually include high-intensity grazing without appropriate recovery periods.

Transition T1A

State 1 to 2

The driver for transition T1A from State 1 (Reference State) to State 2 (Degraded) is low to high intensity, long duration, and high frequency herbivory events.

Additional community tables

Table 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1				286–476	
	Indian ricegrass	ACHY	<i>Achnatherum hymenoides</i>	95–191	–
	needle and thread	HECOC8	<i>Hesperostipa comata ssp. comata</i>	95–191	–
	prairie Junegrass	KOMA	<i>Koeleria macrantha</i>	50–95	–
	Sandberg bluegrass	POSE	<i>Poa secunda</i>	50–95	–
	basin wildrye	LECI4	<i>Leymus cinereus</i>	39–56	–
	sand dropseed	SPCR	<i>Sporobolus cryptandrus</i>	17–50	–
	bluebunch wheatgrass	PSSP6	<i>Pseudoroegneria spicata</i>	11–28	–
	James' galleta	PLJA	<i>Pleuraphis jamesii</i>	11–28	–
	squirreltail	ELEL5	<i>Elymus elymoides</i>	11–28	–
	thickspike wheatgrass	ELLAL	<i>Elymus lanceolatus ssp. lanceolatus</i>	11–28	–
Forb					
2				95–146	
	arrowleaf balsamroot	BASA3	<i>Balsamorhiza sagittata</i>	17–28	–
	deathcamas	ZIGAD	<i>Zigadenus</i>	17–28	–
	scarlet globemallow	SPCO	<i>Sphaeralcea coccinea</i>	11–22	–
	hollyleaf clover	TRGY	<i>Trifolium gymnocarpon</i>	11–17	–
	sulphur-flower buckwheat	ERUM	<i>Eriogonum umbellatum</i>	11–17	–
	hairy false goldenaster	HEVI4	<i>Heterotheca villosa</i>	11–17	–
	western yarrow	ACMIO	<i>Achillea millefolium var. occidentalis</i>	11–17	–
	rosy pussytoes	ANRO2	<i>Antennaria rosea</i>	0–11	–
	woolly locoweed	ASMO7	<i>Astragalus mollissimus</i>	0–11	–
	western wallflower	ERAS2	<i>Erysimum asperum</i>	0–11	–
	sand lupine	LUAM	<i>Lupinus ammophilus</i>	0–11	–
	longleaf phlox	PHLO2	<i>Phlox longifolia</i>	0–11	–
Shrub/Vine					
3				381–527	
	Wyoming big sagebrush	ARTRW8	<i>Artemisia tridentata ssp. wyomingensis</i>	191–286	–
	silver sagebrush	ARCA13	<i>Artemisia cana</i>	22–39	–
	rubber rabbitbrush	ERNA10	<i>Ericameria nauseosa</i>	11–22	–
	plains pricklypear	OPPO	<i>Opuntia polyacantha</i>	11–22	–
	antelope bitterbrush	PUTR2	<i>Purshia tridentata</i>	11–22	–
	spineless horsebrush	TECA2	<i>Tetradymia canescens</i>	11–22	–
	yellow rabbitbrush	CHVI8	<i>Chrysothamnus viscidiflorus</i>	0–11	–

Animal community

WILDLIFE INTERPRETATIONS:

This site provides habitats which support a resident animal community that is characterized by antelope, sagegrouse, Nuttall and desert cottontail, white-tailed jackrabbit, sage thrasher, western bluebird, western

meadowlark, Brewer's sparrow, mourning dove, red-tailed hawk, marsh hawk, Golden eagle, seasonal use by mule deer, and occasionally elk during the winter.

When this site is near its climax potential all species of wildlife found on this site will have adequate quality forage and browse on a yearlong basis. Overgrazing by livestock or big game herbivores will result in low quality brush species and low quality forbs and grasses invading the site. This will result in reduced forage and cover values for wildlife.

GRAZING INTERPRETATIONS:

This range site is very productive in palatable species. In order to maintain this high productivity, care must be taken to avoid overgrazing. Herding of sheep and movement of cattle during early spring growth is necessary to avoid depletion of stored carbohydrates and photosynthetic material by continual spring grazing. A system of deferred grazing, which varies the season of grazing in pastures during successive years, is needed to maintain a healthy well-balanced plant community. Rest during different seasons of the year benefits different plants. Fall and winter rest (Oct-Mar) benefits shrubs such as antelope bitterbrush, Wyoming big sagebrush, and silver sagebrush. Spring rest (Mar-May) benefits cool-season plants such as Indian ricegrass, needleandthread, Nevada bluegrass, and arrowleaf balsam root. Deferment during late winter and spring reduces competition between grazing animals for palatable shrubs and forbs.

Vegetation palatability by animal class is based on the attractiveness of the plant to animals as forage. Grazing preference changes from time to time and place to place depending on the animal class, plant palatability and nutrient value, stage of growth, and season of use.

Stocking rates given below are based on continuous use for the entire growing season and are intended only as an initial guide. Forage needs are calculated on the basis of 900 lbs of air-dry forage per animal unit month (AUM). To maintain proper use and allow for forage that disappears through trampling, small herbivore use, weathering, etc., 35 percent of the palatable forage produced is considered available for grazing by large herbivores.

CONDITION CLASS - (PERCENT CLIMAX VEGETATION)

excellent - (76-100) - 4.3 AC/AUM - .23AUM/AC

good - (51-75) - 7.0 AC/AUM - .14 AUM/AC

fair - (26-50) - 11.0 AC/AUM - .09 AUM/AC

poor - (0-25) - 15 AC/AUM - .07 AUM/AC

Adjustments to the initial stocking rates should be made as needed to obtain proper use. With specialized grazing systems, large livestock breeds, uncontrolled big game herbivores inaccessibility, dormant season use, etc., stocking rate adjustments will be required.

Hydrological functions

Soils in this site are grouped into "B" hydrologic group, as outlined in the Soils of Colorado Loss Factors and Erodibility Hydrologic Groupings handbook. Field investigations are needed to determine hydrologic cover conditions and hydrologic curve numbers. Refer to Peak Flows in Colorado handbook, and SCS National Engineering Handbook, Section 4, for hydrologic curve numbers in determining runoff quantities.

Recreational uses

There is limited potential for this site with regard to natural beauty. There is, however, a very high potential for this site in hunting big game species as well as coyotes and rabbits. There is also a high potential for wildlife observation and photography.

Wood products

None.

Other information

Deathcamas is poisonous to sheep and may affect cattle and horses. One half pound will poison sheep. Spring and summer are the seasons of most common poisoning.

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. Other sources used as references include: USDA NRCS Water and Climate Center, USDA NRCS National Range and Pasture Handbook, and USDA NRCS Soil Surveys from various counties.

Type locality

Location 1: Moffat County, CO	
General legal description	NW 1/4 SE 1/4, Section 36, T9N, R93W, Moffat County, CO.
Location 2: Moffat County, CO	
General legal description	SW 1/4 NW 1/4, Section 9, T8N, R91W, Moffat County, CO.
Location 3: Moffat County, CO	
General legal description	NW 1/4 NW 1/4, Section 7, T4N, R100W, Moffat County, CO.

Other references

Belnap, J. and S. L. Phillips. 2001. Soil biota in an ungrazed grassland: Response to annual grass (*Bromus tectorum*) invasion. *Ecological Applications*: 11: 1261-1275.

Caudle, D., H. Sanchez, J. DiBenedetto, C. Talbot, and M. Karl. 2013. Draft Interagency Ecological Site Handbook for Rangelands. US Dept. of Agriculture. Washington D.C

Cleland, D.T.; Freeouf, J.A.; Keys, J.E., Jr.; Nowacki, G.J.; Carpenter, C; McNab, W.H. 2007. Ecological Subregions: Sections and Subsections of the Conterminous United States.[1:3,500,000], Sloan, A.M., cartog. Gen. Tech. Report WO-76. Washington, DC: U.S. Department of Agriculture, Forest Service.

Musgrave, G.W. 1955. How much of the rain enters the soil? In *Water*: U.S. Department of Agriculture Yearbook. Washington, D.C. P. 151-159.

National Engineering Handbook. US Department of Agriculture, Natural Resources Conservation Service. Available: <http://www.info.usda.gov/CED/Default.cfm#National%20Engineering%20Handbook>. Accessed February 25, 2008.

Passey, H. B., W. K. Hugie, E. W. Williams, and D. E. Ball. 1982. Relationships between soil, plant community, and climate on rangelands of the Intermountain west. USDA, Soil Conservation Service, Tech. Bull. No. 1669.

Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. Web Soil Survey. Available online at <http://websoilsurvey.nrcs.usda.gov/>. Accessed [8/10/2015].

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land Resource Regions and Major Land Resource Areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296.

Western Regional Climate Center. Retrieved from <http://www.wrcc.dri.edu/summary/Climsmco.html> on May 17, 2018.

Contributors

Approval

Kirt Walstad, 9/07/2023

Acknowledgments

Field offices in Colorado where the site occurs: Craig, Eagle, Glenwood Springs, Meeker, and Steamboat Springs.

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	05/18/2024
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:**
-