

Ecological site R034AY420CO

Cold Desert Breaks

Last updated: 9/07/2023
Accessed: 04/25/2024

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): 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: 7-10 inches
- RV Frost-Free Days: 95-105 days

Classification relationships

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 are not slightly saline or saline-sodic.
 - o are deep
 - o are not skeletal within 10" of soil surface, minimal rock fragments at the soil surface; maybe skeletal (>35% fragments by volume) below 10"
 - o are not strongly or violently effervescent in surface mineral 10".
 - o surface textures are usually loamy fine sand (may have a cobbly soil modifier) in surface mineral 4".
- Slope is less than 40 percent.
- Clay content is less than 18% in mineral soil surface 1-2".

Associated sites

R034AY421CO	Cold Desert Overflow
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Similar sites

R034AY428CO	Sandy Cold Desert
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Table 1. Dominant plant species

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

Physiographic features

This site occurs on steeper slopes, generally with some rock outcrop. Slopes range from 12 to 40 percent. Elevation for the site ranges from 5,300 to 5,600 feet above, sea level.

Table 2. Representative physiographic features

Landforms	(1) Escarpment
Runoff class	Medium
Flooding frequency	None
Ponding frequency	None
Elevation	5,300–5,600 ft
Slope	12–40%
Aspect	Aspect is not a significant factor

Climatic features

The climate of this site is arid to semi-arid, with precipitation averaging between 7 and 10 inches annually.

The growing season for the native plants averages 160 to 180 days. This growth usually starts in early April and goes until late September. Cool season grasses start spring growth using moisture stored in the soil from snow melt and spring rains. Optimum growth occurs from mid-April, and continues until the soil profile is depleted of useable soil moisture (generally through mid-June). A second period of growth may occur in the fall months as a result of fall precipitation.

The average annual air temperature ranges from 45 to 48 degrees Fahrenheit. Summer temperatures can reach 100 degrees Fahrenheit, and winter temperatures can dip to -30 degrees Fahrenheit. Temperatures fall below the freezing mark much of the time in October through May. The average frost-free period occurs from approximately June 2 through September 15, lasting about 105 days.

Spring and fall are peak periods of precipitation, and July is usually the driest month. The seasonal distribution of precipitation, and relatively low spring temperatures favor the production of cool season plants, making the site more productive than the annual precipitation might indicate.

Table 3. Representative climatic features

Frost-free period (characteristic range)	95-105 days
Freeze-free period (characteristic range)	
Precipitation total (characteristic range)	7-10 in

Frost-free period (average)	0 days
Freeze-free period (average)	
Precipitation total (average)	10 in

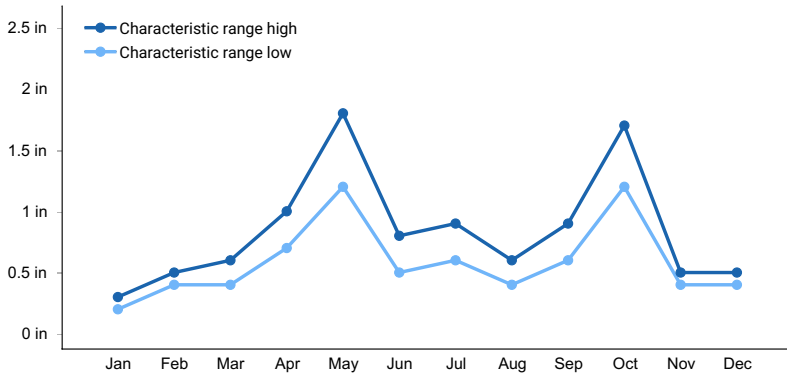


Figure 1. Monthly precipitation range

Influencing water features

None

Wetland description

None

Soil features

The soils in this site are deep and excessively drained. They have the effective rooting depth of 60 inches or more, medium runoff, moderate hazard for water erosion, and a high wind blowing hazard.

The Willwood soils formed in old valley fill of mixed origin. The surface layer is a very cobbly loamy fine sand about 5 inches thick. This is underlain by a very gravelly loamy fine sand 6 inches thick, and then by an extremely cobbly loamy sand 23 inches thick, and then sands to a depth of 60 inches or more.

The Tipperary soils formed in eolian deposits of mixed origin. The surface layer is a loamy fine sand about 3 inches thick. This is underlain by loamy fine sand to 43 inches, and fine sands to 60 inches or more.

Soil Texture Percent Slope

Willwood CBV loamy fine sand 12 to 40 percent slope

Tipperary loamy fine sand 12 to 40 percent slope

Table 4. Representative soil features

Parent material	(1) Alluvium (2) Eolian deposits
Surface texture	(1) Very cobbly loamy fine sand (2) Loamy fine sand
Family particle size	(1) Sandy or sandy-skeletal
Drainage class	Excessively drained
Permeability class	Rapid to very rapid
Soil depth	60 in
Surface fragment cover <=3"	5–25%
Surface fragment cover >3"	0–25%

Available water capacity (0-40in)	1.5–4.9 in
Calcium carbonate equivalent (0-40in)	2–5%
Sodium adsorption ratio (0-40in)	0–1
Subsurface fragment volume <=3" (0-40in)	10–25%
Subsurface fragment volume >3" (0-40in)	0–35%

Ecological dynamics

The aspect of this site is a grass-shrub community dominated by needle and thread, galleta, Indian ricegrass, Wyoming big sagebrush, and shadscale. The plant community is about 65 percent grass, 5 percent forbs, and 30 percent shrubs (air-dry weight of current season's growth).

Historical records and photographs document the fact that the Brown's Park area was under severe grazing pressure by cattle, sheep, and horses during the last half of the 1800's and early 1900's. This pressure significantly altered the native vegetation, particularly the lowlands immediately adjacent to the Green River, and the area north of the river. This has made it difficult to determine the potential natural vegetation.

Dominant grasses are needle and thread, galleta, and Indian ricegrass.

Less abundant grasses are bottlebrush squirreltail, sand dropseed, and western wheatgrass.

Forbs present in the plant community include dusty maiden, mat locoweed, stemless actinea, and tufted evening primrose.

Shrubs, half-shrubs, and trees that occur on this site are Wyoming big sagebrush, shadscale, spiny horsebrush, and Nuttall horsebrush.

If ecological retrogression is cattle induced, the percentage and production of desirable plants such as needle and thread, Indian ricegrass, western wheatgrass, and winterfat will decrease. If retrogression is sheep induced, the percentage and production of desirable plants such as Indian ricegrass, Wyoming big sagebrush, black sagebrush, and shadscale will decrease.

Along with the decrease in desirable plants, there will be an increase in plants such as red threeawn, mat loco, dusty maiden, hoods phlox, Nuttall horsebrush, plains pricklypear, broom snakeweed and spiny horsebrush. Further evidence of retrogression may be "hedging" of shrubs, bare areas, sheet erosion, a large increase in annuals, in an 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, winterfat, and shadscale by deer, antelope, livestock, and any elk which may occupy the site. Wildlife and livestock will make use of low palatable species to avoid starvation.

Generally, there is inadequate fuel on this site to carry fire. Should a fire burn across the site, the western wheatgrass will be greatly benefited and Nuttall and spiny horsebrush, and rubber rabbitbrush will flourish. Shrubs, particularly winterfat, shadscale, and Wyoming big sagebrush, will be severely affected, and will be several years recovering. The grasses and forbs will increase initially with shrubs having long term increases.

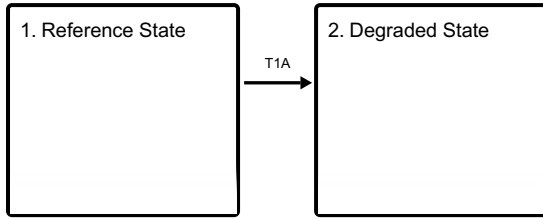
Due to low precipitation of the area, this site will recover slowly from a prolonged and/or severe drought. Grass and forbs will show signs of stress and recover earlier than shrubs because of their shallow root system.

Basal area (the area of ground surface covered by the perennial vegetation measured one inch above the soil) is approximately 15 percent when near the potential plant community.

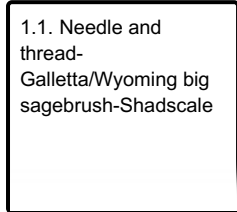
Of the total annual production, approximately 30 percent will be unpalatable or out of reach to grazing animals.

State and transition model

Ecosystem states



State 1 submodel, plant communities



State 1 Reference State

Community 1.1 Needle and thread-Galletta/Wyoming big sagebrush-Shadscale

The plant community consists of 55 to 70 percent grasses, 5 to 10 percent forbs, and 25 to 35 percent shrubs.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	95	235	275
Shrub/Vine	90	110	135
Forb	15	30	40
Total	200	375	450

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 (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1				205–260	
	needle and thread	HECOC8	<i>Hesperostipa comata ssp. comata</i>	75–115	–
	James' galleta	PLJA	<i>Pleuraphis jamesii</i>	40–55	–
	Indian ricegrass	ACHY	<i>Achnatherum hymenoides</i>	40–55	–
	squirreltail	ELEL5	<i>Elymus elymoides</i>	20–40	–
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	10–20	–
	sand dropseed	SPCR	<i>Sporobolus cryptandrus</i>	10–20	–
	Fendler threeawn	ARPUL	<i>Aristida purpurea var. longiseta</i>	5–10	–
Forb					
2				20–40	
	scarlet globemallow	SPCO	<i>Sphaeralcea coccinea</i>	0–10	–
	mat milkvetch	ASKET	<i>Astragalus kentrophyta var. tegetarius</i>	0–10	–
	Douglas' dustymaiden	CHDO	<i>Chaenactis douglasii</i>	0–10	–
	tufted evening primrose	OECA10	<i>Oenothera caespitosa</i>	0–10	–
	stemless four-nerve daisy	TEAC	<i>Tetraneris acaulis</i>	0–10	–
	spiny phlox	PHHO	<i>Phlox hoodii</i>	0–5	–
	desertdandelion	MALAC3	<i>Malacothrix</i>	0–5	–
	small-leaf globemallow	SPPA2	<i>Sphaeralcea parvifolia</i>	0–5	–
Shrub/Vine					
3				95–130	
	Wyoming big sagebrush	ARTRW8	<i>Artemisia tridentata ssp. wyomingensis</i>	40–55	–
	shadscale saltbush	ATCO	<i>Atriplex confertifolia</i>	20–40	–
	yellow rabbitbrush	CHVI8	<i>Chrysothamnus viscidiflorus</i>	10–15	–
	rubber rabbitbrush	ERNA10	<i>Ericameria nauseosa</i>	10–15	–
	broom snakeweed	GUSA2	<i>Gutierrezia sarothrae</i>	10–15	–
	winterfat	KRLA2	<i>Krascheninnikovia lanata</i>	10–15	–
	shortspine horsebrush	TESP2	<i>Tetradymia spinosa</i>	10–15	–
	black sagebrush	ARNO4	<i>Artemisia nova</i>	5–10	–
	plains pricklypear	OPPO	<i>Opuntia polyacantha</i>	5–10	–
	Nuttall's horsebrush	TENU2	<i>Tetradymia nuttallii</i>	5–10	–

Animal community

WILDLIFE INTERPRETATIONS:

This site provides habitats which support a resident animal community that is characterized by antelope, mule deer, desert and Nuttall's cottontail, white-tailed jackrabbits, white-tailed prairie eagle, western meadowlark, and midget faded rattlesnake. There is heavy seasonal use by mule deer in winter, and use by elk where this site is adjacent to pinyon juniper sites.

Brush control, grazing management, and reseeding of some areas on this site will improve the variety and production of forage species. The variety of cover and food will attract big and small game mammals, as well as a variety of birds. With ecological retrogression, food supply and cover may become restricted, forcing some animals

to abandon the site. Loss of desirable habitat will reduce the areas which can be utilized by peregrine falcons, and bald and golden eagles for hunting. Sage grouse leks should be protected from severe disturbance when applying conservation practices.

GRAZING INTERPRETATIONS:

This site is used in conjunction with adjacent sites which are more level and higher in annual production. Care must be exercised to prevent abuse of this site by over-grazing since the steep slopes make it highly susceptible to erosion. Winter use by cattle is common for the site with the animals being sent to the high country in June for grazing on Federal land. 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 during October-March benefits shrubs such as winterfat, shadscale, and Wyoming big sagebrush. Spring rest during March-May benefits plants such as needleandthread, Indian ricegrass, western wheatgrass, and galleta. Deferment during late winter and spring reduces competition between grazing animals for palatable shrubs and forbs. Plants of particularly high grazing value on this site include Indian ricegrass, western wheatgrass, needleandthread, black sagebrush, shadscale, and winterfat.

Brush management is best accomplished by application of herbicides, which minimizes soil disturbance. Reseeding is best accomplished in the fall by aerial seeding. Mechanical treatment is not practical due to steepness of slopes and rocks on surface. Seedling establishment is difficult due to low precipitation. Mechanical brush management is not recommended due to rocks on the soil surface and steep slopes.

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 pounds of air-dry forage per animal unit month (AUM). To maintain proper use and allow for forage that disappears through trampling, small herbivores, weathering, etc., 35 percent of the palatable forage produced is considered useable.

Condition Class (Percent Climax vegetation)
Excellent (76-100%) - 5.3 AC/AUM - .19 AUM/Ac
Good (51-75%) - 7.5 AC/AUM - .13 AUM/Ac
Fair (26-50%) - 11.0 AC/AUM - .09 AUM/Ac
Poor (0-25%) - 17+ AC/AUM - .06 AUM/Ac

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

Hydrological functions

This site has a good cover of grass and shrubs. Livestock grazing should be managed to protect this cover and prevent soil erosion. Sod forming grasses, such as galleta, should be managed to keep the soil in place. Any brush control or reseedling should be done with a minimum of soil disturbance, this will decrease runoff. Deferment following brush control will allow grasses to make use of the additional moisture and provide a good cover for the soil.

Soils in this site are grouped into "A" 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

This site has low value for natural beauty. It is a great distance from any population centers and really does not draw people to it for scenic drives, camping, or picnicking. It has a high recreational value in the form of hunting antelope, mule deer, and coyotes.

Wood products

There is no known potential for commercial wood products on this site. On a limited basis, this site is suitable for tree plantings to provide wildlife cover, windbreaks, and control soil erosion. Species which may be considered include pinyon pine, Rocky Mountain juniper, Eastern red cedar, and Russian olive. Sites must be engineered to provide supplemental moisture, to increase seedling survival.

Other information

Major Poisonous Plants to Livestock:

Black greasewood is poisonous to sheep and cattle. The type of poisoning is acute sodium and potassium oxalates. The season of poisoning is spring.

Broom snakeweed is poisonous to cattle and sheep when forage is scarce and broom snakeweed makes up 10% or more of the green weight consumption.

ENDANGERED PLANTS AND ANIMALS:

This site can be used by peregrine falcons for hunting, especially where rock outcrops are nearby. This site is within the historic range of the black-footed ferret, and any active prairie dog towns on this site are potential habitat for the ferret.

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	
Township/Range/Section	TT10N RR103W S36
General legal description	Center Section 36, T10N, R103W, Browns Park, Moffat County, Colorado

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

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Approval

Kirt Walstad, 9/07/2023

Acknowledgments

Field Offices in Colorado where this site occurs: Craig

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	04/25/2024
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:**
