

Ecological site R034AY428CO Sandy Cold Desert

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: 75-105 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 strongly or violently effervescent in surface mineral 10".
 - o surface textures usually range from loamy fine sand to sand in surface mineral 3-14".
- Slope is less than 12 percent.
- Clay content is less than 18% in mineral soil surface 1-2".

Associated sites

R034AY426CO	Loamy Cold Desert
R034AY420CO	Cold Desert Breaks

Similar sites

R034AY426CO	Loamy Cold Desert
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Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) <i>Atriplex confertifolia</i>
Herbaceous	(1) <i>Hesperostipa comata</i> (2) <i>Achnatherum hymenoides</i>

Physiographic features

This site occurs on nearly flat to gently sloping areas. Slopes range from 1 to 12 percent. This site occurs on all exposures. Elevation for the site ranges from 5400 to 6000 feet above sea level.

Table 2. Representative physiographic features

Landforms	(1) Plateau (2) Hill (3) Alluvial fan (4) Structural bench
Runoff class	Low
Flooding frequency	None
Ponding frequency	None
Elevation	5,400–6,000 ft
Slope	1–12%
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. Cool-season grasses start spring growth using moisture stored in the soil from snow melt and spring rains. Optimum growth occurs from mid-April through mid-June, and continues until the soil profile is depleted of usable soil moisture. A second growth period may occur in the fall months as a result of a fall moisture peak.

The average annual air temperature is about 45 to 48 degrees Fahrenheit. Summer temperatures can reach 100°F, 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 25, lasting about 105 days.

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 making the site more productive than the annual precipitation might indicate.

Table 3. Representative climatic features

Frost-free period (characteristic range)	75-105 days
Freeze-free period (characteristic range)	
Precipitation total (characteristic range)	7-10 in
Frost-free period (average)	105 days

Freeze-free period (average)	
Precipitation total (average)	10 in

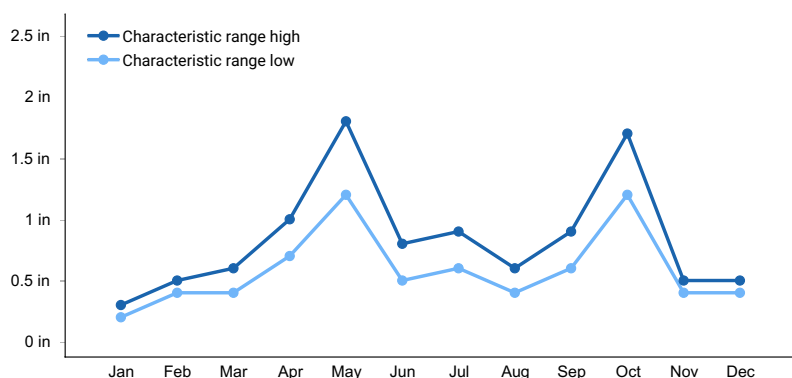


Figure 1. Monthly precipitation range

Influencing water features

None

Wetland description

None

Soil features

The soils of this site are deep and excessively drained except for the Ecklund, which is moderately deep. Permeabilities are moderately rapid and available water holding capacities low for Ecklund and Tipperary soils. Permeabilities are rapid and available water holding capacities very low for the Willwood Tax soils. All soils in this site have a slow runoff potential, with a slight water erosion and high soil blowing hazard. The Ecklund and Tipperary soils formed from materials derived from sandstone, while the other soils are formed from old valley fill of mixed sources.

The surface layers are loamy fine sands from 3 to 14 inches thick. The upper part of the underlying material is a loamy fine sand from 3 to 46 inches thick. The Ecklund soil will have gravelly sands from 24 to 36 inches where it hits bedrock. The Tipperary soils are sands from 46 to 60 inches or more. The Willwood soils are extremely cobbly loamy sands from 10 to 60 inches.

Soils associated with this site include:

Ecklund-Tipperary complex, 1 to 12 percent slope

Tipperary sand, 5 to 20 percent slope

Tipperary loamy fine sand, 3 to 12 percent slope

Willwood-Tipperary, cobbly substratum complex, 1 to 12 percent slope

Table 4. Representative soil features

Parent material	(1) Eolian deposits (2) Alluvium
Surface texture	(1) Loamy fine sand (2) Sand
Family particle size	(1) Sandy or sandy-skeletal (2) Sandy
Drainage class	Excessively drained
Permeability class	Moderately rapid to rapid

Soil depth	40–60 in
Surface fragment cover <=3"	0–10%
Surface fragment cover >3"	0–5%
Available water capacity (0-40in)	1.7–4.9 in
Calcium carbonate equivalent (0-40in)	2–5%
Soil reaction (1:1 water) (0-40in)	7.9–8.4
Subsurface fragment volume <=3" (0-40in)	0–20%
Subsurface fragment volume >3" (0-40in)	0–30%

Ecological dynamics

Historical records and photographs document the fact that the Browns 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 in the lowlands 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, Indian ricegrass, and bottlebrush squirreltail. Less abundant grasses are galleta and Sandberg bluegrass. Forbs present in the plant community include scarlet globemallow, dusty maiden, and Pacific aster. Shrubs and half-shrubs that occur on this site are spiny hopsage, shadscale, and Wyoming big sagebrush.

If ecological retrogression is cattle induced, the percentage and production of desirable plants such as Indian ricegrass, needleandthread, Sandberg bluegrass, Pacific aster, winterfat, and Gardner's saltbush will decrease. If retrogression is sheep induced, the percentage and production of desirable plants such as Indian ricegrass, Sandberg bluegrass, Pacific aster, shadscale, Wyoming big sagebrush, Gardner's saltbush, bud sagebrush, and winterfat will decrease. Along with the decrease in desirable plants, there will be an increase in plants such as sixweeks fescue, sand dropseed, dusty maiden, Fremont penstemon, spiny hopsage, plains pricklypear, Nuttall hosebrush, sticky leaf low rabbitbrush, black greasewood, and annuals such as cheatgrass and halogeton.

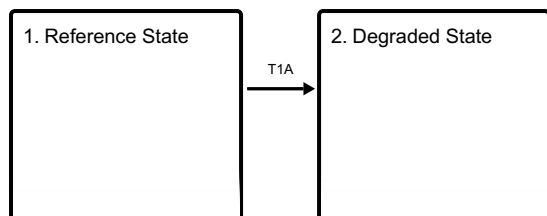
Further evidence of retrogression may be "hedging" of shrubs, bare areas, blow outs, dunes, a large increase in annuals, absence of plant litter and new seedlings, and highly unstable forage production from year to year. During winters of severe temperatures and snows there will be heavy use in local areas of shadscale, Wyoming big sagebrush, and winterfat 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 bunchgrasses will be only slightly benefited, while thickspike wheatgrass will be greatly benefited, and Nuttall's horsebrush and sticky leaf low rabbitbrush will flourish. Shrubs, particularly shadscale, winterfat, and Wyoming big sagebrush will be severely affected, and will be several years recovering. The production will decline the first year and thereafter, grasses and forbs will increase, with shrubs having long-term increase.

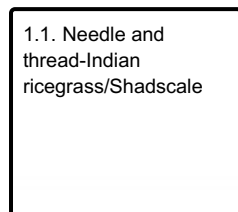
Due to low precipitation of the area, this site will recover slowly from a prolonged and severe drought. Grass and forbs will show signs of stress and recovery earlier than shrubs because of their shallow root systems.

State and transition model

Ecosystem states



State 1 submodel, plant communities



State 1 Reference State

Community 1.1 Needle and thread-Indian ricegrass/Shadscale

The plant community is about 50 to 75 percent grasses, 5 to 10 percent forbs, and 20 to 40 percent shrubs (air-dry weight of current season's growth). Basal area (the area of ground surface covered by the perennial vegetation measured one inch above the soil) is approximately 20 percent when near the potential plant community. Annual Production: If the range is in excellent condition, the approximate total annual production (air-dry) is: Favorable years 800 pounds per acre Normal years 650 pounds per acre Unfavorable years 350 pounds per acre Of this production, 25 percent will likely be unpalatable or out of reach to grazing animals.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	195	405	455
Shrub/Vine	125	195	275
Forb	30	50	70
Total	350	650	800

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				325–488	
	needle and thread	HECOC8	<i>Hesperostipa comata ssp. comata</i>	100–195	–
	Indian ricegrass	ACHY	<i>Achnatherum hymenoides</i>	100–165	–
	Sandberg bluegrass	POSE	<i>Poa secunda</i>	65–100	–
	squirreltail	ELEL5	<i>Elymus elymoides</i>	35–65	–
	James' galleta	PLJA	<i>Pleuraphis jamesii</i>	35–65	–
	thickspike wheatgrass	ELLAL	<i>Elymus lanceolatus ssp. lanceolatus</i>	20–35	–
	sand dropseed	SPCR	<i>Sporobolus cryptandrus</i>	0–15	–
	sixweeks fescue	VUOC	<i>Vulpia octoflora</i>	0–15	–
Forb					
2				35–65	
	scarlet globemallow	SPCO	<i>Sphaeralcea coccinea</i>	5–25	–
	Pacific aster	SYCH4	<i>Symphyotrichum chilense</i>	5–15	–
	Douglas' dustymaiden	CHDO	<i>Chaenactis douglasii</i>	5–15	–
	Fremont's beardtongue	PEFR	<i>Penstemon fremontii</i>	5–15	–
Shrub/Vine					
3				130–260	
	shadscale saltbush	ATCO	<i>Atriplex confertifolia</i>	65–100	–
	Wyoming big sagebrush	ARTRW8	<i>Artemisia tridentata ssp. wyomingensis</i>	35–65	–
	spiny hopsage	GRSP	<i>Grayia spinosa</i>	35–65	–
	winterfat	KRLA2	<i>Krascheninnikovia lanata</i>	15–25	–
	Gardner's saltbush	ATGA	<i>Atriplex gardneri</i>	0–25	–
	Nuttall's horsebrush	TENU2	<i>Tetradymia nuttallii</i>	15–25	–
	yellow rabbitbrush	CHVI8	<i>Chrysothamnus viscidiflorus</i>	10–15	–
	plains pricklypear	OPPO	<i>Opuntia polyacantha</i>	0–15	–
	bud sagebrush	PIDE4	<i>Picrothamnus desertorum</i>	0–15	–
	greasewood	SAVE4	<i>Sarcobatus vermiculatus</i>	0–15	–

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 jackrabbit, white-tailed prairie dog, western bluebirds, mourning doves, red-tailed hawk, Golden eagles, and western meadowlark. There is seasonal use in winter by elk when this site is adjacent to pinyon-juniper sites.

This site supports a wide variety of wildlife. Management should be geared to providing a variety of food and cover for the wildlife present. If the site is in fair or poor condition, the food supply will become limited and may force some animals to abandon the site. If range seeding is done, the seeding mixture should meet the needs of livestock and wildlife present. Brush control is not recommended near sage grouse leks

GRAZING INTERPRETATIONS:

This site is best suited for winter grazing by cattle and sheep. Stock water developments are difficult to establish and therefore, are few and far between. Winter snows provide water to animals. Livestock are generally moved to

the high country in June where they graze on Federal lands. Care must be exercised to prevent over-grazing as condition will decrease, production will rapidly decline, invaders become established on the site, and the soil will be susceptible to blowing.

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 (October through March) benefits shrubs such as Wyoming big sagebrush, shadscale, Nuttall saltbush, and winterfat. Spring rest (March through May) benefits cool-season plants such as needleandthread, Indian ricegrass, and Sandberg bluegrass. 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, Sandberg bluegrass, Pacific aster, winterfat, and Nuttall saltbush.

Brush management by mechanical methods is not recommended due to the high soil blowing hazard. Chemical control is recommended if grass cover is good under the shrubs. Burning in fall or spring is an alternative method of brush control (when brush is adequate for fuel). In the spring, when soil moisture is high and plants are about to begin growth is the best time to burn. Seedling establishment is difficult because of light textured soils and low precipitation. Fall is the best time to seed. Mechanical treatments should be given to inter-seeding when reseeding this site.

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 herbivore use, weathering, etc. Of the palatable forage produced, 35 percent is considered available for grazing by large herbivores.

Condition Class - Percent Climax Vegetation - (Ac/AUM) (AUM/Ac)

Excellent - 76-100% - (2.8) (.35)

Good - 51-75% - (4.0) (.25)

Fair - 26-50% - (6.0) (.17)

Poor - 0-25% - (9.0+) (.11)

Adjustment 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.

Major Poisonous Plants:

Halogeton can be poisonous to sheep and cattle in the spring. The poison is acute with symptoms occurring in 4 to 6 hours.

Greasewood can be poisonous to sheep and cattle in April to June. The poison is acute with symptoms occurring in 2 to 4 hours.

Hydrological functions

This site has good vegetative cover when in good or excellent condition. As cover and residue increase, runoff and soil blowing hazards will decrease. Efforts to maintain or improve plant cover are recommended, through grazing management, range seeding, and chemical brush control.

Soils in this site are grouped into "A" & "B" hydrologic groups, 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, deer, rabbits, and coyotes.

Wood products

There is no known potential for commercial wood products on this site. However, this site lends itself to tree and shrub plantings for windbreaks, wildlife, and controlling wind erosion. Species which might be considered include Russian olive, Rocky Mountain juniper, and pinyon. Sites must be designed to provide supplemental moisture to promote seedling establishment. Soil disturbance should be minimized when establishing the planting.

Other products

None noted.

Other information

ENDANGERED PLANTS AND ANIMALS:

This site can be important hunting grounds for peregrine falcons, especially when 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	T10N R100W S11
General legal description	SE1/4 of SE1/4, Section 11, T10N, R100W, 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 the 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:
