

Ecological site R034AY434CO

Dry Sandy

Last updated: 3/11/2025
Accessed: 05/11/2025

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): 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: 9-11 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

M170 Great Basin & Intermountain Dwarf Sagebrush Shrubland & Steppe Group

A3222 Black sagebrush Steppe and Shrubland Alliance

CEGL001425 *Artemisia nova*/*Hesperostipa comata* 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 are not slightly saline or saline-sodic.
 - o deep

- o not skeletal within 20" of soil surface, minimal rock fragments at the soil surface
- o are not strongly or violently effervescent in surface mineral 10".
- o surface textures usually range from loamy coarse sand to loamy sand, and sometime with a gravelly modifier on surface mineral 4".
- Slope is < 25%.
- Clay content is < 18% in mineral soil surface 1-2".

Associated sites

R034AY418CO	Alkali Upland Has salt accumulation is adjacent areas not influenced by eolian deposits
-------------	---

Similar sites

R034AY330CO	Sandy Land Coarse textured soils but not influenced by eolian deposits, Wyoming big sagebrush dominates.
-------------	--

Table 1. Dominant plant species

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

Physiographic features

The landscape of this site is nearly flat to moderately sloping areas, often along ridge tops. Slopes range from 2 to 25 percent. The elevation ranges from 6000 to 6800 feet above sea level.

Table 2. Representative physiographic features

Landforms	(1) Ridge (2) Hill
Runoff class	Low
Elevation	6,000–6,800 ft
Slope	2–25%
Aspect	Aspect is not a significant factor

Climatic features

The climate of this site is arid to semi-arid. Winters are cold and summers are warm. The average precipitation ranges from 9 to 11 inches annually. The majority of this precipitation comes as winter snows and spring rains. This moisture promotes good early plant growth, but is rarely sufficient to last beyond mid-June. The average seasonal amount of this annual precipitation is as follows:

Winter (October 16 through April 15) receives 4.0 inches, Spring (April 16 through June 30) receives 3.0 inches, Summer (July 1 through August 31) receives 1.4 inches, and Fall (September 1 through October 15) receives 1.6 inches.

*Precipitation data organized by season because area is remote and data is checked on a seasonal basis.

The growing season for native plants is about 120 days. Plants begin growth in April. The optimum growth period is from mid-May to mid-June unless summer rains occur and are effective in maintaining plant growth.

The average annual air 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)	75-95 days
Freeze-free period (characteristic range)	
Precipitation total (characteristic range)	9-11 in
Frost-free period (average)	95 days
Freeze-free period (average)	
Precipitation total (average)	11 in

Influencing water features

None

Wetland description

N/A

Soil features

The soils in this site are deep and excessively drained. They formed in either eolian sands derived from sandstone or relict stream deposits. The Kandaly soil is a very gravelly loamy coarse sand throughout the profile. The permeability of these soils are rapid, the available water holding capacity is low, the hazards for soil blowing is slight for the Dunul soil and high for the Kandaly soil. Hazard for water erosion is slight.

Major soils associated with this site:

Dunul gravelly, loamy coarse sands, 5 to 25 percent slopes

Kandaly, loamy sand, 2 to 20 percent slopes

Table 4. Representative soil features

Parent material	(1) Eolian deposits–sandstone
Surface texture	(1) Very gravelly loamy coarse sand
Drainage class	Well drained to excessively drained
Permeability class	Moderately rapid to rapid
Soil depth	20–78 in
Surface fragment cover <=3"	0–25%
Surface fragment cover >3"	0–10%
Available water capacity (0-40in)	1.2–2.8 in
Soil reaction (1:1 water) (0-40in)	7.9–8.4
Subsurface fragment volume <=3" (0-40in)	0–25%
Subsurface fragment volume >3" (0-40in)	0–10%

Ecological dynamics

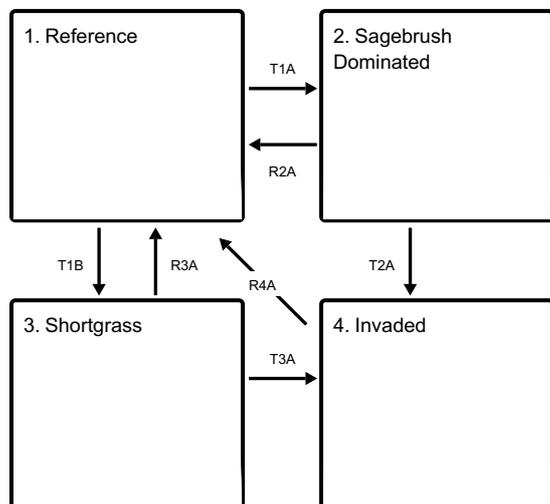
The plant community is about 80 percent grasses, 5 percent forbs, and 15 percent shrubs air-dry weight.

The production is predominantly made up of needle and thread, threadleaf sedge, Indian ricegrass, and black

sagebrush. The aspect if the site is a grassland with scattered forbs and shrubs. The dominant grass and grass-like plants are needle and thread, threadleaf sedge, and Indian ricegrass. Less abundant grasses are Sandberg bluegrass, thickspike wheatgrass, bottlebrush squirreltail, galleta, and bluebunch wheatgrass. Forbs that make up the site are few and scattered across the site. Shrubs that occur on this site are black sagebrush, shadscale, and spineless horsebrush.

State and transition model

Ecosystem states



T1A - Moderate Continuous Season-long Grazing

T1B - Moderate Continuous Season-long Grazing, Continuous Spring Grazing

R2A - Brush Management (all methods), Prescribed Grazing

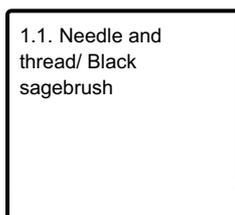
T2A - Brush Management (all methods), Moderate Continuous Season-long Grazing

R3A - Mechanical Treatment (chiseling, ripping, pitting)

T3A - Heavy Continuous Season-long Grazing

R4A - Chemical Seedbed Preparation, Re-seed, Long-term Prescribed Grazing

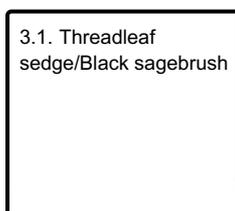
State 1 submodel, plant communities



State 2 submodel, plant communities



State 3 submodel, plant communities



State 4 submodel, plant communities

4.1. Cheatgrass/Prickly pear

State 1 Reference

Community 1.1 Needle and thread/ Black sagebrush

If ecological retrogression is cattle induced, the percentage and production of desirable plants such as needle and thread, Indian ricegrass, bluebunch wheatgrass, Sandberg bluegrass, Gardner's saltbush, and winterfat will decrease. If ecological retrogression is sheep induced, the percentage and production of desirable plants such as needle and thread, Indian ricegrass, bluebunch wheatgrass, Sandberg bluegrass, black sagebrush, winterfat, and shadscale will decrease. Heavy use of shrubs will give them a hedged appearance. If the site is un-grazed for several years there may be an increase in brush species. With the decrease in desirable plants there will be an increase in plants such as gray horsebrush, plains pricklypear, and hoods phlox(spiny phlox). Annuals are likely to invade this site include cheatgrass, Russian thistle, halogeton, kochia, and perfoliated pepperweed. Further evidence of retrogression may be sheet erosion, bare area pedestaling of bunch grasses, an increase in annuals and sagebrush cover, absence of plant litter new seedlings, and highly unstable production from year to year. During winters of sever temperatures and snows there will be heavy use in local areas of plants such as winterfat, shadscale, and black sagebrush by deer, pronghorn, 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. If a fire burns across the site the bunch grasses will be slightly affected, the shrubs will be more severely affected and basically only thickspike wheatgrass will be benefitted. There will be an initial decrease in production the first year followed by an increase of grass and forb production, and a long term increase shrub production. Due to low precipitation of the area, and drought characteristics of the soil, this site will recover slowly from prolonged and or sever drought. In general, grasses and forbs will show signs of stress and recovery earlier than shrubs due to their shallower root systems. Basal area (the area of ground surface covered by perennial vegetation measured at ground level) is approximately 15 percent. Annual production: If the range is in excellent condition, the approximate total annual production (air-dry) is: Favorable years 550 pounds per acre Normal years 400 pounds per acre Unfavorable years 300 pounds per acre Of this production, 20 percent will likely be unpalatable or out of reach of grazing animals.

Table 5. Annual production by plant type

Table with 4 columns: Plant Type, Low (Lb/Acre), Representative Value (Lb/Acre), High (Lb/Acre). Rows include Grass/Grasslike, Shrub/Vine, Forb, and Total.

State 2 Sagebrush Dominated

Community 2.1 Big sagebrush/Short grass

State 3 Shortgrass

Community 3.1
Threadleaf sedge/Black sagebrush

State 4
Invaded

Community 4.1
Cheatgrass/Prickly pear

Transition T1A
State 1 to 2

Moderate Continuous Season-long Grazing

Transition T1B
State 1 to 3

Moderate Continuous Season-long Grazing, Continuous Spring Grazing

Restoration pathway R2A
State 2 to 1

Brush Management (all methods), Prescribed Grazing

Transition T2A
State 2 to 4

Brush Management (all methods), Moderate Continuous Season-long Grazing

Restoration pathway R3A
State 3 to 1

Mechanical Treatment (chiseling, ripping, pitting)

Transition T3A
State 3 to 4

Heavy Continuous Season-long Grazing

Restoration pathway R4A
State 4 to 1

Chemical Seedbed Preparation, Re-seed, Long-term Prescribed Grazing

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	Grasses			240–360	
	Sandberg bluegrass	POSE	<i>Poa secunda</i>	60–120	–
	needle and thread	HECOC8	<i>Hesperostipa comata ssp. comata</i>	80–120	–
	Indian ricegrass	ACHY	<i>Achnatherum hymenoides</i>	60–80	–
	threadleaf sedge	CAFI	<i>Carex filifolia</i>	60–80	–
	squirreltail	ELEL5	<i>Elymus elymoides</i>	20–40	–
	thickspike wheatgrass	ELLA3	<i>Elymus lanceolatus</i>	20–40	–
	bluebunch wheatgrass	PSSP6	<i>Pseudoroegneria spicata</i>	10–20	–
	James' galleta	PLJA	<i>Pleuraphis jamesii</i>	10–20	–
Forb					
2	Forbs			20–40	
	Hooker's sandwort	ARHO4	<i>Arenaria hookeri</i>	5–10	–
	bastard toadflax	COMAN	<i>Comandra</i>	5–10	–
	sulphur-flower buckwheat	ERUM	<i>Eriogonum umbellatum</i>	5–10	–
	spiny phlox	PHHO	<i>Phlox hoodii</i>	5–10	–
	hoary Townsend daisy	TOIN	<i>Townsendia incana</i>	5–10	–
Shrub/Vine					
3	Shrubs			20–120	
	black sagebrush	ARNO4	<i>Artemisia nova</i>	20–40	–
	shadscale saltbush	ATCO	<i>Atriplex confertifolia</i>	10–15	–
	Gardner's saltbush	ATGA	<i>Atriplex gardneri</i>	10–15	–
	spineless horsebrush	TECA2	<i>Tetradymia canescens</i>	10–15	–
	winterfat	KRLA2	<i>Krascheninnikovia lanata</i>	5–10	–
	plains pricklypear	OPPO	<i>Opuntia polyacantha</i>	5–10	–
	prairie sagewort	ARFR4	<i>Artemisia frigida</i>	5–10	–

Animal community

INTERPRETATIONS FOR LIVESTOCK

This site is used for grazing by cattle and sheep as well as big game. When the vegetation is near climax potential on this site, most of the production will be readily used by cattle or sheep. Because of the droughty characteristics of the soils, the annual production is lower than adjacent sites. Water is difficult to obtain by wells and the textures of the soil prohibit development of stock ponds. Care must be taken to prevent overgrazing as the soils are subject to erosion by wind and or water if the vegetation is overgrazed or destroyed by other means. Due to the large amount of production by needle and thread, heavy grazing during and after seed maturity may cause injuries to livestock. Therefore grazing management programs need to be developed that reduces this injury potential. 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 winterfat, fringed sagebrush, silver sagebrush, shadscale, and Nuttalls saltbush. Spring rest (April through July 1) will benefit the cool season grasses.

Guide to initial stocking rates:

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., 35 percent of the palatable forage produced is considered available for grazing by large herbivores.

Condition % Climax
Class Vegetation AUM/Ac AC/AUM
Excellent 76-100 .12-.14 7-8
Good 51-75 .08-.11 9-13
Fair 26-50 .04-.07 14-20
Poor 0-25 0-.03 21+

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

INTERPRETATIONS FOR WILDLIFE

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.

This range 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 dog, eagle, western meadowlark, and midget faded rattlesnake. There is heavy seasonal use by mule deer, and use by elk where this site is adjacent to pinyon or juniper trees. Antelope also use the site extensively.

Hydrological functions

Soils in this site are grouped into "A" hydrologic group, as outlined in the Soils of Colorado Loss Factors and Erodibility Hydrologic Groupings 1979 Handbook. Field investigations are needed to determine hydrologic cover conditions and hydrologic curve numbers. Refer to SCS National Engineering Handbook, Section 4, and Peak Flows in Colorado Handbook for more information.

Recreational uses

RECREATION AND NATURAL BEAUTY:

This site has a 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

No wood products are grown on this site without irrigation.

Other information

ENDANGERED PLANTS AND ANIMALS:

This site can be used by peregrine falcons for hunting, especially when rock outcrops are nearby. The site is within the historic range of the black-footed ferret and any activity 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	T12N R98W S28
General legal description	N ½ of SW ¼ Sec 28 T12N R98W

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

Suzanne Mayne Kinney

Approval

Kirt Walstad, 3/11/2025

Acknowledgments

The site occurs in Moffat county.

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	03/11/2025
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:**
-