USDA Natural Resources
Conservation Service

Ecological site R034AY433CO
Silty Swale

Last updated: 9/07/2023
Accessed: 05/12/2025

General information

Provisional. A provisional ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model and enough information to identify the ecological site.

MLRA notes

Major Land Resource Area (MLRA): 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
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
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 loam to sandy loam in surface mineral 4”.
• Slope is < 6%.
• Clay content is <35% in mineral soil surface 1-2”.

Associated sites

R034AY418CO	**Alkali Upland** higher salt content, dominated by salt shrubs

Similar sites

R034AY424CO	**Loamy 7-10 PZ** in adjacent uplands, where silty swale is a lower landscape position.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Artemisia tridentata ssp. wyomingensis*
Herbaceous	(1) *Elymus lanceolatus ssp. lanceolatus* (2) *Pascopyrum smithii*

Physiographic features

This site occurs on broad, nearly level to moderately sloping fans and bottoms. Slopes range from nearly level to 6 percent slopes. This site occurs on all aspects. Elevation for the site ranges from 6200 to 7200 feet above sea level.

Table 2. Representative physiographic features

Landforms	(1) Drainageway (2) Alluvial fan
Runoff class	Low to medium
Flooding frequency	None
Ponding frequency	None
Elevation	1,890–2,195 m
Slope	0–6%
Aspect	Aspect is not a significant factor

Climatic features

The climate for this site is arid to semi-arid with precipitation averaging between 9 and 11 inches annually. *The average seasonal precipitation in inches is as follows:

Winter (Oct 16-Apr 15) - 4.0
Spring (Apr 16-Jun 30) - 3.0
Summer (Jul 1-Aug 31) - 1.4
Fall (Sep 1-Oct 15) - 1.6

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

The growing season for the native plants averages 160 to 180 days. Growth usually starts about mid-April and continues until the end of July. 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 42 to 45 degrees Fahrenheit. Summer temperatures can reach 95ºF, while 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 ranges from 75 to 95 days and occurs from mid-June through mid-September.

Table 3. Representative climatic features

Frost-free period (characteristic range)	75-95 days
Freeze-free period (characteristic range)	
Precipitation total (characteristic range)	229-279 mm
Frost-free period (average)	95 days
Freeze-free period (average)	
Precipitation total (average)	279 mm

Influencing water features

This is a run-in site and receives additional moisture from surrounding uplands.

Wetland description

May be associated with a wetland site, but does not carry a wetland designation.

Soil features

Soils of this site are deep and well-drained. They formed in alluvium derived dominantly from interbedded sedimentary rocks. The upper 1 inch of the surface layer is pale brown loam. The lower 2 inches is grayish brown loam. This surface layer is underlain by loams to 48 inches, and then a sandy loam to a depth of 60 inches.

Soils associated with this site are:

Talamantes loam, 0 to 6 percent slope

Table 4. Representative soil features

Parent material	(1) Alluvium–interbedded sedimentary rock
Surface texture	(1) Loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderately slow to moderate
Soil depth	152 cm
Surface fragment cover <=3"	0–10%
Available water capacity (0-101.6cm)	15.75–26.42 cm
Calcium carbonate equivalent (0-101.6cm)	2–5%
Sodium adsorption ratio (0-101.6cm)	2–4

Soil reaction (1:1 water) (0-101.6cm)	7.4–9
Subsurface fragment volume <=3" (0-101.6cm)	0–10%

Ecological dynamics

The aspect of this site is a broad, open grassland in a bottom or fan position where it receives run-on moisture from adjacent sites. Shrubs are scattered across the site becoming dominant along narrow drainages. Sandberg bluegrass may appear to dominate this site because of its ability to grow rapidly in the spring. Later, western wheatgrass, thickspike wheatgrass, and streambank wheatgrass will dominate the site.

Dominant grasses are western wheatgrass, thickspike wheatgrass, and streambank wheatgrass. Less abundant grasses are Sandberg bluegrass and basin wildrye.

Forbs present in the plant community are few and are scattered sparsely across the site.

Shrubs and half-shrubs that occur on this site include Wyoming big sagebrush, winterfat, Nuttall's saltbush, and basin big sagebrush.

If ecological retrogression is cattle induced, the percentage and production of desirable plants such as western wheatgrass, Sandberg bluegrass, needle and thread, Indian ricegrass, tapertip onion, winterfat, Gardner's saltbush, and four-wing saltbush will decrease. If ecological retrogression is sheep induced, the percentage and production of desirable plants such as Indian ricegrass, Sandberg bluegrass, tapertip onion, Wyoming big sagebrush, Nuttall saltbush, winterfat, shadscale, threadleaf rubber rabbitbrush, and four-wing saltbush will decrease. With the decrease in desirable plants, there will be an increase in plants such as greasewood, plains pricklypear, spiny horsebrush, and basin big sagebrush. Annuals such as halogeton, perfoliated pepperweed, and cheatgrass will invade. If the site is un-grazed for several years, there will be an increase in shrub species.

Further evidence of retrogression may include sheet or rill erosion, pedestaling of bunchgrasses, bare areas, and increase in annuals, an absence of litter, new seedlings, or sprouts, and highly unstable forage production from year to year.

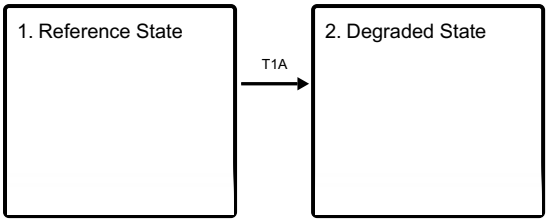
During winters of severe temperatures and snow, this site will receive heavy use in local areas on plants such as Wyoming big sagebrush, basin big sagebrush, winterfat, Gardner's saltbush, four-wing saltbush, and threadleaf rubber rabbitbrush, by deer, antelope, livestock, and elk which may occupy the site. To avoid starvation, livestock and wildlife will make use of low palatable species on this site.

In general, there is inadequate fuel to carry a fire across the site. Should a fire burn across the site, the wheatgrasses will be benefited, bunchgrasses will be slightly affected, and shrubs severely affected. Grass and forb production will decline the year and then increase for several years. Non-sprouting shrubs will be reduced immediately following fire, but will slowly increase until they dominated the site or are reduced by another fire. Sprouting species such as rabbitbrush or horsebrush will increase rapidly following a fire, but will slowly decline as other species are able to return.

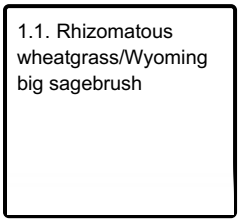
Due to the low precipitation of the area, this site will recover slowly from prolonged and severe drought. Its recovery may be enhanced if run-on moisture is received from adjacent sites. In general, grasses and forbs will show signs of stress and recovery earlier than shrubs due to their shallow root systems.

State and transition model

Ecosystem states



State 1 submodel, plant communities



State 1
Reference State

Community 1.1
Rhizomatous wheatgrass/Wyoming big sagebrush

The plant community is about 45 to 60 percent grasses, 5 to 10 percent forbs, and 35 to 45 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 1000 pounds per acre Normal years 850 pounds per acre Unfavorable years 700 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 (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	426	499	572
Shrub/Vine	314	381	448
Forb	45	73	101
Total	**785**	**953**	**1121**

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				432–572	
	western wheatgrass	PASM	*Pascopyrum smithii*	146–191	–
	thickspike wheatgrass	ELLAL	*Elymus lanceolatus ssp. lanceolatus*	146–191	–
	Sandberg bluegrass	POSE	*Poa secunda*	95–143	–
	basin wildrye	LECI4	*Leymus cinereus*	50–95	–
	needle and thread	HECOC8	*Hesperostipa comata ssp. comata*	22–50	–
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	22–50	–
	squirreltail	ELEL5	*Elymus elymoides*	11–28	–
Forb					
2				50–95	
	tapertip onion	ALAC4	*Allium acuminatum*	11–28	–
	plains springparsley	CYAC	*Cymopterus acaulis*	11–28	–
	Gray's biscuitroot	LOGR	*Lomatium grayi*	11–28	–
	spiny phlox	PHHO	*Phlox hoodii*	11–28	–
	longleaf phlox	PHLO2	*Phlox longifolia*	11–28	–
Shrub/Vine					
3				336–432	
	Wyoming big sagebrush	ARTRW8	*Artemisia tridentata ssp. wyomingensis*	95–146	–
	basin big sagebrush	ARTRT	*Artemisia tridentata ssp. tridentata*	50–95	–
	Gardner's saltbush	ATGA	*Atriplex gardneri*	50–95	–
	winterfat	KRLA2	*Krascheninnikovia lanata*	50–95	–
	bud sagebrush	PIDE4	*Picrothamnus desertorum*	11–45	–
	greasewood	SAVE4	*Sarcobatus vermiculatus*	11–45	–
	Nuttall's horsebrush	TENU2	*Tetradymia nuttallii*	11–45	–
	shadscale saltbush	ATCO	*Atriplex confertifolia*	17–45	–
	yellow rabbitbrush	CHVIV4	*Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus*	11–28	–
	fourwing saltbush	ATCA2	*Atriplex canescens*	11–28	–
	shortspine horsebrush	TESP2	*Tetradymia spinosa*	11–28	–
	plains pricklypear	OPPO	*Opuntia polyacantha*	11–28	–

Animal community

WILDLIFE INTERPRETATIONS:

This range site provides habitats which support a resident animal community that is characterized by desert and Nuttall's cottontail, white-tailed jackrabbit, white-tailed prairie dog, sage thrasher, western bluebird, western

meadowlark, brewer's sparrow, mourning dove, red-tailed hawk, golden eagle, and midget-faded prairie rattlesnake. This site is particularly important for sage grouse and antelope. It also serves as mule deer habitat when in proximity to mountains, and it may also provide critical habitat for elk in the winter.

Management should be geared to provide cover and food for the wildlife present. If range seeding is done, mixtures should meet the needs of the wildlife and livestock present. When applying brush control, care should be taken not to destroy sage grouse strutting areas.

GRAZING INTERPRETATIONS:

This site is used almost exclusively as winter range for sheep. Due to its broad, open and relatively flat topography, it receives heavy use by livestock and wildlife which congregate on it. In order to maintain the productivity of this site, care must be taken to avoid over-grazing. Herding of sheep and movement of cattle is necessary during early spring growth 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 (October through March) benefits shrubs such as winterfat, Nuttall's saltbush, four-wing saltbush, shadscale, and Wyoming big sagebrush. Spring rest (March through May) benefits cool season plants such as western wheatgrass, Sandberg bluegrass, needle and thread, Indian ricegrass, and tapertip onion. 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, needle and thread, western wheatgrass, tapertip onion, four-wing saltbush, winterfat, and Wyoming big sagebrush.

Brush management may be accomplished by application of herbicides. Fire is an alternative, but when an abundance of rabbitbrush exists, it is not recommended. Mechanical control is a possibility, as the disturbance of rhizomes will cause wheatgrasses to flourish and stabilize the soil to prevent further erosion.

If this site has bee severely damaged by overgrazing and is producing a high percentage of undesirable shrubs, range seeding may be necessary to restore this site. Seedling establishment is difficult due to low precipitation, fall seeding is highly recommended. Species selected should meet the needs of livestock and wildlife.

Total annual air dry production ranges are as follows:

Unfavorable year - 700 pounds/Ac.
Normal year - 850 pounds/Ac.
Favorable year - 1,000 pounds/Ac.

Of this production, 25 percent will likely be unpalatable of out of reach to grazing animals.

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, and weathering expect 35 percent of the palatable forage produced to be available for grazing.

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

Excellent - 76-100% - (2.2) (.50)
Good - 51-75% - (4.0) (.25)
Fair - 26-50% - (6.0) (.17)
Poor - 0-25% - (10.0) (.10)

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, presence of introduced species, etc., stocking rate adjustments will be required.

Major Poisonous Plants:

Black greasewood affects sheep and cattle. Type of poisoning are sodium and potassium oxalates. Season of concern is spring.

Halogeton affects sheep and cattle also. Type of poisoning is calcium oxalates. Season of concern - spring.

Nuttall and spiny horsebrush affect sheep. Type of poisoning is organic resins. Season of concern is spring.

Hydrological functions

The abundance of grasses on this site provides a good canopy cover which will protect the soil surface. The presence of sod-forming wheat grasses provides good protection from soil erosion if they are maintained in a healthy condition. Efforts to maintain or improve plant cover are highly recommended, and may require seeding to do so in order too prevent water erosion.

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 determin e hydrologic cover conditions and hydrologic curve numbers. Refer to Peak Flows in Coloado handbook, and SCS National Engineering Handbook, Section 4, for hydrologic curve numbers in determining runoff quantities.

Recreational uses

This site has native forbs and shrubs that bloom from early spring to early summer which are aesthetically pleasing. Hunting for upland game birds, rabbits, coyotes, and antelope provide recreation.

Wood products

There is no real potential for commercial wood products on this site. However, this site lends itself to tree and shrub plantings for windbreaks, wildlife, and controlling soil erosion. Species which may be included are Russian olive, honey locust, Rocky Mountain juniper, and pinyon. Sites should be engineered to provide supplemental moisture to promote seedling establishment.

Other products

None noted.

Other information

ENDANGERED PLANTS AND ANIMALS:

If there are any prairie dog towns on the site they are potential habitat for the black-footed 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	
General legal description	SW 1/4 of NW 1/4 Section 17, T9N, R99W; Moffat County and the NE 1/4 of NE 1/4 of SW1/4 Section 19, T12N, R97W; Moffat County

Other references

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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	05/12/2025

Approved by	Kirt Walstad
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:**

2. **Presence of water flow patterns:**

3. **Number and height of erosional pedestals or terracettes:**

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):**

5. **Number of gullies and erosion associated with gullies:**

6. **Extent of wind scoured, blowouts and/or depositional areas:**

7. **Amount of litter movement (describe size and distance expected to travel):**

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):**

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):**

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:**

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):**

12. **Functional/Structural Groups (list in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to):**

    Dominant:

Sub-dominant:

Other:

Additional:

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):**

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14. **Average percent litter cover (%) and depth (in):**

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):**

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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:**

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17. **Perennial plant reproductive capability:**
