

Ecological site R034AY418CO Alkali Upland

Last updated: 9/07/2023
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

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 is saline or saline-sodic.
 - o very shallow to 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 sandy loam to silty clay loam in surface mineral 4".
- Slope is < 20%.
- Clay content is < 35% in mineral soil surface 1-2".

Associated sites

| | |
|-------------|--|
| R034AY424CO | Loamy 7-10 PZ not a salt affected site adjacent to alkali upland |
|-------------|--|

Similar sites

| | |
|-------------|--|
| R034AY144WY | Saline Upland Green River and Great Divide Basins (SU) site occurs in adjoining LRU in Wyoming |
|-------------|--|

Table 1. Dominant plant species

| | |
|------------|--|
| Tree | Not specified |
| Shrub | (1) <i>Atriplex gardneri</i> |
| Herbaceous | (1) <i>Pascopyrum smithii</i> (2) <i>Achnatherum hymenoides</i> |

Physiographic features

This site occurs on upland positions on flat to slightly sloping areas. Slopes range from 0 to 20 percent. This site occurs on all exposures. Elevation for the site ranges from 6000 to 7200 feet above sea level.

Table 2. Representative physiographic features

| | |
|--------------------|------------------------------------|
| Landforms | (1) Hill (2) Alluvial fan |
| Runoff class | Low to high |
| Flooding frequency | None |
| Ponding frequency | None |
| Elevation | 6,000–7,200 ft |
| Slope | 0–20% |
| Aspect | Aspect is not a significant factor |

Climatic features

The climate of this site is arid to semi-arid, with precipitation averaging between 9 and 11 inches annually. About 40 percent of this precipitation comes in the form of snow. The average monthly precipitation follows.

Winter (Oct. 16 - April 15) - 4.0 inches

Spring (April 16 - June 30) - 3.0 inches

Summer (July 1 - August 31) - 1.4 inches

Fall (September 1 - Oct. 15) - 1.6 inches

The growing season for the native plants averages about 30 days. This usually starts about mid-May and goes until mid June. Cool-season grasses start spring growth using moisture stored in the soil from snow melt and spring rains. Optimum growth continues until the soil profile is depleted of useable soil moisture.

The average annual air temperature is about 42 to 45 degrees Fahrenheit. Summer temperatures can reach 90°F, and winter temperatures can dip to -30 degrees Fahrenheit. Temperatures fall below the freezing mark much of the time in October through April. The average frost-free period occurs from June through August lasting about 75 to 95 days.

This area is windy during the winter and spring, causing the site to be very droughty. Most of the rain comes in relatively slow soaking showers. Many do not yield enough moisture to be effective due to the high evaporation.

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

None

Soil features

Soils of this site are very shallow to deep and well drained. They formed in alluvium derived from gypsiferous shales and residium derived from fissile shale and red shale. Surface textures are mostly silty clay loam and sandy loam. The underlying material is silty clay loam and clay loam grading into weathered shale, interbedded shale and sandstone. Permeability ranges from slow to very slow. Available water holding capacities are low to very high. Effective rooting depth is 10 to 60 inches. Runoff is medium to rapid and the hazard of water erosion is moderate to high.

Major soils which are associated with this site:

Beamton silty clay loam 2 to 12 percent slope

Boltus silty clay loam 2 to 12 percent slope

Boltus silty clay loam 2 to 20 percent slope

Blazon sandy loam 5 to 15 percent slope

Table 4. Representative soil features

| | |
|--|--|
| Parent material | (1) Alluvium–shale (2) Residuum–shale |
| Surface texture | (1) Silty clay loam (2) Sandy loam |
| Family particle size | (1) Clayey |
| Drainage class | Well drained |
| Permeability class | Very slow to moderate |
| Soil depth | 10–60 in |
| Available water capacity (0-40in) | 2.7–4.7 in |
| Calcium carbonate equivalent (0-40in) | 5% |
| Electrical conductivity (0-40in) | 4–8 mmhos/cm |
| Sodium adsorption ratio (0-40in) | 5 |

Ecological dynamics

The aspect of this site is that of a low growing shrub community, dominated by Gardner's Saltbush. The plant

community is about 35 to 45 percent grass, 5 to 15 percent forbs, and 50 to 60 percent shrubs (air-dry weight of current seasons growth).

Dominant grasses are Western wheatgrass, thickspike wheatgrass, streambank wheatgrass, and Indian ricegrass. Less abundant grasses are Sandberg bluegrass, bluebunch wheatgrass, bottlebrush squirreltail, and needle and thread.

Major forbs present in the plant community include Hoods phlox (spiny phlox), stemless spring parsley, rose pussytoes, tapertip onion, fern-leaf biscuitroot, daisy fleabane, and longleaf phlox.

Shrubs and half-shrubs that occur on this site are Gardner's saltbush, green molly summer cypress, winterfat, shadscale, and mat saltbush.

If ecological retrogression is cattle induced, the percentage and production of desirable plants such as western wheatgrass, Indian ricegrass, needleandthread, Sandberg bluegrass, tapertip onion, Gardner's saltbush, Winterfat, and shadscale will decrease. If ecological retrogression is sheep induced, the percentage and production of desirable plants such as Indian ricegrass, Sandberg bluegrass, tapertip onion, rose pussytoes, Gardner's saltbush, bud sagebrush, mat saltbush, winterfat and shadscale will decrease.

As retrogression continues, plants such as plains prickly pear, stemless goldenweed, and woodyaster will increase. Plants likely to invade the site and increase in density include cheatgrass, halogeton, curly dock, Russian thistle and perfoliated pepperweed.

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

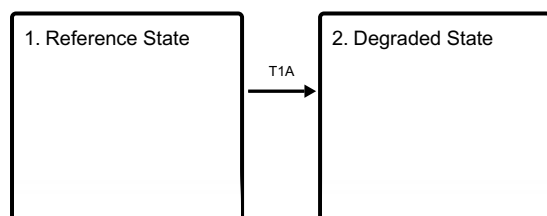
During winters of severe temperatures and snows, there will be heavy use in local areas of plants such as winterfat, shadscale, Wyoming big sagebrush and Gardner's saltbush by deer, antelope, livestock and any elk which may occupy the site. In extreme situations wildlife and livestock will make use of low palatable species to avoid starvation.

Generally there is inadequate fuel to carry a fire across the site. Should a fire burn across the site, thickspike wheatgrass, western wheatgrass and streambank wheatgrass will be benefited. Other grasses and forbs will be slightly to somewhat adversely affected. Most shrub species will be severely affected except for horsebrush and rabbitbrush species, which will flourish following fire.

Due to the low precipitation of the area, recovery from long and severe drought will be slow. In general, grasses and forbs will show signs of stress and recovery earlier due to their shallow root systems.

State and transition model

Ecosystem states



State 1 submodel, plant communities



State 1

Reference State

Community 1.1

Gardner's Saltbush/Indian Ricegrass-Western Wheatgrass

Basal area (the area of ground surface covered by perennial vegetation at ground level) is approximately 10 to 15 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 700 lbs/ac Normal years 450 lbs/ac Unfavorable years 300 lbs/ac Of this production, 35 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 | 80 | 170 | 330 |
| Shrub/Vine | 200 | 235 | 300 |
| Forb | 20 | 45 | 70 |
| Total | 300 | 450 | 700 |

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 | | | | 115–225 | |
| | Indian ricegrass | ACHY | <i>Achnatherum hymenoides</i> | 45–70 | – |
| | western wheatgrass | PASM | <i>Pascopyrum smithii</i> | 45–70 | – |
| | thickspike wheatgrass | ELLA3 | <i>Elymus lanceolatus</i> | 20–35 | – |
| | thickspike wheatgrass | ELLAL | <i>Elymus lanceolatus</i> ssp. <i>lanceolatus</i> | 20–35 | – |
| | Sandberg bluegrass | POSE | <i>Poa secunda</i> | 5–15 | – |
| | bluebunch wheatgrass | PSSP6 | <i>Pseudoroegneria spicata</i> | 5–10 | – |
| | needle and thread | HECOC8 | <i>Hesperostipa comata</i> ssp. <i>comata</i> | 5–10 | – |
| | squirreltail | ELEL5 | <i>Elymus elymoides</i> | 5–10 | – |
| Forb | | | | | |
| 2 | | | | 25–70 | |
| | tapertip onion | ALAC4 | <i>Allium acuminatum</i> | 5–10 | – |
| | rosy pussytoes | ANRO2 | <i>Antennaria rosea</i> | 5–10 | – |
| | plains springparsley | CYAC | <i>Cymopterus acaulis</i> | 5–10 | – |
| | fernleaf biscuitroot | LODI | <i>Lomatium dissectum</i> | 5–10 | – |
| | spiny phlox | PHHO | <i>Phlox hoodii</i> | 5–10 | – |
| | longleaf phlox | PHLO2 | <i>Phlox longifolia</i> | 0–5 | – |
| | hoary Townsend daisy | TOIN | <i>Townsendia incana</i> | 0–5 | – |
| | prairie fleabane | ERST3 | <i>Erigeron strigosus</i> | 0–5 | – |
| | povertyweed | IVAX | <i>Iva axillaris</i> | 0–5 | – |
| Shrub/Vine | | | | | |
| 3 | | | | 205–270 | |
| | Gardner's saltbush | ATGA | <i>Atriplex gardneri</i> | 205–225 | – |
| | winterfat | KRLA2 | <i>Krascheninnikovia lanata</i> | 10–20 | – |
| | green molly | BAAM4 | <i>Bassia americana</i> | 5–10 | – |
| | shadscale saltbush | ATCO | <i>Atriplex confertifolia</i> | 5–10 | – |
| | mat saltbush | ATCO4 | <i>Atriplex corrugata</i> | 5–10 | – |
| | yellow rabbitbrush | CHVI8 | <i>Chrysothamnus viscidiflorus</i> | 0–5 | – |
| | slender buckwheat | ERMIL2 | <i>Eriogonum microthecum</i> var. <i>laxiflorum</i> | 0–5 | – |
| | plains pricklypear | OPPO | <i>Opuntia polyacantha</i> | 0–5 | – |
| | bud sagebrush | PIDE4 | <i>Picrothamnus desertorum</i> | 0–5 | – |
| | stemless mock goldenweed | STAC | <i>Stenotus acaulis</i> | 0–5 | – |
| | Nuttall's horsebrush | TENU2 | <i>Tetradymia nuttallii</i> | 0–5 | – |
| | charming woodyaster | XYVE | <i>Xylorhiza venusta</i> | 0–5 | – |
| | prairie sagewort | ARFR4 | <i>Artemisia frigida</i> | 0–5 | – |
| | birdfoot sagebrush | ARPE6 | <i>Artemisia pedatifida</i> | 0–5 | – |
| | Wyoming big sagebrush | ARTRW8 | <i>Artemisia tridentata</i> ssp. <i>wyomingensis</i> | 0–5 | – |

Animal community

WILDLIFE INTERPRETATIONS:

This range site provides habitat which supports a resident animal community that is characterized by coyotes, antelope, desert cottontail, Nuttall's cottontail, white-tailed jackrabbit, mourning dove, and occasionally sage grouse and sage sparrows. There is seasonal use by mule deer and occasionally elk during the winter.

This site is most valuable to small wildlife species since the aspect is a low growing shrub/grass community. A number of forage species on this site are highly palatable to big game herbivores.

GRAZING INTERPRETATIONS:

This site is used extensively as winter range for sheep, and to a lesser degree for cattle. Gardner's saltbush is important winter feed for both domestic animals and big game species. In order to maintain the productivity of this site, care must be taken to avoid overgrazing. 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 necessary 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 Gardner's saltbush, winterfat, shadscale, bud sagebrush and mat saltbush. Spring rest (Mar-May) benefits cool season plants such as western wheatgrass, Indian ricegrass, needleandthread, Sandberg bluegrass, tapertip onion, and rose pussytoes. Deferment during late winter and spring reduces competition between grazing animals for palatable shrubs and forbs.

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

CONDITION CLASS - (PERCENT CLIMAX VEGETATION) - AC/AUM - AUM/AC

Excellent (76-100) - 6.7 AC/AUM - .15 AUM/AC

Good (51-75) - 8.0 AC/AUM - .12 AUM/AC

Fair (26-50) - 12.0 AC/AUM - .08 AUM/AC

Poor (0-25) - 16.0+ Ac/AUM - .06 AUM/AC

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.

Depending on climatic conditions, in some years palatable annuals such as cheatgrass may produce large amounts of forage that is available for only a short time. Intensive grazing programs on these areas followed by deferment is an excellent management tool to utilize these annuals but still allow recovery of the perennial vegetation normally associated with this site.

Hydrological functions

Soils in this site are grouped into "C" and "D" 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 high potential for recreation in hunting antelope, coyotes and rabbits. Its distance from population centers keeps it from drawing people to it for camping or picnicking. It offers no real natural beauty other than its being a very unique site.

Wood products

No wood products are native to this site. The site is not suited for tree production.

Other products

None noted.

Other information

ENDANGERED PLANTS AND ANIMALS:

This site is within the historical range of the black-footed ferret. If there are any prairie dog towns on the site, they offer potential habitat for the ferret

PRESCRIBED BURNING:

Prescribed burning is not recommended on this site. Proper use and a planned grazing system are the best treatments for range improvement.

SITE OCCURRENCE:

The site occurs in the northwest part of Moffat County.

POISONOUS PLANTS:

Halogeton is poisonous to cattle and sheep. The poison is sodium and potassium oxalates. Sheep and cattle are most affected in the spring during rapid growth.

Woody aster is poisonous to sheep by a resinous substance. It most affects sheep in the spring and early summer when other forage is not available.

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 | SE1/4, Sec 12, T11N, R100W, Moffat County, CO; and NW1/4 NW1/4, Sec 12, T10N, R99W, Moffat County, Co |

Other references

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Contributors

Suzanne Mayne Kinney

Approval

Kirt Walstad, 9/07/2023

Acknowledgments

Field offices in Colorado where the site occurs: Moffat.

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 | 05/11/2025 |
| 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:**
-