USDA Natural Resources
Conservation Service

Ecological site R034AY331CO
Sandy Slopes

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: 11-12 inches (10 to 14 inches)
• RV Frost-Free Days: 75-95 days

Classification relationships

Relationship to Other Established Classification Systems

Ecoregions (EPA):
Level I: 10 North American Deserts
Level II: 10.1 Cold Deserts
Level III: 10.1.4 Wyoming Basin

Ecological site concept

• This site does not receive any additional water.
• These soils:
o are not saline or saline-sodic
o are very deep
o are not skeletal within 20” of the soil surface; and have minimal rock fragments at the soil surface
o are not strongly or violently effervescent in the surface mineral layer (within top 10”)
o have surface textures that usually range from loamy fine sand to fine sandy loam in surface mineral layer (4”)
• have slopes less than 30 percent
• does not have a clay content that is greater than 35% in mineral soil surface layer (1-2”)

Associated sites

R034AY330CO	**Sandy Land**

Similar sites

R034AY293CO	**Sandhills**

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Artemisia tridentata ssp. wyomingensis* (2) *Purshia tridentata*
Herbaceous	(1) *Hesperostipa comata* (2) *Achnatherum hymenoides*

Physiographic features

The topography of this site is rolling to fairly steep hillsides.

Table 2. Representative physiographic features

Landforms	(1) Hill (2) Alluvial fan
Runoff class	Very low to medium
Flooding frequency	None
Ponding frequency	None
Elevation	6,000–7,200 ft
Slope	10–30%
Aspect	Aspect is not a significant factor

Climatic features

Mean annual precipitation is 11 to 12 inches, ranging from 10 to 14 inches.

This site has a hard freeze free periods of 135 to 180 days (24ºF).

Mean annual air temperature is between 42 and 45 degrees Fahrenheit.
Mean annual soil temperature is between 43 and 46 degrees Fahrenheit.

Table 3. Representative climatic features

Frost-free period (characteristic range)	75-95 days
Freeze-free period (characteristic range)	135-180 days
Precipitation total (characteristic range)	10-14 in
Frost-free period (actual range)	75-95 days
Freeze-free period (actual range)	
Precipitation total (actual range)	10-14 in
Frost-free period (average)	80 days
Freeze-free period (average)	155 days
Precipitation total (average)	12 in

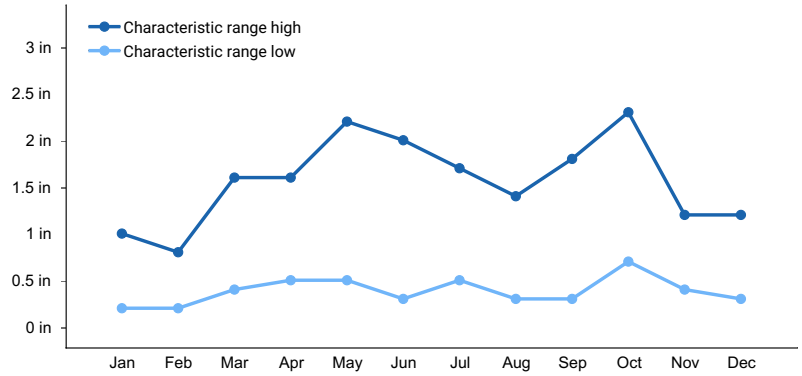


Figure 1. Monthly precipitation range

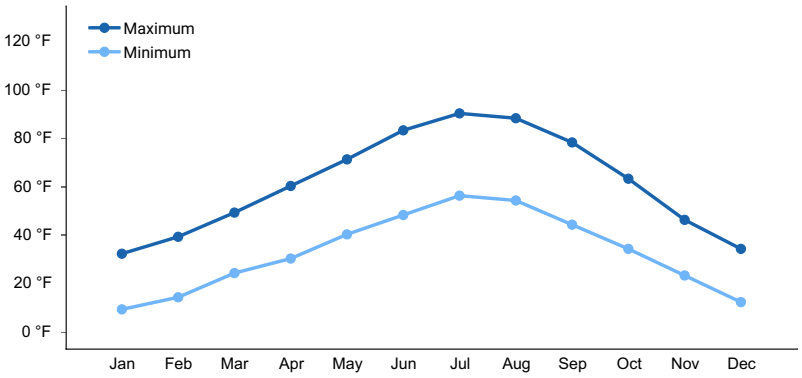


Figure 2. Monthly average minimum and maximum temperature

Influencing water features

None

Wetland description

None

Soil features

Soils are very deep and excessively drained. The surface soil is loamy fine sand two inches thick and light yellow brown. The texture of the subsoil is fine sandy loam to a depth of 28 inches and is light brownish gray. The underlying material is fine sandy loam to a depth of more than 60 inches and is pale yellow. The water holding capacity is moderate and runoff is medium. The soil is calcareous throughout. Hazard of water erosion and wind erosion is high.

Soils correlated to this site are:
Grieves loamy fine sand 10 to 30 percent slope

Table 4. Representative soil features

Parent material	(1) Alluvium–sandstone (2) Residuum–sandstone
Surface texture	(1) Loamy fine sand
Family particle size	(1) Sandy
Drainage class	Well drained to excessively drained
Permeability class	Rapid to very rapid
Soil depth	60 in

Surface fragment cover <=3"	0–5%
Available water capacity (0-40in)	2.9–5.8 in
Calcium carbonate equivalent (0-40in)	0–5%
Soil reaction (1:1 water) (0-40in)	6.6–8.4
Subsurface fragment volume <=3" (Depth not specified)	0–15%

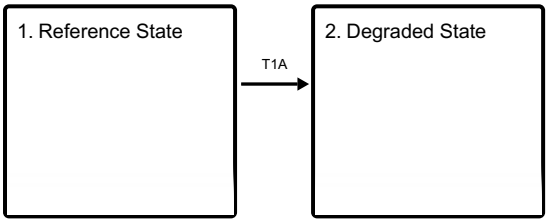
Ecological dynamics

When this site is near its potential, a combination of grasses, forbs and shrubs will be present. The dominant grasses include Indian ricegrass, needle and thread, western wheatgrass, galleta, bottlebrush squirreltail, and prairie Junegrass. The most abundant shrubs include antelope bitterbrush, and Wyoming big sagebrush.

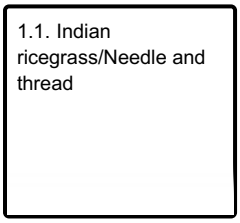
This site is very fragile with highly erosive soils. If degradation is cattle induced, the more palatable plants such as needle and thread, bluebunch wheatgrass, Indian ricegrass, and antelope bitterbrush will decrease in relative production. If degradation is sheep induced, the more palatable plants such as Wyoming big sagebrush, antelope bitterbrush, bluebunch wheatgrass, Indian ricegrass, needleleaf sedge, and threadleaf sedge will decrease in relative production. Utah juniper and pinyon pine will invade the site along with cheatgrass and annual mustards. As the site continues to degrade, the trees will become dominant and the soil becomes susceptible to extreme soil erosion.

State and transition model

Ecosystem states



State 1 submodel, plant communities



State 1
Reference State

Community 1.1
Indian ricegrass/Needle and thread

Grasses make up approximately 50 to 75 percent of the total production while forbs are 5 to 10 percent and shrubs make up approximately 20 to 40 percent.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	135	190	240
Shrub/Vine	55	90	125
Forb	10	20	35
Total	**200**	**300**	**400**

Table 6. Ground cover

Tree foliar cover	0%
Shrub/vine/liana foliar cover	1-2%
Grass/grasslike foliar cover	12-15%
Forb foliar cover	0-1%
Non-vascular plants	0%
Biological crusts	0%
Litter	0%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	0%

Table 7. Canopy structure (% cover)

Height Above Ground (Ft)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.5	–	–	–	3-5%
>0.5 <= 1	–	–	25-30%	–
>1 <= 2	–	–	–	–
>2 <= 4.5	–	3-5%	–	–
>4.5 <= 13	–	–	–	–
>13 <= 40	–	–	–	–
>40 <= 80	–	–	–	–
>80 <= 120	–	–	–	–
>120	–	–	–	–

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 8. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1				150–225	
	needle and thread	HECOC8	*Hesperostipa comata ssp. comata*	45–120	–
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	30–75	–
	bluebunch wheatgrass	PSSP6	*Pseudoroegneria spicata*	30–60	–
	squirreltail	ELEL5	*Elymus elymoides*	30–45	–
	thickspike wheatgrass	ELLAL	*Elymus lanceolatus ssp. lanceolatus*	15–30	–
	Sandberg bluegrass	POSE	*Poa secunda*	0–30	–
	needleleaf sedge	CADU6	*Carex duriuscula*	0–15	–
	threadleaf sedge	CAFI	*Carex filifolia*	0–15	–
	prairie Junegrass	KOMA	*Koeleria macrantha*	0–15	–
Forb					
2				15–30	
	tapertip onion	ALAC4	*Allium acuminatum*	0–5	–
	rosy pussytoes	ANRO2	*Antennaria rosea*	0–5	–
	Fendler's sandwort	ARFE3	*Arenaria fendleri*	0–5	–
	freckled milkvetch	ASLE8	*Astragalus lentiginosus*	0–5	–
	woolly locoweed	ASMO7	*Astragalus mollissimus*	0–5	–
	wavyleaf Indian paintbrush	CAAPM	*Castilleja applegatei ssp. martinii*	0–5	–
	sego lily	CANU3	*Calochortus nuttallii*	0–5	–
	tapertip hawksbeard	CRAC2	*Crepis acuminata*	0–5	–
	roughseed cryptantha	CRFL6	*Cryptantha flavoculata*	0–5	–
	cushion buckwheat	EROV	*Eriogonum ovalifolium*	0–5	–
	shaggy fleabane	ERPU2	*Erigeron pumilus*	0–5	–
	rosy gilia	GISI	*Gilia sinuata*	0–5	–
	fernleaf biscuitroot	LODI	*Lomatium dissectum*	0–5	–
	silvery lupine	LUAR3	*Lupinus argenteus*	0–5	–
	mat penstemon	PECA4	*Penstemon caespitosus*	0–5	–
	Crandall's beardtongue	PECR5	*Penstemon crandallii*	0–5	–
	longleaf phlox	PHLO2	*Phlox longifolia*	0–5	–
	scarlet globemallow	SPCO	*Sphaeralcea coccinea*	0–5	–
	heartleaf twistflower	STCO6	*Streptanthus cordatus*	0–5	–
	stemless four-nerve daisy	TEAC	*Tetraneuris acaulis*	0–5	–
	hollyleaf clover	TRGY	*Trifolium gymnocarpon*	0–5	–
Shrub/Vine					
3				60–120	
	Wyoming big sagebrush	ARTRW8	*Artemisia tridentata ssp. wyomingensis*	30–60	–
	antelope bitterbrush	PUTR2	*Purshia tridentata*	30–45	–

	spiny hopsage	GRSP	*Grayia spinosa*	0–30	–
	desert princesplume	STPIP	*Stanleya pinnata var. pinnata*	0–5	–

Animal community

WILDLIFE INTERPRETATIONS:

This site is important winter habitat for mule deer and pronghorn. Sage grouse, sage sparrows and many other wildlife species associated with sagebrush communities are also found on the site. Conservation practices that provide water such as ponds can be very beneficial. Brush control and range seeding is detrimental to many sage dependent wildlife species while being beneficial to other species. Brush control practices with less than 75 percent kill are preferable for wildlife. Planned practices should strive for a mosaic of areas in different successional stages from grass to decadent sagebrush to provide for all wildlife species.

Some representative species of sagebrush bunchgrass communities are:
Mule deer
pronghorn
mountain lion
elk
badger
bobcat
coyote
Nuttall's cottontail
white-tailed jackrabbit
mourning dove
sage grouse
green-tailed townee
Brewer's sparrow
sage sparrow
sage thrasher
red-tailed hawk
ferruginous hawk
golden eagle
sagebrush vole
deer mouse
white-tailed prairie dog
Richardson's ground squirrel
Great Basin spadefoot
tiger salamander
sagebrush lizard
Eastern fence lizard
side-blotched lizard
western rattlesnake
striped whipsnake
bull snake

GRAZING INTERPRETATIONS:

Stocking rates given below are based on continuous use for the entire growing season and are intended only as an initial guide. About 20 to 40 percent of the total production (by air-dry weight) will likely be unpalatable or out of reach of grazing animals. 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.

Excellent (76-100%) .13-.12AUM/Ac; 7-8 Ac/AUM; 84-96Ac/AU
Good (51-75%) .12-.10 AUM/Ac; 9-10 Ac/AUM; 108-120 Ac/AU

Fair (26-50%) .09-.05 AUM/Ac; 11-20 Ac/AUM; 132-240 Ac/AU
Poor (0-25%) .04-.01 AUM/Ac; No grazing recommended.

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

Grazing value of this site even in climax condition, is fairly low due to low production. Extreme care needs to be exercised to prevent accelerated soil erosion. Any Utah juniper and pinyon pine present on this site should be cut or killed. Severe erosion occurs on this site when juniper and pinyon pine gain dominance. A planned grazing system that provides deferment from grazing at least 75 percent of the time during the growing season can help to maintain and improve the vegetation on this site.

Hydrological functions

Soils in this site are grouped into the "D" 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 NRCS National Engineering Handbook, Section 4, and Peak Flows in Colorado Handbook for more information.

Recreational uses

The site has some potential for recreation and natural beauty. The forbs bloom in the spring which can be very attractive. The site offers good hunting in the fall.

Wood products

The site when in climax condition, is treeless. There is no potential for wood products under these condiions. If trees have invaded onto the site, they should be harvested for firewood, fence posts, fence stays, and Christmas trees or destroyed because of the erosion hazard that the trees create on this soil.

Other information

Endangered Plants and Animals:
Areas of this site that contain white-tailed prairie dogs are potential black-footed ferret habitat.

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

Other references

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Contributors

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Approval

Kirt Walstad, 9/07/2023

Acknowledgments

Counties where this 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:**