USDA Natural Resources
Conservation Service

Ecological site R034AY421CO
Cold Desert Overflow

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 receives additional water.
• Soils are:
o are not slightly saline or saline-sodic.
o are deep
o are 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 fine sand to clay loam in surface mineral 4”.
• Slope is less than 3 percent.
• Clay content is less than 35% and great than 18% in mineral soil surface 1-2”.

Associated sites

R034AY420CO	**Cold Desert Breaks**

Similar sites

R034AY285CO	**Foothill Swale**
R034AY433CO	**Silty Swale**

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Atriplex canescens* (2) *Salix interior*
Herbaceous	(1) *Leymus cinereus* (2) *Pascopyrum smithii*

Physiographic features

This site occurs on nearly level areas along the Green River and some of its tributaries. Slopes range from 0 to 3 percent with the site occurring on all aspects. Elevation for the site ranges from 5,300 to 5,500 feet above sea level.

Table 2. Representative physiographic features

Landforms	(1) Flood plain
Runoff class	Very low to medium
Flooding frequency	Rare
Elevation	5,300–5,500 ft
Slope	0–3%
Ponding depth	0 in
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. About 40 percent of this precipitation comes in the form of snow.

The growing season for the native plants averages 160 to 180 days. This usually starts in early April and goes until late September. Cool season grasses start spring growth using moisture stored in the soil from snow melt, spring rains, and sub-water from the Green River and its tributaries. Optimum growth occurs from late April through late July, until the soil profile is depleted of usable soil moisture. A second period of growth may occur in the fall as a result of a fall moisture peak.

The average annual air temperature ranges from 45 to 48 degrees Fahrenheit. Summer temperatures can reach 100 degrees Fahrenheit, 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 June 2 through September 15, lasting about 105 days.

July is normally the driest month. The position of the site with respect to the river or smaller tributaries, lengthens the growing season. Prior to the construction of the Flaming Gorge Dam, this site was flooded annually during the growing season.

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

Influencing water features

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

Wetland description

Although associated with wetlands potentially, no wetland classification is made.

Soil features

The soils are deep and have an effective rooting depth of more than 60 inches. Hazards for water erosion are slight, and soil blowing high. Runoff is slow. They range from moderately to somewhat excessively drained. Permeabilities range from moderate for Glenton and Youngston soils, to rapid for the Baroid and slow for Winkleman soils. Available water holding capacities are high for the Youngston and Winkelman soils, moderate for Glenton, and low for Baroid.

The vegetation on this site is influenced more by subirrigation than soil texture. Surface horizons are from 3 to 9 inches thick. They are underlain to 60 inches by clay and silt loams in the Youngston soils, and loams and clay loams in the Winkelman soils. The Glenton soils are underlain by stratified sandy clay loams and fine sandy loams. The Baroid soils are underlain by stratified fine sands, loamy fine sands and fine sandy loams. Below 47 inches loams are present.

Major soils associated with this site are:

Baroid-Eghelm complex, 0 to 3 percent
Winkleman clay loam, 0 to 3 percent
Youngston loam, cool, 0 to 3 percent

Table 4. Representative soil features

Parent material	(1) Alluvium
Surface texture	(1) Loamy fine sand (2) Fine sandy loam (3) Clay loam
Family particle size	(1) Loamy
Drainage class	Moderately well drained to somewhat excessively drained
Permeability class	Slow to rapid
Soil depth	60 in
Surface fragment cover <=3"	0–10%
Available water capacity (0-40in)	5.6–10.8 in
Calcium carbonate equivalent (0-40in)	5–10%
Soil reaction (1:1 water) (0-40in)	7.9–9
Subsurface fragment volume <=3" (0-40in)	0–10%

Ecological dynamics

The aspect of this site is an open grassland with scattered shrubs.

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 existing vegetation, particularly the lowlands immediately adjacent to the Green River and the area north of the river. This has made it difficult to determine the potential natural vegetation.

It is also known that many areas near the river were under irrigated cultivation for hay, which creates further complications in determining the potential natural vegetation, and accounts for a wide variety of introduced species.

Dominant grasses and grasslike plants are basin wildrye, western wheatgrass, and common reed. Less abundant grasses are alkali sacaton, inland saltgrass, and bottlebrush squirreltail.

Shrubs, and half-shrubs that occur on this site are fourwing saltbush, rubber rabbitbrush, sandbar willow, and skunkbush sumac. Rio Grande poplar can grow on the site in widely scattered stands.

If ecological retrogression occurs, the percentage and production of desirable plants such as alkali sacaton, western wheatgrass, fourwing saltbush, sandbar willow, and dandelion will decrease. Along with the decrease in desirable plants, there will be an increase in plants such as common reed, scratchgrass, black greasewood, wetern virginsbower, and rubber rabbitbrush. Plants likely to invade include tamarisk, Russian thistle, Kentucky bluegrass, and cheatgrass. Further evidence of retrogression may be "hedging" of shrubs, bare areas, blowouts, a "stooled" appearance of basin wildrye, a large increase in annuals, absence of plant litter and new seedlings, and highly unstable forage production from year to year.

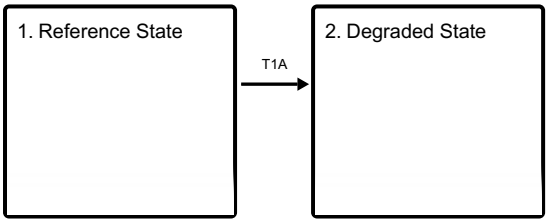
During winters of severe temperatures and snows, there will be heavy use in local areas of skunkbush sumac, Woods rose, sandbar willow, and fourwing saltbush by deer, antelope, livestock, and any elk which may occupy the site. Wildlife and livestock will make use of low palatable species to avoid starvation.

Due to the proximity of this site to perennial water and a seasonal high water table, the effects of prolonged and/or severe drought are lessened, and enable the site to recover at a faster rate than adjacent upland sites.

Basal area (the, area of ground surface covered by the perennial vegetation measured one inch above the soil) is approximately 45 percent when near the potential plant commty.

State and transition model

Ecosystem states



State 1 submodel, plant communities

State 1
Reference State

Community 1.1
Basin Wildrye-Western Wheatgrass/Sandbar Willow

The plant community is about 60 to 80 percent grass, 5 to 10 percent forbs, and 15 to 30 percent shrubs (air-dry weight of current season's growth). Annual Production: If the range is in excellent condition, the approximate total annual production (air-dry) is: Favorable years 4000 lbs/ac Normal years 3500 lbs/ac Unfavorable years 3000 lbs/ac Of this production, 60 percent will likely be unpalatable or out of reach of the grazing animal.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	2430	2450	2975
Shrub/Vine	400	650	785
Forb	170	265	375
Total	**3000**	**3365**	**4135**

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				2100–2800	
	basin wildrye	LECI4	*Leymus cinereus*	875–1225	–
	western wheatgrass	PASM	*Pascopyrum smithii*	350–700	–
	common reed	PHAU7	*Phragmites australis*	350–525	–
	saltgrass	DISP	*Distichlis spicata*	175–350	–
	squirreltail	ELEL5	*Elymus elymoides*	175–350	–
	rush	JUNCU	*Juncus*	105–175	–
	alkali sacaton	SPAI	*Sporobolus airoides*	0–175	–
	scratchgrass	MUAS	*Muhlenbergia asperifolia*	70–175	–
	sedge	CAREX	*Carex*	105–175	–
Forb					
2				175–350	
	scouringrush horsetail	EQHY	*Equisetum hyemale*	70–175	–
Shrub/Vine					
3				525–1050	
	sandbar willow	SAIN3	*Salix interior*	175–350	–
	greasewood	SAVE4	*Sarcobatus vermiculatus*	70–175	–
	rubber rabbitbrush	ERNA10	*Ericameria nauseosa*	105–175	–
	skunkbush sumac	RHTR	*Rhus trilobata*	105–175	–
	fourwing saltbush	ATCA2	*Atriplex canescens*	105–175	–
	western white clematis	CLLI2	*Clematis ligusticifolia*	70–140	–
	Woods' rose	ROWO	*Rosa woodsii*	35–105	–
Tree					
4				0–70	
	Rio Grande cottonwood	PODEW	*Populus deltoides ssp. wislizeni*	0–70	–

Animal community

WILDLIFE INTERPRETATIONS:
This site provides habitats which support a resident animal community that is characterized by a wide variety of wildlife species. The site provides year-round habitat for mule deer, antelope, white-tailed jackrabbit, and cottontail. There is seasonal use by waterfowl such as ducks, geese, and sandhill crane, along with other migratory waterfowl. The site can be substantially improved for waterfowl by mechanical manipulation.

The side can be flooded by constructing dikes. This creates nesting and feeding areas for geese, cranes, and ducks.

If the intent is to increase grasses and forbs on this site, prescribed burning can be used. Basin wildrye and the rhizomatus grasses will respond rapidly to burning. The impact of burning on the soil and vegetation is minimized by high soil moisture.

GRAZING INTERPRETATIONS:
This site, when in native vegetation is highly productive, but species palatable to grazing animals are limited. Overgrazing will leave the area relatively useless for grazing, and expose it to erosion by wind and water.

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 skunkbush sumac, fourwing saltbush, and Woods rose. Spring rest (Mar-May) benefits cool season plants such as common dandelion, basin wildrye, western wheatgrass, and alkali sacaton. Deferment during late winter and spring reduces competition between grazing animals for palatable shrubs and forbs. Native species of particularly high grazing value which occur on this site include alkali sacaton, western wheatgrass, common dandelion, fourwing saltbush, and sandbar willow.

If an area is used for waterfowl production as well as grazing, care must be exercised to prevent overgrazing during the nesting season.

Brush management is best accomplished through late fall or early winter burning, which will enhance the production of basin wildrye and provide quality cover for the wide variety of wildlife species which inhabit this site. Chemical control of brush should be carefully planned, as chemicals may reduce water quality and be harmful to resident fish and wildlife populations. Mechanical control is an alternative for brush control, but care should be taken to minimize soil disturbance which would reduce water quality. Range seeding is easily done due to level slopes, soil moisture, and soil textures. Range seeding is best accomplished in the fall.

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 lbs of air-dry for age 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 Class % - Climax Vegetation - (Ac/AUM) (AUM/Ac)
Excellent - 76-100 - (0.9) (1.11)
Good - 51-75 - (2.0) (.50)
Fair - 26-50 - (4.0) (.25)
Poor - 0-25 - (7.0) (.14)

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, inaccessability, dormant season use, presence of introduced species, etc., stocking rate adjustments will be required.

If the site is occupied by palatable introduced species such as orchardgrass, smooth brome, timothy, and Kentucky bluegrass, a forage value rating for carrying capacity is to be used instead of the Guide to Initial Stocking Rates.

Major Poisonous Plants to Livestock:

Scouring rush affects horses and cattle. The type of poisoning is cumulative, alkaloidal nerve poisoning. It is a concern when fed as hay or when other forage is scarce.

Black greasewood affects sheep and cattle. The type of poisoning is acute, oxalates of sodium and potassium. It is a concern in the winter and spring when other forage is scarce.

Hydrological functions

Basically, this site serves as a naturally occuring filter strip for the Green river and its tributaries. It is important to manage grazing to promote cover and minimize soil loss which will maintain or improve water quality in the river and adjacent wetlands.

Soils in this site are grouped into "A,B,&C" 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 a high value for natural beauty. There are several campgrounds along the Green River, and the river is a popular area for fishing and hunting. Raft trips down the Green River pass through this site. It is also popular for

scenic drives and bird watching.

Wood products

Small amounts of firewood may be cut on the site where populars are thick and overmature. There is no known potential for commercial lumber production on this site. This site is highly suited to trees for wildlife cover and windbreaks. Species which may be considered include golden willow, skunkbush sumac, narrowleaf and Rio Grande poplar, and Russian olive.

Other products

None noted.

Other information

ENDANGERED PLANTS AND ANIMALS:
Where the Green River enters the Gates of LaDore, it is bordered by narrow areas of this site with steep rock cliffs on either side. Peregrine falcons are found on and near these cliffs. This site provides important hunting grounds for the bald eagle, golden eagle, and the peregrine falcon. When overflow areas are flooded, the Colorado squawfish, tail chub, humpback chub, and razorback sucker may be present until the water recedes.

FIRE ECOLOGY:
Generally, there is adequate fuel on this site to carry fire. Should a fire burn across the site, basin wildrye and rubber rabbitbrush will flourish and western wheatgrass will be greatly benefited. Shrubs, particularly fourwing saltbrush, skunkbush sumac, and Woods rose, will be severly affected and will be several years recovering. The site's production will decline the first year. Thereafter grasses and forbs will increase, with shrubs having a long-term increase.

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 R102W S30
General legal description	SW 1/4, Section 30, T10N, R102W, Moffat County.

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, 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:**