Ecological site R028AB202UT
Semidesert Alkali Loam (Black Greasewood) South

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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): 028A–Ancient Lake Bonneville

MLRA 28A occurs in Utah (82 percent), Nevada (16 percent), and Idaho (2 percent). It encompasses approximately 36,775 square miles (95,246 square kilometers). A large area west and southwest of Great Salt Lake is a salty playa. This area is the farthest eastern extent of the Great Basin Section of the Basin and Range Province of the Intermontane Plateaus. It is an area of nearly level basins between widely separated mountain ranges trending north to south. The basins are bordered by long, gently sloping alluvial fans. The mountains are uplifted fault blocks with steep side slopes. Most of the valleys are closed basins containing sinks or playa lakes. Elevation ranges from 3,950 to 6,560 feet (1,204 to 2000 meters) in the basins and from 6,560 to 11,150 feet (1996 to 3398 meters) in the mountains. Much of the MLRA has alluvial valley fill and playa lakebed deposits at the surface from pluvial Lake Bonneville, which dominated this MLRA 13,000 years ago. A level line of remnant lake terraces on some mountain slopes indicates the former extent of this glacial lake. The Great Salt Lake is what remains of the pluvial lake. Mountains in the interior of this MLRA consist of tilted blocks of marine sediments from Cambrian to Mississippian age with scattered outcrops of Tertiary continental sediments and volcanic rocks. The average annual precipitation is 5 to 12 inches (13 to 30 cm) in the valleys and ranges up to 49 inches (124 cm) in the mountains. Most of the rainfall in the southern LRU occurs as high-intensity, convective thunderstorms during the growing season (April through September). The driest period is from midsummer to early autumn in the northern LRU. Precipitation in winter typically occurs as snow. The average annual temperature is 39 to 53 °F (4 to 12 °C). The freeze-free period averages 165 days and ranges from 110 to 215 days, decreasing in length with increasing elevation. The dominant soil orders in this MLRA are Aridisols, Entisols, and Mollisols. Soils are dominantly in the mesic or frigid soil temperature regime, aridic or xeric soil moisture regime, and mixed mineralogy. The soils are generally well drained, loamy or loamy-skeletal, and very deep.

LRU notes

The Basin and Range South LRU has mountain ranges that are about 40 percent sedimentary/metasedimentary (limestone/quartzite dominant) and about 40 percent Tertiary volcanics. The basin floors are generally higher in the southern LRU than in the north LRU between 4,900 and 6,100 feet (1,493 to 1,859 meters) in elevation. The Basin and Range South LRU also exhibits patterns of summers with a greater relative amount of precipitation in July and August coming from convective storms (ustic trending pattern). Pinyon and juniper ecological sites have a great percentage of pinyon pine (Pinus edulis or monophylla) than Utah juniper (Juniperus osteosperma), with pinyon pine up to 50 percent of the tree composition in the semidesert zones and more than 50 percent in upland zones. Warm season grasses, such as James' galleta (Pleuraphis jamesii) or blue grama (Bouteloua gracilis), are present within the plant community, and can make up a large portion of the subdominant grass composition. Bristlecone pine (Pinus longaeva) and cliffrose (Purshia sp.) are also present and dominant on some ecological sites in the southern LRU, while they are sparse or absent in the northern LRU.

Classification relationships

EPA Ecoregion: North American Deserts Cold Deserts Central Basin and Range Shadscale-Dominated Saline Basins, Sagebrush Basins and Slopes

Ecological site concept

The Semidesert Alkali Loam (Black Greasewood) South ecological site occurs in the broad ecotone between the Semidesert Loam (Wyoming big sagebrush) and Alkali Flat (Greasewood) site on lake terraces and fan remnants on low slopes. This site typically contains both greasewood and Wyoming sagebrush. Greasewood increases as the ecotone nears the Alkali Flat site and Wyoming big sagebrush increases as it nears Semidesert Loam. This site has influence from summer thunderstorms and contains warm season grasses in the plant community.

Associated sites

R028AY220UT	**Semidesert Loam (Wyoming Big Sagebrush)** This site typically occurs adjacent to the site higher on the landscape

Similar sites

R028AY220UT	**Semidesert Loam (Wyoming Big Sagebrush)** This site is dominated by Wyoming sagebrush with little to no greasewood.
R028AY202UT	**Semidesert Alkali Loam (Black Greasewood) North** This site occur in the Basin and Range North LRU and has little to no warm season grasses in the plant community.
R028AY008NV	**SODIC TERRACE 8-10 P. Z.** This site occurs in Nevada’s portion of 28A and is very similar to this site.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Artemisia tridentata var. wyomingensis* (2) *Sarcobatus vermiculatus*
Herbaceous	Not specified

Physiographic features

The Semidesert Alkali Loam (Black Greasewood) South site occurs on stream terraces, fan remnants, alluvial fans, and alluvial flats. It is commonly found on slopes from 0 to 5 percent with low to medium runoff. Aspect has little effect on site dynamics. See block diagram below (SS-Area-Component UT611-41)

Figure 1. Block Diagram

Table 2. Representative physiographic features

Landforms	(1) Stream terrace (2) Fan remnant (3) Alluvial fan
Flooding frequency	None to very rare
Ponding frequency	None

Elevation	1,550 – 1,630 m
Slope	0 – 10 %
Aspect	Aspect is not a significant factor

Climatic features

The climate is semi-arid and characterized by cold snowy winters and ustic trending summers that have influence from thunderstorms generated from monsoonal moisture pushed up from the Gulf of California. The average annual precipitation is 8 to 12 inches. Approximately 70 percent comes as rain from March through October. Mean Annual Air Temperature: 45-52 Mean Annual Soil Temperature: 47-54.

There are no Western Region Climate Center stations that intersect this site and none within a reasonable distance from the site (1000 meters). The tables are derived from PRISM model using 30 year normal data.

Table 3 Representative climatic features

Frost-free period (average)	
Freeze-free period (average)	
Precipitation total (average)	250 mm

Influencing water features

Soil features

The soil is deep and well drained and the surface texture is typically silt loam. The soil formed in alluvium derived from basic and intermediate igneous and sedimentary rock. Rock fragments are less than 10 percent by volume in the soil profile. Permeability is slow to moderately rapid and runoff is medium. The high amounts of sodium salts and silica cementation are the limiting soil factors affecting plant growth.

Soils are moderately to strongly affected by salts. Sodium is the most common salt, but others may be present. Water intake rates are slow to moderately slow, available water holding capacity is very low to high, and runoff is low to medium. The soil moisture regime is aridic bordering on xeric.

This site has been correlated to the following soil components:
White Pine County, Nevada, East Park NV779: Taylorsflat
UT626: Annabella, Manselo, Medburn, Taylorsflat, Trenton, Woodrow
UT628: Mellor, Woodrow
UT629: Woodrow
UT632: Mellor
UT634: Annabella, Manselo

Table 4. Representative soil features

Parent material	(1) Alluvium – sandstone (2) Lacustrine deposits – limestone

Surface texture	(1) Loam (2) Silt loam (3) Fine sandy loam
Drainage class	Well drained
Permeability class	Slow to moderate
Soil depth	150 cm
Surface fragment cover <=3"	Not specified
Surface fragment cover >3"	Not specified
Available water capacity (0-101.6cm)	9.14 – 17.02 cm
Calcium carbonate equivalent (0-101.6cm)	0 – 40 %
Electrical conductivity (0-101.6cm)	Not specified
Sodium adsorption ratio (0-101.6cm)	0 – 10
Soil reaction (1:1 water) (0-101.6cm)	7.9 – 10
Subsurface fragment volume <=3" (Depth not specified)	0 – 10 %
Subsurface fragment volume >3" (Depth not specified)	Not specified

Ecological dynamics

The Semidesert Alkali Loam (Black Greasewood) South site is a broad ecotone between Alkali Flat (Greasewood) 028AY004UT and Semidesert Loam (Wyoming big sagebrush) 028AY220UT that occurs on lake terraces and fan remnants. Greasewood increases as the ecotone nears the Alkali Flat site and Wyoming big sagebrush (Artemisia tridentata ssp. Wyomingensis) increases as it nears Semidesert Loam. There is often an equal mixture of both shrubs in the community.

Black greasewood (Sarcobatus vermiculatus) requires access to groundwater and develops best where moisture is easily available (Eddleman 2002; Mozingo 1987; Brown 1965). It is a deep-rooted shrub and the groundwater can be fairly deep in the soil profile. Wyoming big sagebrush is the most drought tolerant of the big sagebrushes and is generally long-lived. Seedling establishment every year is not necessary to keep the stand intact. Common bunchgrasses in this site are Nevada bluegrass (Poa secunda), bottlebrush squirreltail (Elymus elymoides), Indian ricegrass (Achnatherum hymenoides), and James' galleta (Pleuraphis jamesii). These grasses are tolerant to drier conditions that exist on this site.

These communities often exhibit the formation of microbiotic crusts within the interspaces between shrubs. These crusts influence the soils on these sites and their ability to reduce erosion and increase infiltration; they may also alter the soil structure and possibly increase soil fertility (Fletcher and Martin 1948, Williams 1993). Finer-textured soils such as silts tend to support more microbiotic cover than coarse-textured soils (Anderson 1982). Disturbance such as hoof action from inappropriate grazing and cheatgrass invasion can reduce biotic crust integrity (Anderson 1982, Ponzetti et al. 2007) and increase erosion.

Ecosystem drivers can range from insect outbreaks, to fire, to grazing. Native insects, like the Aroga moth, can defoliate and kill sagebrush (Furniss & Barr 1975). These events have been cyclical and are influenced by climate patterns.

Annual non-native species such as Halogeton (Halogeton glomeratus), Russian thistle (Salsola iberica) , and cheatgrass (Bromus tectorum) invade these sites where competition from perennial species is decreased. This ecological site has low resilience to disturbance and resistance to invasion. Increased resilience increases with elevation, aspect, increased precipitation and increased nutrient availability. Five possible stable states have been identified for this site.

Fire Ecology:
Fire is a rare disturbance in salt-desert shrub communities likely occurring in years with above-average production. Black greasewood may be killed by severe fires, but can resprout after low to moderate severity fires (Robertson 1983, West 1994). Grazing and other disturbance may result in increased biomass production due to sprouting and increased seed production, also leading to greater fuel loads (Sanderson and Stutz 1994). Higher production sites would have experienced fire more frequently than lower production sites.

Wyoming big sagebrush is easily killed by fire (Blaisdell 1953). Wyoming big sagebrush only regenerates from seed. Repeated fires may eliminate the onsite seed source and reestablishment after fire may require 50-120 or more years (Baker 2006). Even then, up to 25 years after fire, Wyoming big sagebrush typically has less than 5 percent of pre-fire cover (Baker 2011). However, the introduction and expansion of cheatgrass has dramatically altered the fire regime (Balch et al. 2013), therefore altering restoration potential of Wyoming big sagebrush communities (Evans and Young 1981). Sites with low abundances of native perennial grasses and forbs typically have reduced resiliency following disturbance and are less resistant to invasion or increases in cheatgrass (Miller et al 2013).

State and transition model

Figure 6. R028AB202UT STM

Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
Shrub/Vine					
0	**Primary Shrubs**			219-328	
	Grass, perennial	2GP	*Grass, perennial*	37-73	–
	basin wildrye	LECI4	*Leymus cinereus*	37-73	–
	western wheatgrass	PASM	*Pascopyrum smithii*	8-22	–
	James' galleta	PLJA	*Pleuraphis jamesii*	8-22	–
	sand dropseed	SPCR	*Sporobolus cryptandrus*	8-22	–
3	**Secondary Shrubs**			37-73	
Grass/Grasslike					
0	**Primary Grasses**			183-291	
	Forb, perennial	2FP	*Forb, perennial*	37-73	–

	cutleaf daisy	ERCO4	*Erigeron compositus*	37-73	–
	spiny phlox	PHHO	*Phlox hoodii*	8-73	–
	scarlet globemallow	SPCO	*Sphaeralcea coccinea*	8-37	–
	Pacific aster	SYCHC	*Symphyotrichum chilense var. chilense*	8-37	–
	freckled milkvetch	ASLE8	*Astragalus lentiginosus*	8-37	–
	fivehorn smotherweed	BAHY	*Bassia hyssopifolia*	8-11	–
	Douglas' dustymaiden	CHDO	*Chaenactis douglasii*	8-11	–
	bastard toadflax	COUM	*Comandra umbellata*	8-11	–
1	**Secondary Grasses**			37-73	
	Shrub (>.5m)	2SHRUB	*Shrub (>.5m)*	37-73	–
	shadscale saltbush	ATCO	*Atriplex confertifolia*	8-22	–
	green molly	BAAM4	*Bassia americana*	8-22	–
	yellow rabbitbrush	CHVIS5	*Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus*	8-22	–
	rubber rabbitbrush	ERNAN5	*Ericameria nauseosa ssp. nauseosa var. nauseosa*	8-22	–
	winterfat	KRLA2	*Krascheninnikovia lanata*	8-22	–
	bud sagebrush	PIDE4	*Picrothamnus desertorum*	8-22	–
	desert princesplume	STPI	*Stanleya pinnata*	8-22	–
	spineless horsebrush	TECA2	*Tetradymia canescens*	8-22	–
Forb					
2	**Forbs**			37-73	

Table 6. Community 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 7. Community 1.3 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 8. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 9. Community 2.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 10. Community 2.3 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 11. Community 3.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 12. Community 3.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 13. Community 4.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 14. Community 5.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 15. Community 5.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

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Approval

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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	08/29/2026
Approved by	
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:**