

Ecological site R028AY106UT

Desert Alkali Clay Loam (Alkali Sacaton)

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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%), Nevada (16%), and Idaho (2%). 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. They generally are 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 (1493 to 1859 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

MLRA 28A, LRU E, southern portion of MLRA

Ecological site concept

This ecological site is dominated by grass in reference condition. It occurs on lake terraces on low slopes. This site occurs on fine textured soils, typically silty clay loams with few rocks on the surface or in the subsurface.

Associated sites

R028AY110UT	Desert Alkali Sand (Fourwing Saltbush) This site is found on coarser textured soils and is dominated by four-wing saltbush.
R028AY124UT	Desert Loam (Shadscale) This site occurs on fine textured soils but is dominated by shadscale.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) <i>Sporobolus airoides</i>

Physiographic features

This site occurs on lacustrine plains above terraces on low slopes. It occurs between 4300 to 5800 feet. This site does not flood or pond during the year.

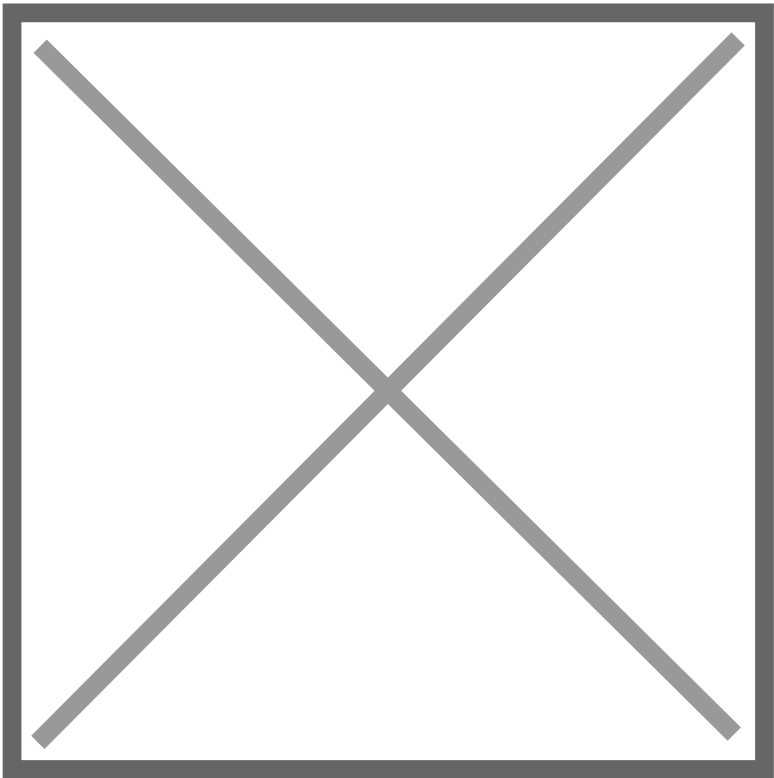


Figure 1.

Table 2. Representative physiographic features

Landforms	(1) Plain (2) Terrace
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Flooding frequency	None
Ponding frequency	None
Elevation	1,310 – 1,770 m
Slope	0 – 10 %

Climatic features

The climate is cold and snowy in the winter and warm and dry in the summer. The average annual precipitation is 5 to 8 inches. Approximately 70 percent comes as rain from March through October. On the average, June through September are the driest months and March through May are the wettest months.

Climate tables derived from PRISM model.

Mean Annual Air Temperature: 45-50

Mean Annual Soil Temperature: 50-53

Table 3 Representative climatic features

Frost-free period (average)	
Freeze-free period (average)	130 days
Precipitation total (average)	180 mm

Influencing water features

No water features in this site, no flooding or ponding occur.

Soil features

Characteristic soils in this site are 60 inches deep and well drained.

They formed in mixed lake sediments and alluvium derived mainly from mixed parent materials. The surface horizon is fine sandy loam or sandy loam textures and 4 to 10 inches thick. Rock fragments are not found in or on this soil.

The underlying layers in these soils are mainly silty clay loam, and clay loam, stratified with thin layers of sand to sandy loam. Permeability is slow to very slow.

The available water capacity is 2.8 to 5.1 inches. Natural geologic erosion in potential is approximately 0.5 tons/acre/year.

This site is correlated to the following soil components and mapunits:

UT617: Goshute (28), Yuba (94, 95)

Table 4. Representative soil features

Surface texture	(1) Silty clay loam (2) Loamy fine sand
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Family particle size	(1) Sandy
Drainage class	Well drained
Permeability class	Slow to moderate
Soil depth	150 cm
Surface fragment cover <=3"	0 – 10 %
Surface fragment cover >3"	Not specified
Available water capacity (0-101.6cm)	7.11 – 12.95 cm
Calcium carbonate equivalent (0-101.6cm)	10 – 40 %
Electrical conductivity (0-101.6cm)	0 – 20 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	10 – 30
Soil reaction (1:1 water) (0-101.6cm)	7.9 – 10
Subsurface fragment volume <=3" (Depth not specified)	0 – 30 %
Subsurface fragment volume >3" (Depth not specified)	Not specified

Ecological dynamics

As ecological condition deteriorates due to overgrazing, alkali sacaton, galleta, and Indian ricegrass decrease while greasewood, low rabbitbrush, and shadscale increases.

When the potential natural plant community is burned, alkali sacaton and Indian ricegrass decrease while low rabbitbrush and greasewood increases.

Annual forbs and annual grasses are most likely to invade this site.

R028AY106UT is similar to R028AY024NV. Nevada developed a state and transition model that is used for the 106UT site (see Stringham et al. 2015).

State and transition model

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			66-101	
	shadscale saltbush	ATCO	Atriplex confertifolia	50-76	–
	bud sagebrush	PIDE4	Picrothamnus desertorum	16-26	–
3	Secondary Shrubs			6-16	
	green molly	BAAM4	Bassia americana	0-6	–
	yellow rabbitbrush	CHVIS5	Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus	0-6	–
	winterfat	KRLA2	Krascheninnikovia lanata	0-6	–
	greasewood	SAVE4	Sarcobatus vermiculatus	0-6	–
Grass/Grasslike					
0	Primary Grasses			328-454	
	alkali sacaton	SPAI	Sporobolus airoides	202-252	–
	James' galleta	PLJA	Pleuraphis jamesii	101-151	–
	Indian ricegrass	ACHY	Achnatherum hymenoides	26-50	–
1	Seconary Grasses			6-16	
	saltgrass	DISP	Distichlis spicata	0-6	–
	squirreltail	ELEL5	Elymus elymoides	0-6	–
	sand dropseed	SPCR	Sporobolus cryptandrus	0-6	–
Forb					
2	Forbs			6-16	
	scarlet globemallow	SPCO	Sphaeralcea coccinea	0-6	–

Table 6. Community 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 7. Community 1.3 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 8. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 9. Community 2.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 10. Community 2.3 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 11. Community 3.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 12. Community 3.2 plant community composition

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

This site is suited for sheep and cattle grazing during fall, winter, and spring. Wildlife using this site include rabbit, coyote, fox, and pronghorn antelope. This is a short list of the more common species found. Many other species are present as well and migratory birds are present at times.

Hydrological functions

The soils are in hydrologic group D. The runoff curve ranges from 80 to 89 depending on condition of the vegetation.

Recreational uses

Resources that have special aesthetic and landscape value are wildflowers. Some recreation of this site are hiking and hunting.

Wood products

None

Other information

Threatened and endangered species include plants and animals.

Type locality

Location 1: Juab County, UT

Other references

Stringham, T.K., P. Novak-Echenique, P. Blackburn, C. Coombs, D. Synder, and A. Wartgow. 2015. Final Report for USDA Ecological Site Description State-and-Transition Models, Major Land Resource Area 28A and 28B Nevada. University of Nevada Reno, Nevada Agricultural Experiment Station Research Report 2015-01. p. 1524.

Contributors

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Approval

Jamin Johanson, 5/02/2025

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.

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Date	01/26/2009
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

- 1. Number and extent of rills:** Very minor rill development will be evident in reference communities on this site. Development will be more pronounced following significant storm or snow melt events. The presence of rills may also be more apparent where run-on from adjacent upland sites or exposed bedrock concentrate flows. Rill development will be moderately short (< 8') and widely spaced (8' – 10'). Evidence of rills will decrease in the months following major weather events.

- 2. Presence of water flow patterns:** Evidence of stable overland water flow is apparent in the reference community; increased flow activity may be observed immediately following significant weather events. Flow patterns are normally <15 feet long, follow natural contours, and are typically spaced 8 to 10 feet apart.

- 3. Number and height of erosional pedestals or terracettes:** Very slight evidence of pedestals or terracettes caused by accelerated water erosion may be evident in the reference community. 1 – 2 inches of elevational mounding around perennial grass clumps and within biological soil crusts is normal and may not be water erosion caused. Some pedestalling around Indian ricegrass plants may indicate past water erosion. There should be no exposed roots.

- 4. Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare ground ranges from 10% - 20% in the reference community. Ground cover (the inverse of bare ground) typically includes: coarse fragments – 1% to 3%; plant canopy – 35% to 50%; litter – 20% to 30%, and biological soil crusts – 2% to 5%.

- 5. Number of gullies and erosion associated with gullies:** Some gully channels are a normal component of desert environments. Gullies associated with reference areas will typically have stable, partially vegetated sides and bottoms with no evidence of head-cutting. Some evidence of disturbance may be evident following significant weather events or when gullies convey runoff from higher elevation

rocky or naturally runoff producing areas.

6. **Extent of wind scoured, blowouts and/or depositional areas:** No evidence of wind generated soil movement is present in reference communities. Slight depositional mounding within perennial grass plants, Shadscale canopies and biological soil crusts is a normal characteristic of this site.
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7. **Amount of litter movement (describe size and distance expected to travel):** Most litter resides in place within or under plant canopies. Some movement of the finest material (< 1/8" or less) may move (1' – 2') in the direction of prevailing winds or down slope if being transported by water. Little accumulation is observed behind obstructions.
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8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** This site should have a soil stability rating of 4 to 5. Surface textures are typically silty clay loams containing few coarse fragments.
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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Soil surface is 4 inches deep and structure is moderate, coarse subangular blocky. The A-horizon color is 2.5YR 7/2. Soils have a salic (natric) horizon that extends 40 inches into the soil profile. Where surface soil is lost, increased clay and silt percentages are common in the remaining soil material.
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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** The presence of perennial grasses combined with Shadscale in the reference community provides for the best infiltration and least runoff from storm events and snow melt. As perennial vegetation decreases and bare ground increases, runoff increases and soil loss is accelerated. Biological soil crusts provide for added soil stability when present.
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11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** None. Soils are deep to very deep. Increases in clay or silt content in subsoil layers could be mistaken for compaction.
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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:** Dominant: Warm season grasses (e.g. Alkali sacaton and/or James galleta) 60 – 80%, >> Non-sprouting shrubs (e.g. Shadscale and Bud sagebrush) 10 – 20%.
- Sub-dominant:** Sub-dominant: Cool season grasses (e.g. Indian ricegrass and Bottlebrush squirreltail) 5-10% > sprouting shrubs (e.g. Black Greasewood and Winterfat).
- Other:** Others: Shrubs (e.g. Low rabbitbrush and Greenmolly) 1-3%, perennial forbs (e.g. Scarlet globemallow and Slender seepweed) 1 - 3%
- Additional:** Moss and lichen communities will normally be found under plant canopies while the cyanobacteria may be found throughout the site.
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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):**
During years with average to above-average precipitation, there should be very little recent mortality or decadence apparent in either the shrubs or grasses. During severe (multi-year) drought or insect infestations up to 80% of the Shadscale plants may die. Some mortality of bunchgrass and other shrubs may also occur during severe droughts. There may be partial mortality of individual bunchgrasses and other shrubs during less severe drought. During drought years principle shrubs may experience early and prolonged leaf drop.
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14. **Average percent litter cover (%) and depth (in):** Litter cover ranges from 10 to 20%. Depth varies from $\frac{3}{4}$ - $\frac{1}{2}$ inch with depth increasing near plant canopies.
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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):**
350 – 450 pounds on an average year.
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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:** Broom snakeweed, Russian thistle, Redstem storksbill, annual bromes and Halogeton are likely to increase in or invade this site.
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17. **Perennial plant reproductive capability:** All perennial plant species have the ability to reproduce in most years except drought years.
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