USDA Natural Resources Conservation Service

Ecological site R028AY224UT
Semidesert Sandy Loam (Winterfat)

Accessed: 05/21/2024

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.

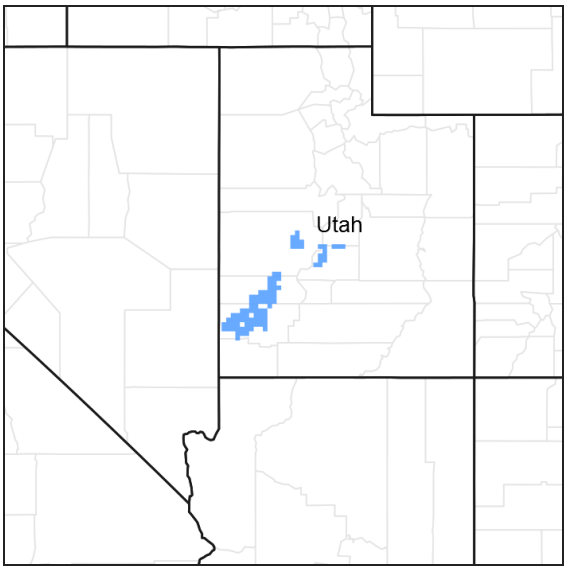

Figure 1. Mapped extent

Areas shown in blue indicate the maximum mapped extent of this ecological site. Other ecological sites likely occur within the highlighted areas. It is also possible for this ecological site to occur outside of highlighted areas if detailed soil survey has not been completed or recently updated.

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.

Land Resource Unit (LRU): Basin and Range North

Notes: The Basin and Range North LRU exhibits dry summer with stronger xeric patterns than the Basin and Range South LRU. Ranges in the north LRU are about 50 percent Paleozoic sedimentary/metasedimentary (limestone/quartzite dominant) and about 10 percent Tertiary volcanics. The basin floors are between 4,200 and 5,100 feet (1280 to 1554 meters) in elevation. Pinyon and juniper sites have a greater percentage of Utah juniper (Juniperus osteosperma) in the plant community than pinyon pine (Pinus edulis or monophylla). The Basin and Range North have few semidesert ecological sites with Utah juniper. Cool season grasses, such as bluebunch wheatgrass (Pseudoroegneria spicata), are dominant in the plant community, while warm season grasses are largely absent or a small component of the plant community.

Classification relationships

MLRA: 28A Great Salt Lake Area> LRU: Basin and Range North> Ecological Zone: Semidesert> Ecological Site: Semidesert Sandy Loam (Winterfat)

EPA Ecoregion: North American Desert> Cold Desert> Central Basin and Range> Sagebrush Basins and Slopes

Ecological site concept

This site is found on lake terraces at slopes up to 10%. The soil is deep, sandy loam texture, with few rock fragments on the surface or subsurface. The dominant species are Indian ricegrass (Achnatherum hymenoides) and winterfat (Krascheninnikovia lanata), with grasses in reference condition accounting for more of the community composition.

Associated sites

R028AY220UT	**Semidesert Loam (Wyoming Big Sagebrush)** Occurs adjacent to the ecological site. Soil texture is finer.
R028AY234UT	**Semidesert Shallow Loam (Utah juniper-Salina wildrye)** Occurs on shallow soils further up on the landform/landscape.

Similar sites

R028AY226UT	**Semidesert Sandy Loam (Wyoming Big Sagebrush)** Dominant shrub is Wyoming big sagebrush.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Krascheninnikovia lanata*
Herbaceous	(1) *Achnatherum hymenoides*

Physiographic features

This site occurs on lake terraces at slopes up to 10 percent. The elevation ranges from 4650 to 4950 feet. The geology is lacustrine deposits over alluvium or colluvium derived from igneous rock.

Table 2. Representative physiographic features

Landforms	(1) Lake terrace
Flooding frequency	None

Ponding frequency	None
Elevation	1,417–1,509 m
Slope	0–10%

Climatic features

The climate of this site is dry subhumid and semiarid. It is characterized by cold, snowy winters and warm, dry summers. The average annual precipitation ranges from 8 to 12 inches. March, April and May are typically the wettest months with June, July and August being the driest. The most reliable sources of moisture for plant growth are the snow that accumulates over the winter, and spring rains. Summer thunderstorms are intermittent and sporadic in nature, and thus are not reliable sources of moisture to support vegetative growth on this site. The mean annual air temperature is 50 degrees.

Climate tables derived from PRISM model. Climate stations were not found within the site.

Table 3. Representative climatic features

Frost-free period (average)	0 days
Freeze-free period (average)	0 days
Precipitation total (average)	254 mm

Influencing water features

Soil features

The characteristic soils in this site are over 60 inches deep and well drained.

They formed in alluvium derived mainly from basic and intermediate igneous parent materials. The surface horizon is sandy loam textures and 3 inches thick. About 25 percent of the soil surface is covered by rock fragments. The volume of rock fragments in the soil profile is 15 to 35 percent.

These soils may have a layer of carbonate and silica accumulation between 20 and 50 inches. Permeability is moderate. Available water capacity is moderate to very low. Runoff is slow and the hazard of water erosion is slight.

The water supplying capacity is 4 to 6 inches. Natural geologic erosion in potential is approximately 1 ton/acre/year.

Soil components correlated to this site:

UT618 and UT627: Stillman (R2)
UT628: Stillman (159, 193, 197, 206)
UT632: Escalante (ESB, EYC), Sugarloaf (SU, SV)

Table 4. Representative soil features

Surface texture	(1) Sandy loam
Drainage class	Well drained to somewhat excessively drained
Permeability class	Moderate to moderately rapid
Soil depth	152 cm
Surface fragment cover <=3"	0–11%
Surface fragment cover >3"	0–15%
Available water capacity (0-101.6cm)	7.37–9.4 cm

Calcium carbonate equivalent (0-101.6cm)	1–5%
Electrical conductivity (0-101.6cm)	4–8 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	1–5
Soil reaction (1:1 water) (0-101.6cm)	7.9–9
Subsurface fragment volume <=3" (Depth not specified)	0–13%
Subsurface fragment volume >3" (Depth not specified)	0–13%

Ecological dynamics

This site is dominated by winterfat and Indian ricegrass in reference condition. Plant community shift in the reference state between shrub dominated and grass dominated based on drought patterns or herbivory. When drought occurs, bunchgrasses decrease, increasing the percentage of shrubs in the community.

As ecological condition deteriorates due to overgrazing, Indian ricegrass decreases, while low rabbitbrush and snakeweed increase. When the potential natural plant community is burned, Indian ricegrass and needleandthread decrease while low rabbitbrush increases.
Annual grasses and annual forbs are most likely to invade this site.

Evaluation of existing data and data collection is needed to fully develop the ecological dynamics.

Draft hypothetical state and transition model from a similar site in Nevada (R028AY030NV). This model will need to be evaluated against existing data for site 224UT to ensure accuracy.

State and transition model

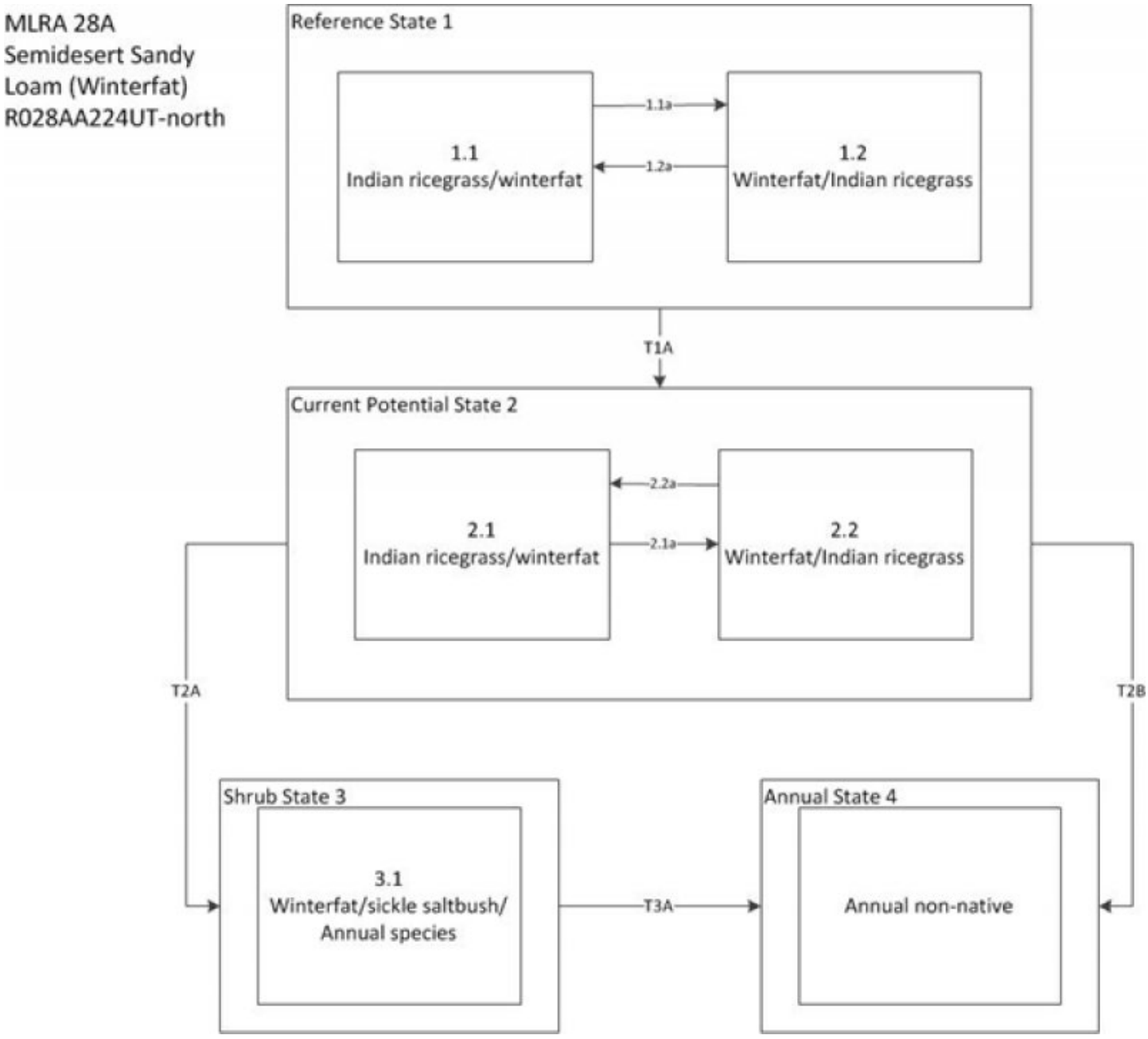

Figure 5. STM R028AA224UT

State 1
Reference State

The dominant aspect of this plant community is Indian ricegrass. The composition by air-dry weight is approximately 55 percent perennial grasses, 10 percent forbs, and 35 percent shrubs.

Community 1.1
Indian ricegrass/winterfat

The dominant aspect of this plant community is Indian ricegrass. The composition by air-dry weight is approximately 55 percent perennial grasses, 10 percent forbs, and 35 percent shrubs.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	155	293	432
Shrub/Vine	99	186	275
Forb	28	54	78
Total	**282**	**533**	**785**

Table 6. Ground cover

Tree foliar cover	0%
Shrub/vine/liana foliar cover	10-25%
Grass/grasslike foliar cover	15-35%
Forb foliar cover	2-5%
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 (M)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.15	–	–	–	–
>0.15 <= 0.3	–	–	–	–
>0.3 <= 0.6	–	–	30-40%	0-10%
>0.6 <= 1.4	–	20-30%	–	–
>1.4 <= 4	–	–	–	–
>4 <= 12	–	–	–	–
>12 <= 24	–	–	–	–
>24 <= 37	–	–	–	–
>37	–	–	–	–

Figure 7. Plant community growth curve (percent production by month). UT2241, PNC. Excellent Condition.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	5	15	40	30	5	5	0	0	0	0

Community 1.2
Winterfat/Indian ricegrass

Drought will favor shrubs over perennial bunchgrasses. However, long-term drought will result in an overall decline in the plant community, regardless of functional group.

Pathway 1.1a

Community 1.1 to 1.2

Long term drought and/or excessive herbivory decrease in perennial bunchgrasses

Pathway 1.2a
Community 1.2 to 1.1

Time, lack of disturbance and recovery from drought would allow the vegetation to increase and bare ground would eventually decrease.

State 2
Current Potential

This state is similar to state 1, however is also includes non-native annual species such as cheatgrass and halogeton. This species change the natural disturbance pattern of this site by increasing under natural disturbance (fire) and out competing native species (Indian ricegrass). The 2.2 community is at risk of moving to a shrub state (3.0) or annual state (4.0) because it has lost resiliency and resistance to returning to a native plant community after disturbance.

Community 2.1
Indian ricegrass/winterfat

This community is dominated by winterfat and Indian ricegrass. Bottlebrush squirreltail and fourwing saltbush are also important species on this site. Community phase changes are primarily a function of chronic drought. Fire is infrequent and patchy due to low fuel loads. Non-native annual species are present in trace amounts (<5%). Potential vegetative composition is approximately 25% grasses, 10% forbs and 65% shrubs.

Community 2.2
Winterfat/Indian ricegrass (At Risk)

Drought will favor shrubs over perennial bunchgrasses. However, long-term drought will result in an overall decline in the plant community, regardless of functional group. Inappropriate grazing will favor unpalatable shrubs such as shadscale, and cause a decline in winterfat and budsage.

Pathway 2.1a
Community 2.1 to 2.2

Inappropriate grazing management and/or drought.

Pathway 2.2a
Community 2.2 to 2.1

Release from drought and/or growing season grazing pressure allows recovery of bunchgrasses, winterfat, and bud sagebrush.

State 3
Shrub State

Bunch grasses have been greatly reduced in this state either from heavy grazing in the presence of non-native species.

Community 3.1
Winterfat/Sickle saltbush/Annual species

Perennial bunchgrasses, like Indian ricegrass are reduced and the site is dominated by winterfat. Rabbitbrush (Chrysothamnus spp.) and shadscale may be significant components or dominant shrubs. Annual non-native species increase. Bare ground has increased.

State 4
Annual State

This state consists of one community phase. This community is characterized by the dominance of annual non-native species such as halogeton and cheatgrass. Rabbitbrush and other sprouting shrubs may dominate the overstory.

Community 4.1
Annual non-native

This community is dominated by annual non-native species. Trace amounts of winterfat and other shrubs may be present, but are not contributing to site function. Bare ground may be abundant, especially during low precipitation years. Wind erosion and extreme soil temperatures are driving factors in site function.

Transition T1A
State 1 to 2

Introduction of non-native invasive species.

Transition T2A
State 2 to 3

Inappropriate grazing management in the presence of non-native species

Transition T2B
State 2 to 4

Large fire and/or multiple fires

Transition T3A
State 3 to 4

Large fire and/or multiple fires

Additional community tables

Table 8. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Shrub/Vine					
0	**Primary Shrubs**			146–224	
	winterfat	KRLA2	*Krascheninnikovia lanata*	56–84	–
	fourwing saltbush	ATCA2	*Atriplex canescens*	56–84	–
	yellow rabbitbrush	CHVI8	*Chrysothamnus viscidiflorus*	17–28	–
	Nevada jointfir	EPNE	*Ephedra nevadensis*	17–28	–
3	**Secondary Shrubs**			17–28	
	black sagebrush	ARNO4	*Artemisia nova*	6–17	–
	Wyoming big sagebrush	ARTRW8	*Artemisia tridentata ssp. wyomingensis*	6–17	–
	shadscale saltbush	ATCO	*Atriplex confertifolia*	6–17	–
	green molly	BAAM4	*Bassia americana*	6–17	–
	spiny hopsage	GRSP	*Grayia spinosa*	6–17	–
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	6–17	–
	plains pricklypear	OPPO	*Opuntia polyacantha*	6–17	–
	Nuttall's horsebrush	TENU2	*Tetradymia nuttallii*	6–17	–
Grass/Grasslike					
0	**Primary Grasses**			230–308	
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	168–196	–
	needle and thread	HECO26	*Hesperostipa comata*	28–56	–
	James' galleta	PLJA	*Pleuraphis jamesii*	17–28	–
	squirreltail	ELEL5	*Elymus elymoides*	17–28	–
1	**Secondary Grasses**			17–28	
	purple threeawn	ARPU9	*Aristida purpurea*	6–17	–
	blue grama	BOGR2	*Bouteloua gracilis*	6–17	–
	sandhill muhly	MUPU2	*Muhlenbergia pungens*	6–17	–
	western wheatgrass	PASM	*Pascopyrum smithii*	6–17	–
	sand dropseed	SPCR	*Sporobolus cryptandrus*	6–17	–
	sixweeks fescue	VUOC	*Vulpia octoflora*	6–17	–
Forb					
0	**Primary Forbs**			17–28	
	gooseberryleaf globemallow	SPGR2	*Sphaeralcea grossulariifolia*	17–28	–
2	**Secondary Forbs**			17–28	
	Fendler's sandwort	ARFE3	*Arenaria fendleri*	6–17	–
	Utah milkvetch	ASUT	*Astragalus utahensis*	6–17	–
	matted buckwheat	ERCA8	*Eriogonum caespitosum*	6–17	–
	longleaf phlox	PHLO2	*Phlox longifolia*	6–17	–
	woolly plantain	PLPA2	*Plantago patagonica*	6–17	–
	thorn skeletonweed	PLSP7	*Pleiacanthus spinosus*	6–17	–
	Pacific aster	SYCHC	*Symphyotrichum chilense var. chilense*	6–17	–

Animal community

This site is suited for grazing by cattle and sheep during winter and spring.

Wildlife using this site include rabbit, coyote, fox, badger, pronghorn antelope, mule deer, and dove.

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 B with runoff curves ranging from 61 to 79 depending on hydrologic condition.

Recreational uses

Resources that have special aesthetic and landscape values are wildflowers. Some recreation uses of this site are hiking and horseback riding.

Wood products

None

Other information

Threatened and endangered species include plants and animals.

Type locality

Location 1: Iron County, UT	
General legal description	Northeast of Cedar City 14 Miles on Luna Highway on Nelson Brothers' Allotment

Contributors

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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.

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Date	02/08/2010
Approved by	Shane A. Green
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** No rills present. Very minor rill development may occur in sparsely vegetated areas. If rills are present, they should be widely spaced and not connected. Rill development may increase following large storm events, but should begin to heal during the following growing season. Frost heaving will accelerate recovery. Rill development may increase when run inflow enters site from adjacent sites that produce large amounts of runoff (i.e. steeper sites, slickrock, rock outcrop). Site is essentially level and rills do not form.

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2. **Presence of water flow patterns:** Water flow patterns will be short (2-5'), narrow (<1'), and meandering; interrupted by plants and exposed rocks. Slight to no evidence of erosion or deposition associated with flow patterns.

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3. **Number and height of erosional pedestals or terracettes:** Plants may have small pedestals (1-3") where they are adjacent to water flow patterns, but without exposed roots. Terracettes should be few and stable. Terracettes should be small (1-3") and show little sign of active erosion. Some plants may appear to have a pedestal but rather than be formed by erosion, the only place litter accumulates and soil collects is at plant bases forming the appearance of a pedestal.

   Well-developed biological crusts may appear pedestalled, but are actually a characteristic of the crust formation. Some plants may appear to have a pedestal but rather than be formed by erosion, the only place litter accumulates and soil collects is at plant bases forming the appearance of a pedestal.

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** 20-35% bare ground (soil with no protection from raindrop impact). Herbaceous communities are most likely to have lower values. As species composition by shrubs increases, bare ground is likely to increase. Poorly developed biological soil crust that is susceptible to raindrop splash erosion should be recorded as bare ground. Very few if any bare spaces of greater than 1 square foot.

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5. **Number of gullies and erosion associated with gullies:** No gullies present.

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6. **Extent of wind scoured, blowouts and/or depositional areas:** Very minor evidence of active wind-generated soil movement. Wind scoured (blowouts) and depositional areas are rarely present. If present they have muted features and are mostly stabilized with vegetation and/or biological crust. Gravel or desert pavement protects the site from wind scour.

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7. **Amount of litter movement (describe size and distance expected to travel):** Most litter resides in place with some redistribution caused by water and wind movement. Very minor litter removal may occur in flow patterns and rills with deposition occurring at points of obstruction. The majority of litter accumulates at the base of plants. Some leaves, stems, and small twigs may accumulate in soil depressions adjacent to plants. Woody stems are not likely to move.

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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):** Soil surface is moderately stable (average soil stability score of 3.5 -5).

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** This description is based on the modal soil (Escalante SL, soil survey area: 634, Iron-Wash). This site has 11 correlated soils, resulting in variation of each of these attributes. Unless working on a location with the modal soil, it is critical to supplement this description with the soil-specific information from the published soil survey.

   Soil surface horizon is typically 7 inches deep. Structure is typically moderate medium platy. Color is typically pale brown (10YR 6/3), brown (10YR 4/3) moist. An ochric horizon extends to a depth of 7 inches. An ochric horizon typically extends to a depth of 2 to 10 inches. The ochric horizon is a surface horizon lacking fine stratification and which is either light colored, or thin, or has an low organic carbon content, or is massive and (very) hard when dry. The A horizon would be expected to be more strongly developed under plant canopies. It is important if you are sampling to observe the A horizon under plant canopies as well as the interspaces.

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Bunchgrasses and shrubs equally important for increasing infiltration and reducing runoff. Litter plays a role in increasing infiltration and decreasing runoff. Plants provide microhabitat for seedlings, catch litter and soil, and slow raindrops and runoff. Vascular plants and/or well-developed biological soil crusts (where present) will break raindrop impact and splash erosion. Spatial distribution of vascular plants and interspaces between well-developed biological soil crusts (where present) provide detention storage and surface roughness that slows runoff allowing time for infiltration. Interspaces between plants and any well-developed biological soil crusts (where present) may serve as water flow patterns during episodic runoff events, with natural erosion expected in severe storms. When perennial grasses decrease, reducing ground cover and increasing bare ground, runoff is expected to increase and any associated infiltration reduced. Shrubs catch snow, slow wind evaporation, and provide microhabitat for seedling establishment.

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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. Naturally occurring soil horizons may be harder than the surface because of an accumulation of calcium carbonate and should not be considered as compaction layers.

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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: Indian ricegrass

    Sub-dominant: fourwing saltbrush

    Other: other grasses = other shrubs > forbs

    Additional: In the northern portion of the MLRA cool-season perennial grasses (Indian ricegrass, needle and thread) dominate. In the southernmost portion of the MLRA warm-season perennial grasses (galleta, sand dropseed) dominate. The two groups share dominance in the middle portion of the MLRA.

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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. Some mortality of bunchgrass and other shrubs may occur during very severe (long-term) droughts. There may be partial mortality of individual bunchgrasses and shrubs during less severe drought. Long-lived species dominate site. Open spaces from disturbance are quickly filled by new plants through seedlings and reproductive reproduction (tillering).

14. **Average percent litter cover (%) and depth (in):** Litter cover includes litter under plants. Most litter will be fine litter. Depth should be 1-2 leaf thickness in the interspaces and up to 1/2” under canopies. Litter cover may increase to 20-30% following years with favorable growing conditions. Excess litter may accumulate in absence of disturbance. Vegetative production may be reduced if litter cover exceeds 40%.

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 475#/acre.
    Even the most stable communities exhibit a range of production values. Production will vary between communities and across the MRLA. Refer to the community descriptions in the ESD. Production will differ across the MLRA due to the naturally occurring variability in weather, soils, and aspect. The biological processes on this site are complex; therefore, representative values are presented in a land management context.

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:** Annual grasses and annual forbs

17. **Perennial plant reproductive capability:** All perennial plants should have the ability to reproduce sexually or asexually, except in drought years. Density of plants indicates that plants reproduce at level sufficient to fill available resource. Within capability of site there are no restrictions on seed or vegetative reproductive capacity.