

Ecological site R028AY223UT Semidesert Sand (Utah Juniper)

Accessed: 05/05/2024

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.

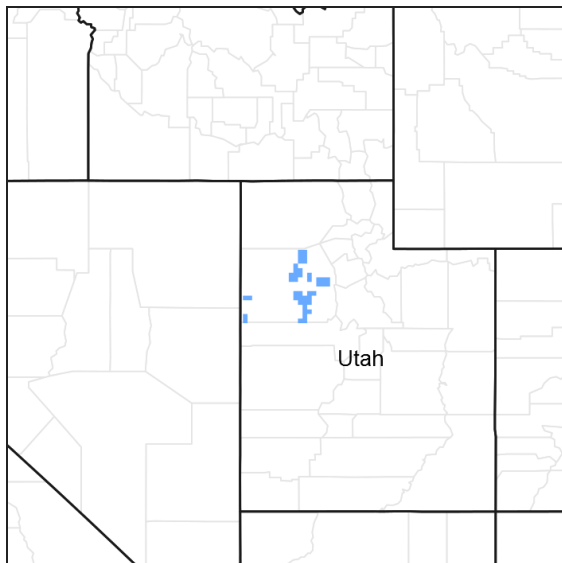


Figure 1. Mapped extent

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 Sand (Utah Juniper)

EPA Ecoregions: North American Deserts> Cold Deserts> Central Basin and Range> Sagebrush Basins and Slopes, Woodland- and Shrub-Covered Low Mountains

Ecological site concept

This site is found on dunes from eolian deposited sand. Overstory is dominated by Utah juniper with an understory of varied shrubs and bunch grasses. Not much is known on why this site is dominated by Utah juniper instead of the typical sandy shrub community of fourwing saltbush. The burn frequency potential is low because of the large interspaces between plants. It is unknown if the juniper would return after a fire or if shrubs or grasses would dominate after a fire. From the data collected on the site there are only two states and one community phase per state, reference community and current potential, which is similar to the reference with the exception of non-native plants present in the community. Other states and community phases may exist, but they have not been found.

Associated sites

R028AY215UT	Semidesert Gravelly Loam (Wyoming Big Sagebrush) North This site is found adjacent and upslope to R028AA223UT.
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Similar sites

R028AY021ID	SANDY 8-12 JUOS/ARTRT/ACHY This site has similar soil characteristics and plant community composition, but was developed for Idaho.
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Table 1. Dominant plant species

Tree	(1) <i>Juniperus osteosperma</i>
Shrub	Not specified
Herbaceous	Not specified

Physiographic features

This site occurs on vegetated sand dunes.

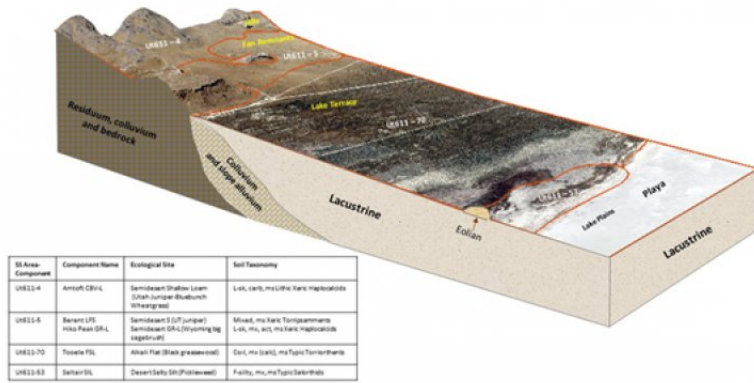


Figure 2. Block Diagram

Table 2. Representative physiographic features

Landforms	(1) Dune
Elevation	1,372–1,768 m
Slope	2–15%

Climatic features

The climate is semiarid and characterized by cold winters and warm summers. October through April is when most of the precipitation occurs, while May through September are the driest months.

The climate station below is the only station within a reasonable distance (1000 meters). PRISM model suggests that the site wide minimum and maximum precipitation and temperature are 10.4 to 16.5 inches (13.4 inch average precipitation) and 37 to 64 degrees F with 50.6 degrees F average. The Johnson Pass climate station has higher precipitation than is expected for the site.

Table 3. Representative climatic features

Frost-free period (average)	113 days
Freeze-free period (average)	146 days
Precipitation total (average)	432 mm

Climate stations used

- (1) JOHNSON PASS [USC00424362], Dugway, UT

Influencing water features

Soil features

The soil is deep and somewhat excessively drained. It formed in eolian and lacustrine sands derived mainly from mixed parent materials. The surface horizon is loamy fine sand textures 6 inches thick. There are no rock fragments in the soil profile or on the soil surface.

Soil photo shows the top 6 inches of soil between trees (lighter color on the right) and darker soil found under the tree canopy (darker color on left). Photo taken by R. Lewis, 8/1/2016, UTM 12S 337195E 4418436N.



Figure 7. Soil Photo

Table 4. Representative soil features

Surface texture	(1) Loamy fine sand
Drainage class	Somewhat excessively drained
Permeability class	Very rapid
Soil depth	152 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	6.1–7.37 cm
Calcium carbonate equivalent (0-101.6cm)	1–15%
Electrical conductivity (0-101.6cm)	0–2 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0
Soil reaction (1:1 water) (0-101.6cm)	7.4–8.4
Subsurface fragment volume <=3" (Depth not specified)	0%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

As this deteriorates due to grazing pressure, needleandthread and Indian ricegrass decrease, while rabbitbrush, big sagebrush, and sand dropseed increase.

When the potential natural plant community is burned, juniper, big sagebrush and wild buckwheat decrease while rabbitbrush increases.

Vegetation dynamics are not well understood in the site. More data collection at all mapped areas is needed.

Two states have been found for this site, a reference state and current potential state. The reference state has not been documented, but is assumed to be similar to the current potential with out invasive annual species. The current potential state has been observed in the field. Other states and community phases may exist and as additional data is collected, the STM will be updated if needed.

State and transition model

MLRA 28A
Semidesert Sand (Utah
Juniper-North

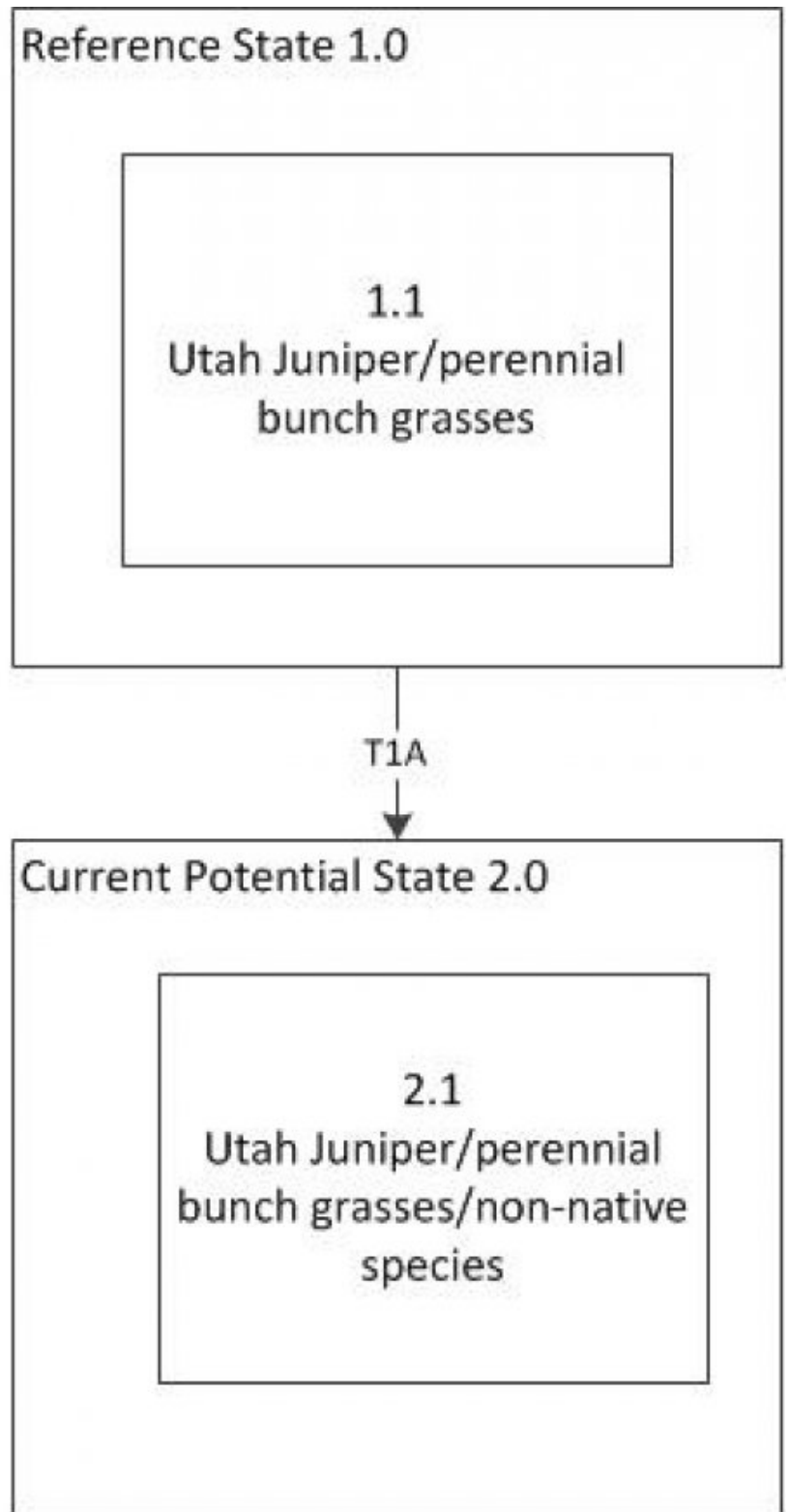


Figure 8. STM R028AA223UT

State 1 Reference State

Plant species dominants: The general view of this site is Utah juniper. The understory composition by air-dry weight is approximately 40 percent perennial grasses, 20 percent forbs, 35 percent shrubs, and 10 percent trees.

Community 1.1 Utah juniper/perennial bunch grasses

The general view of this site is Utah juniper. The understory composition by air-dry weight is approximately 40 percent perennial grasses, 20 percent forbs, 35 percent shrubs, and 10 percent trees.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	211	314	412
Shrub/Vine	185	275	361
Forb	105	157	206
Tree	53	78	103
Total	554	824	1082

Table 6. Ground cover

Tree foliar cover	5%
Shrub/vine/liana foliar cover	2-5%
Grass/grasslike foliar cover	2-5%
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	–	–	–	0-10%
>0.3 <= 0.6	–	–	0-10%	–
>0.6 <= 1.4	–	0-10%	–	–
>1.4 <= 4	0-10%	–	–	–
>4 <= 12	–	–	–	–
>12 <= 24	–	–	–	–
>24 <= 37	–	–	–	–
>37	–	–	–	–

**Figure 10. Plant community growth curve (percent production by month).
UT2231, 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

Current Potential

Plant species dominants: Utah juniper is the dominant overstory species with various shrubs and bunch grasses in the understory.

Community 2.1

Utah juniper/perennial bunch grasses/non-native species



Figure 11. Community Phase 2.1, photo 2



Figure 12. Community Phase 2.1, photo 3



Figure 13. Community Phase 2.1, photo 1

The general view of this site is Utah juniper. The understory composition by air-dry weight is approximately 40 percent perennial grasses, 20 percent forbs, 35 percent shrubs, and 10 percent trees. Non-native invasive forbs and grasses are present in the community. Photo number 2 and 3 captions: Dominant plants are Utah juniper, Wyoming sagebrush and Indian ricegrass, with some cheatgrass and mustards. Photo taken by Randy Lewis 8/1/2016, UTM 12S 337195E 4418436N

Transition T1A

State 1 to 2

Introduction and establishment of non-native invasive plants.

Additional community tables

Table 8. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Tree					
0	Trees			84–127	
	Utah juniper	JUOS	<i>Juniperus osteosperma</i>	84–127	–
Shrub/Vine					
0	Primary Shrubs			168–295	
	fourwing saltbush	ATCA2	<i>Atriplex canescens</i>	43–84	–
	shadscale saltbush	ATCO	<i>Atriplex confertifolia</i>	26–43	–
	spiny hopsage	GRSP	<i>Grayia spinosa</i>	26–43	–
	bud sagebrush	PIDE4	<i>Picrothamnus desertorum</i>	26–43	–
	browneyed Susan	RUTRT	<i>Rudbeckia triloba var. triloba</i>	26–43	–
	basin big sagebrush	ARTRT	<i>Artemisia tridentata ssp. tridentata</i>	26–43	–
3	Secondary Shrubs			26–43	
	yellow rabbitbrush	CHVIS5	<i>Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus</i>	9–26	–
	rubber rabbitbrush	ERNAN5	<i>Ericameria nauseosa ssp. nauseosa var. nauseosa</i>	9–26	–
Grass/Grasslike					
0	Primary Grasses			211–261	
	needle and thread	HECO26	<i>Hesperostipa comata</i>	127–135	–
	Indian ricegrass	ACHY	<i>Achnatherum hymenoides</i>	84–127	–
1	Secondary Grasses			43–84	
	squirreltail	ELEL5	<i>Elymus elymoides</i>	26–43	–
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	26–43	–
	Sandberg bluegrass	POSE	<i>Poa secunda</i>	26–43	–
	sand dropseed	SPCR	<i>Sporobolus cryptandrus</i>	26–43	–
Forb					
0	Primary Forbs			67–127	
	lemon scurfpea	PSLA3	<i>Psoraleidium lanceolatum</i>	43–84	–
	scarlet globemallow	SPCO	<i>Sphaeralcea coccinea</i>	26–43	–
2	Secondary Forbs			43–84	
	Geyer's milkvetch	ASGE	<i>Astragalus geyeri</i>	9–26	–
	roundspike cryptantha	CRHU2	<i>Cryptantha humilis</i>	9–26	–
	cushion buckwheat	EROV	<i>Eriogonum ovalifolium</i>	9–26	–
	shaggy fleabane	ERPU2	<i>Erigeron pumilus</i>	9–26	–
	low beardtongue	PEHU	<i>Penstemon humilis</i>	9–26	–
	longleaf phlox	PHLO2	<i>Phlox longifolia</i>	9–26	–

Animal community

This site may be properly grazed by cattle and sheep during any season of the year.

Wildlife using this site include jackrabbit, coyote, fox, and mule deer.

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

This soil is in hydrologic group A. The hydrologic curve number is 39 when the vegetation is in good condition.

Recreational uses

Hunting, hiking, and camping

Wood products

Posts and firewood.

Other information

Threatened and endangered species include plants and animals.

Type locality

Location 1: Tooele County, UT	
Township/Range/Section	T2S R10W S20
General legal description	7.5 Miles South of Aragonite (East of Wendover, Utah) Exact Location: 220 Feet South and 500 Feet West of the Northeast Corner of Section 20 in Township 2S, Range 10W.

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.

Author(s)/participant(s)	Jack Alexander, Range Specialist, Synergy Resource Solutions, Inc. Julia Kluck, Soil Scientist, Synergy Resource Solutions, Inc. Shane Green, State Range Specialist, Utah NRCS
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Date	02/08/2010
Approved by	Shane A. Green
Approval date	

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.

2. **Presence of water flow patterns:** Water flow patterns will be short (2-5') and meandering; interrupted by plants and exposed rocks. Some evidence of erosion or deposition associated with flow patterns. Where slopes exceed 5%, water flow patterns may be longer (5-10').

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.

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** 20-40% 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.

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

6. **Extent of wind scoured, blowouts and/or depositional areas:** Very minor evidence of active wind generated soil movement is present in reference communities. Wind scoured (blowouts) and depositional areas are rarely present. Slight depositional mounding at plant bases. Slight deposition may occur in perennial bunchgrasses, under winterfat canopy, and within biological soil crusts. Wind scour or deposition areas are associated with fire activity. Very small areas (less than 4 square feet) may be present.

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.

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Soil surface is generally not stable due to soil structure and chemistry (average soil stability rating of 2 – 3).
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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 (Goldrun LFS, soil survey area: 611, Tooele), the only soil correlated with this site.

Soil surface horizon is typically 7 inches deep. Structure is typically weak thin platy. Color is typically light brownish gray (10YR 6/2), dark grayish brown (10YR 4/2) moist.

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Vascular plants and any 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. Since site is level and well covered, infiltration is very high and runoff very low.

Vascular plants and any 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. Crowns of trees and accumulating litter at base of trees appear to create a micro-topography that may enhance development of water flow patterns below the drip line of the canopy. Significant increases in pinyon-juniper canopy reduces understory vegetation and increases runoff.

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 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: needle and thread

Sub-dominant: Indian ricegrass, Utah juniper

Other: other shrubs > other grasses > 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.

Functional/structural groups may appropriately contain non-native species if their ecological function is the same as the native species in the reference state (e.g. crested wheatgrass and Russian wildrye may substitute for mid stature cool season perennial native bunchgrasses.). Biological soil crust is variable in its expression on this site and is measured as a component of ground cover. Forbs can be expected to vary widely in their expression in the plant community based upon departures from average growing conditions.

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%.
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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 735#/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.
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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:** Cheatgrass, halogeton, green rabbitbrush, annual forbs, broom snakeweed, Utah juniper, purple threeawn, medusahead rye.
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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.
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