USDA Natural Resources Conservation Service

Ecological site R028AY132UT
Desert Salty Silt (Iodinebush)

Accessed: 05/01/2024

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): 028A–Ancient Lake Bonneville

This site occurs in MLRA 28A, LRU A, the northern part of MLRA 28A. This LRU has a mesic soil temperature regime and a typic aridic soil moisture regime. Typically most precipitation occurs in the winter. Mean annual precipitation is between 4 to 8 inches. The north desert ecological zone typically has no big sagebrush (Artemisia tridentata spp.), but typically is dominated by shadscale (Atriplex confertifolia), winterfat (Krascheninnikovia lanata), saltbushes (Atriplex spp), Indian ricegrass (Achnatherum hymenoides), and bottlebrush squirreltail (Elymus elymoides). Unlike the southern LRUs, there is typically very little if any galleta (Pleuraphis jamesii) grass.

Classification relationships

MLRA 28A, LRU A, northern desert ecological zone

Ecological site concept

This site is dominated by iodinebush and is typically found on playas, lake plains, flats and depressions. The soil is typically saturated to the surface and can frequently pond water.

Associated sites

R028AY004UT	**Alkali Flat (Black Greasewood)**
R028AY119UT	**Desert Flat (Shadscale)**

Similar sites

R028AY009NV	**SALINE FLAT** This site is similar in soils and vegetation but is found in Nevada.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Allenrolfea occidentalis*
Herbaceous	Not specified

Physiographic features

This site occurs on playas,lake plains, flats, and depressions. It is on very low slopes between 0 and 2 percent between 4200 to 5200 feet of elevation. The water table is either at the soil surface or close to the soil surface February through September. This site also ponds water for a large portion of the year.

Table 2. Representative physiographic features

Landforms	(1) Playa (2) Lake plain (3) Flat
Flooding frequency	None
Ponding duration	Long (7 to 30 days)
Ponding frequency	Frequent
Elevation	4,200–5,200 ft
Slope	0–2%
Ponding depth	0–6 in
Water table depth	0–12 in

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.

Mean Annual Air Temperature: 45-50
Mean Annual Soil Temperature: 47-52

Table 3. Representative climatic features

Frost-free period (average)	103 days
Freeze-free period (average)	124 days
Precipitation total (average)	4 in

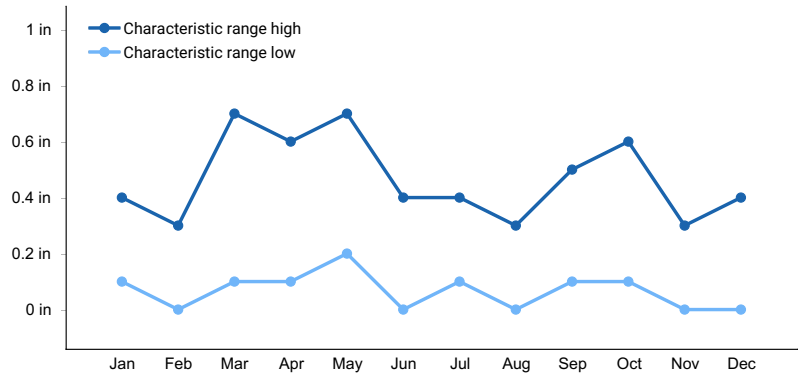

Figure 1. Monthly precipitation range

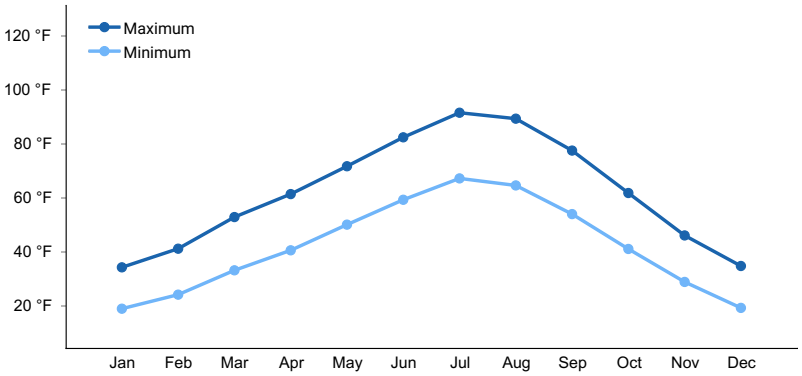

Figure 2. Monthly average minimum and maximum temperature

Influencing water features

Soil features

Characteristic soils in this site are over 60 inches deep and very poorly to poorly drained.

They formed in lacustrine sediments derived mainly from limestone, shale, and quartzite parent material. the surface horizon is silt loam textures and 6 inches thick. Rock fragments are not found in or on this soil.

These soils are silty textures and have a layer of salt accumulation near the surface. Roots are usually stopped by this layer. Thin crusts of crystalline salt may form on the soil surface during dry weather. These soils are calcareous throughout, and are strongly saline. Permeability is slow or very slow. Available water capacity is greatly reduced by salinity and is 0.5 to 5 inches. A seasonal high water table is at the surface to a depth of 1 foot. Mottles are usually found within 12 inches of the surface.

The water supplying capacity is not figured because the water table provides sub irrigation making this number meaningless. Natural geologic erosion in potential is approximately 0.5 tons/acre/year.

Table 4. Representative soil features

Surface texture	(1) Silty clay loam (2) Silt loam (3) Fine sandy loam
Drainage class	Poorly drained to somewhat poorly drained
Permeability class	Slow to very slow
Soil depth	60 in
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-40in)	0.4–1.6 in
Calcium carbonate equivalent (0-40in)	15–40%
Electrical conductivity (0-40in)	16–32 mmhos/cm
Sodium adsorption ratio (0-40in)	13–90
Soil reaction (1:1 water) (0-40in)	7.9–9
Subsurface fragment volume <=3" (Depth not specified)	0%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

As ecological condition deteriorates due to overgrazing, inland saltgrass decreases while iodinebush increases.

This site lacks the quantity of fuel to carry a fire.

Annual forbs are most likely to invade this site.

This site is similar to Nevada's site 028AY009NV. The state and transition model developed for 028AY009NV (Stringham et al. 2015) is used for this ecological site.

State and transition model

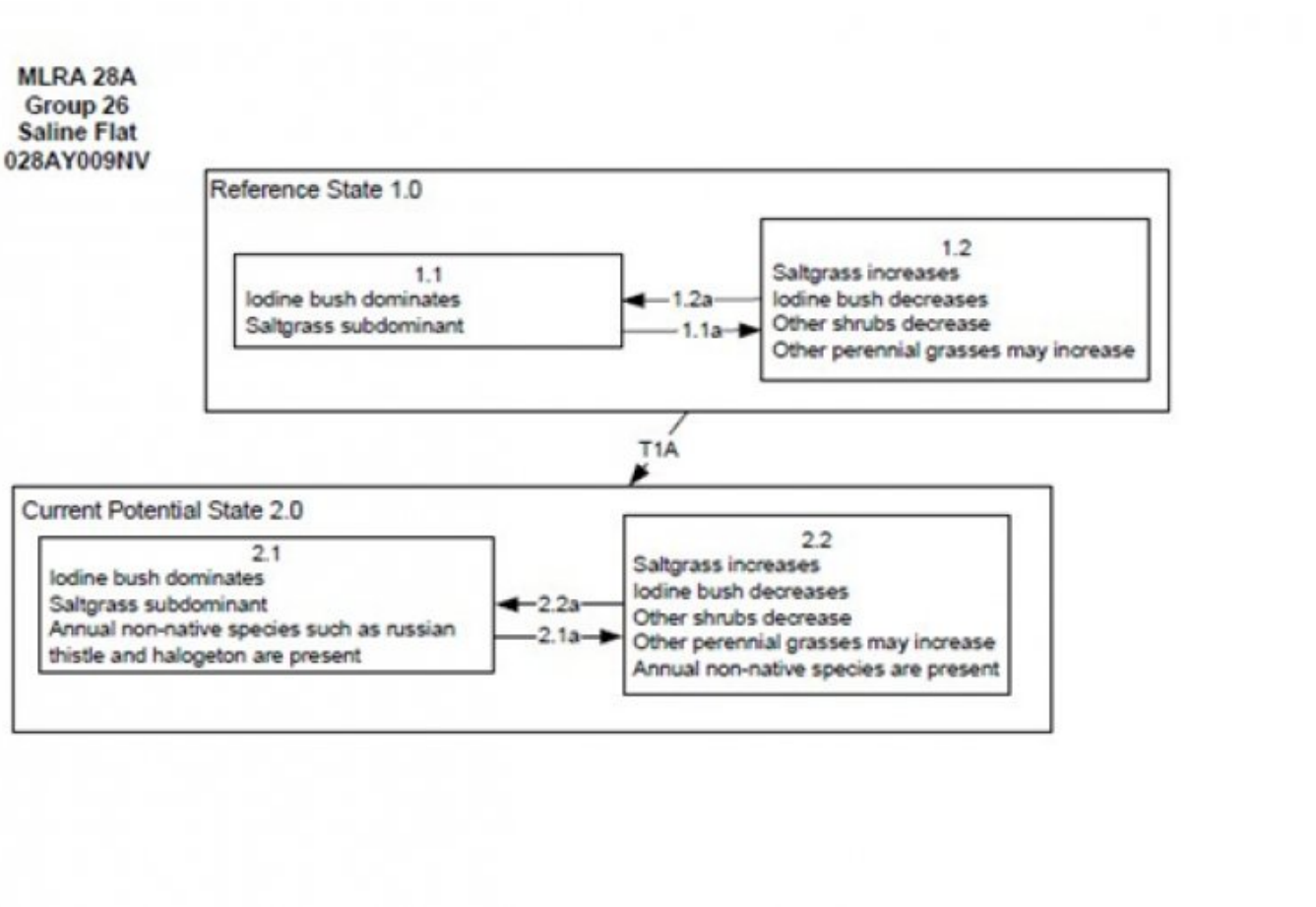

Figure 3. R028AA132UT STM

State 1
Reference State

The Reference State 1.0 is representative of the natural range of variability under pristine conditions. The Reference State has two general community phases; a shrub-grass dominant phase and a shrub dominant phase. State dynamics are maintained by interactions between climatic patterns and disturbance regimes. Negative feedbacks enhance ecosystem resilience and contribute to the stability of the state. These include the presence of all structural and functional groups, low fine fuel loads, and retention of organic matter and nutrients. This site is very stable, with little variation in plant community composition. Plant community changes would occur in response to precipitation, long-term drought, or abusive grazing and would be reflected in annual production. Wet years will increase grass production, while normal dry conditions will reduce grass production and shrubs will dominate.

Community 1.1
Iodine bush, saltgrass

The dominant aspect of the plant community is Iodinebush. The composition by air dry weight is approximately 35 percent perennial grasses, 5 percent forbs, and 60 percent shrubs.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Shrub/Vine	30	105	150
Grass/Grasslike	18	61	88
Forb	3	9	13
Total	**51**	**175**	**251**

Table 6. Ground cover

Tree foliar cover	0%
Shrub/vine/liana foliar cover	15-30%
Grass/grasslike foliar cover	10-15%
Forb foliar cover	1-2%
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 (Ft)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.5	–	–	–	–
>0.5 <= 1	–	25-35%	10-20%	0-5%
>1 <= 2	–	–	–	–
>2 <= 4.5	–	–	–	–
>4.5 <= 13	–	–	–	–
>13 <= 40	–	–	–	–
>40 <= 80	–	–	–	–
>80 <= 120	–	–	–	–
>120	–	–	–	–

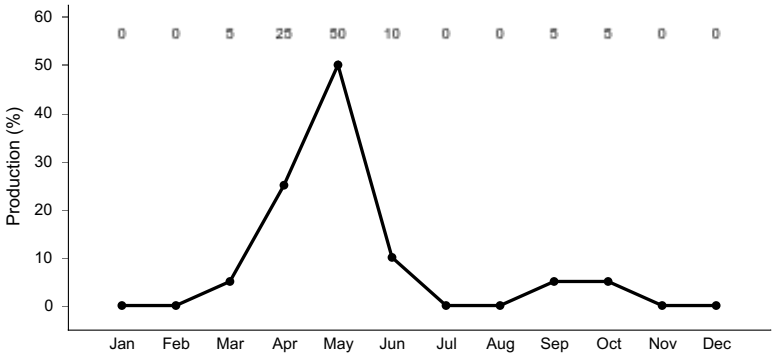

Figure 5. Plant community growth curve (percent production by month). UT1321, PNC. Excellent Condition.

Community 1.2
Saltgrass, iodine bush

Saltgrass increases, iodinebush may decrease. Other perennial bunchgrasses such as alkali sacaton and basin wildrye may increase.

Pathway 1.1a
Community 1.1 to 1.2

Abnormally high precipitation will cause ponding on the soil surface, leading to an increase in saltgrass.

Pathway 1.2a
Community 1.2 to 1.1

Dry conditions cause salts to accumulate at the soil surface, which allows iodinebush to become dominant. Perennial bunchgrasses will be reduced.

State 2
Current Potential State

This state is similar to the Reference State 1.0 with two similar community phases. Ecological function has not changed, however the resiliency of the state has been reduced by the presence of invasive weeds. Non-natives may increase in abundance but will not become dominant within this state. These non-natives can be highly flammable and can promote fire where historically fire had been infrequent. Negative feedbacks enhance ecosystem resilience and contribute to the stability of the state. These feedbacks include the presence of all structural and functional groups, low fine fuel loads, and retention of organic matter and nutrients. Positive feedbacks reduce ecosystem resilience and stability of the state. These include the non-natives' high seed output, persistent seed bank, rapid growth rate, ability to cross pollinate, and adaptations for seed dispersal. Management would be to maintain high diversity of desired species to promote organic matter inputs and prevent the dispersal and seed production of the non-native invasive species.

Community 2.1
Iodine bush, saltgrass, non-native annuals

This community is dominated by iodinebush and saltgrass. Mojave seablite, black greasewood, alkali sacaton, and basin wildrye make up minor components. Annual non-native species such as halogeton and Russian thistle are present and may be increasing within the community. Saltcedar may occur in disturbed areas where water has ponded.

Community 2.2
Saltgrass, iodinebush, non-native annuals

Saltgrass increases, iodinebush may decrease. Other perennial bunchgrasses such as alkali sacaton and basin wildrye may increase. Annual non-native species present and may increase with spring precipitation.

Pathway 2.1a
Community 2.1 to 2.2

Abnormally high precipitation will cause ponding on the soil surface, leading to an increase in saltgrass.

Pathway 2.1a
Community 2.2 to 2.1

Dry conditions cause salts to accumulate at the soil surface, which allows iodinebush to become dominant. Perennial bunchgrasses will be reduced.

Transition T1A
State 1 to 2

Trigger: This transition is caused by the introduction of non-native annual plants such as halogeton, Russian thistle, cheatgrass, or salt cedar. Slow variables: Over time the annual non-native species will increase within the community. Threshold: The presence of introduced non-native species causes an immediate decrease in the resilience of the site. Annual non-native species cannot be easily removed from the system and have the potential to significantly alter disturbance regimes from their historic range of variation.

Additional community tables

Table 8. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Shrub/Vine					
0	**Primary Shrubs**			90–110	
	iodinebush	ALOC2	*Allenrolfea occidentalis*	90–110	–
3	**Secondary Shrubs**			6–10	
	sickle saltbush	ATFA	*Atriplex falcata*	2–6	–
	whiteflower rabbitbrush	CHAL9	*Chrysothamnus albidus*	2–6	–
	greasewood	SAVE4	*Sarcobatus vermiculatus*	2–6	–
Grass/Grasslike					
0	**Primary Grasses**			60–80	
	saltgrass	DISP	*Distichlis spicata*	60–80	–
1	**Secondary Grasses**			6–10	
	Torrey's rush	JUTO	*Juncus torreyi*	2–6	–
	alkali cordgrass	SPGR	*Spartina gracilis*	2–6	–
Forb					
2	**Forbs**			10–20	
	clustered goldenweed	PYRAR	*Pyrrocoma racemosa var. racemosa*	6–10	–
	slender grasswort	SAMA11	*Salicornia maritima*	6–10	–
	Mojave seablite	SUMO	*Suaeda moquinii*	6–10	–

Animal community

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

This site receives minor use by a few species of wildlife.

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 with runoff curve numbers ranging from 80 89 depending on hydrologic condition.

Recreational uses

A recreational use of this site is hiking.

Wood products

None

Other information

Threatened and endangered species include plants and animals.

Type locality

Location 1: Box Elder County, UT	
Township/Range/Section	T8N R15W S15
General legal description	Box Elder, West Soil Survey – South of Terrace Mountain; Section 15, Township 8N, Range 15W.

Other references

Stringham, T.K., P. Novak-Echenique, P. Blackburn, C. Coombs, D. Snyder, 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.

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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	02/03/2009
Approved by	Shane A. Green
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** Minor small rill development will be apparent in reference communities. Development will be more pronounced following significant storm or snow melt events. Rills should be short (< 3') and spaced 6' – 8'. Rills will run from higher to lower micro-elevational areas within the site and will travel in random directions. Evidence of rills will slowly decrease in the months following major weather events. Rills development may also be more pronounced on the edges of this site where run-on from adjacent upland sites or exposed bedrock concentrate flows.

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2. **Presence of water flow patterns:** Evidence of stable overland water flow is apparent in the reference community. Flow patterns follow site micro-contours, are sinuous and may have standing water after storm events. There are no exposed roots around Saltgrass clumps and biological soil crusts, where present under Iodinebush mounds, show little sign of disturbance. Flow patterns are normally <25 feet long, flow around shrub mounds, and are typically spaced 12 to 15 feet apart.

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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 depositional mounding under Iodinebush canopies and within Saltgrass clumps is normal and may not be water erosion caused.

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare ground ranges from 50% - 60% in the reference community. Ground cover (the inverse of bare ground) typically includes: coarse fragments – < 1%; plant canopy – 25% to 35%; litter – 15% to 20%, and biological soil crusts – 2% to 5%.

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5. **Number of gullies and erosion associated with gullies:** Developed 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 apparent following significant weather events or when gullies convey runoff from higher elevation rocky or naturally eroding areas.

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6. **Extent of wind scoured, blowouts and/or depositional areas:** No evidence of wind generated soil movement is present in reference communities. Wind caused blowouts are also not present. Slight depositional mounding within Saltgrass patches and under Iodinebush canopies 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 grass patches 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 3 to 4 under plant canopies and 2 to 3 in interspaces. Surface textures are typically silts containing no 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 1 inch deep and structure is weak, thick platy. The A-horizon color is 5Y 6/1. Soils have an Ochric epipedon that extends 1 inch 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 healthy Saltgrass patches and Iodinebush stands 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.

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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: Non-sprouting shrubs (e.g. Iodinebush) 50 – 55%, > rhizomatous grasses (e.g. Saltgrass) 30 – 40%.

    Sub-dominant: Sub-dominant: Sprouting shrubs (e.g. Black greasewood and Sickle saltbush) 1 - 3% > Cool season grasses/grass-likes (e.g. Alkali cordgrass and Torrey rush) 1 - 3%.

    Other: Others: Shrubs (e.g. Whiteflower rabbitbrush) 1-3%, perennial forbs (e.g. Shrubby seepweed and Sea saltwort) 3-5%, biological soil crusts (e.g. lichens, mosses, cyanobacteria) trace%.

    Additional: Moss and lichen communities will normally be found under plant canopies while the cyanobacteria will be found throughout the site. Functional/structural groups may appropriately contain non-native species if their ecological function is the same as the native species in the reference state. Perennial and annual forbs can be expected to vary widely in their expression in the plant community based upon departures from average growing conditions.

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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 50% of the shrubs may die (or appear dead). There may be partial mortality of individual bunchgrasses and other shrubs during severe drought.

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14. **Average percent litter cover (%) and depth (in):** Litter cover ranges from 15 to 20%. Depth varies from 0-1/4 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):** 150 – 200 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:** Russian thistle, ragweed, annual bromes and Halogeton are likely to 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.
