

Ecological site R028AY032ID

South Slope Loamy 12-16 ARTRT/PSSPS

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General information

Provisional. A provisional ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model and enough information to identify the ecological site.

MLRA notes

Major Land Resource Area (MLRA): 028A–Ancient Lake Bonneville

MLRA 28A occurs in Utah (82 percent), Nevada (16 percent), and Idaho (2 percent). It encompasses approximately 36,775 square miles (95,246 square kilometers). A large area west and southwest of Great Salt Lake is a salty playa. This area is the farthest eastern extent of the Great Basin Section of the Basin and Range Province of the Intermontane Plateaus. It is an area of nearly level basins between widely separated mountain ranges trending north to south. The basins are bordered by long, gently sloping alluvial fans. The mountains are uplifted fault blocks with steep side slopes. Most of the valleys are closed basins containing sinks or playa lakes. Elevation ranges from 3,950 to 6,560 feet (1,204 to 2000 meters) in the basins and from 6,560 to 11,150 feet (1996 to 3398 meters) in the mountains. Much of the MLRA has alluvial valley fill and playa lakebed deposits at the surface from pluvial Lake Bonneville, which dominated this MLRA 13,000 years ago. A level line of remnant lake terraces on some mountain slopes indicates the former extent of this glacial lake. The Great Salt Lake is what remains of the pluvial lake.

Mountains in the interior of this MLRA consist of tilted blocks of marine sediments from Cambrian to Mississippian age with scattered outcrops of Tertiary continental sediments and volcanic rocks. The average annual precipitation is 5 to 12 inches (13 to 30 cm) in the valleys and ranges up to 49 inches (124 cm) in the mountains. Most of the rainfall in the southern LRU occurs as high-intensity, convective thunderstorms during the growing season (April through September). The driest period is from midsummer to early autumn in the northern LRU. Precipitation in winter typically occurs as snow. The average annual temperature is 39 to 53 °F (4 to 12 °C). The freeze-free period averages 165 days and ranges from 110 to 215 days, decreasing in length with increasing elevation. The dominant soil orders in this MLRA are Aridisols, Entisols, and Mollisols. Soils are

dominantly in the mesic or frigid soil temperature regime, aridic or xeric soil moisture regime, and mixed mineralogy. The soils are generally well drained, loamy or loamy-skeletal, and very deep.

LRU notes

The Basin and Range 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 (1,280 to 1,554 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.

Ecological site concept

The South Slope Loamy 12-16 ARTRT/PSSPS site occurs on slopes on lake terraces of old Lake Bonneville. Slopes range from 12 to 60 percent on south and west aspects. Elevation ranges from 4,700 to 5,200 feet (1,432 to 1,585 meters). Soil surface textures are silt clay and silty clay loams. The dominant vegetation is basin big sagebrush and bluebunch wheatgrass.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) <i>Artemisia tridentata</i> ssp. <i>tridentata</i>
Herbaceous	(1) <i>Pseudoroegneria spicata</i> ssp. <i>spicata</i>

Physiographic features

The South Slope Loamy 12-16 ARTRT/PSSPS site occurs on slopes on lake terraces of old Lake Bonneville. Slopes range from 12 to 60 percent on south and west aspects. Elevation ranges from 4,700 to 5,200 feet (1,432 to 1,585 meters).

Table 2. Representative physiographic features

Landforms	(1) Lake terrace (2) Escarpment
Elevation	1,433–1,585 m
Slope	12–60%

Climatic features

The Great Salt Lake Area has elevations in the basins ranging from 3,950 to 6,560 feet above sea level with mountains ranging up to 11,150 feet. The average annual precipitation is 14 inches based on data collected from 5 long term climate stations located throughout the MLRA. The average annual low is 11 inches and the average annual high is 16 inches. The average annual temperature is 46 degrees Fahrenheit. The average annual low is 32 and the average annual high is 60 degrees F. The frost free period ranges from 100 to 125 days and the freeze free period ranges from 131 to 156 days.

Table 3. Representative climatic features

Frost-free period (average)	125 days
Freeze-free period (average)	156 days
Precipitation total (average)	406 mm

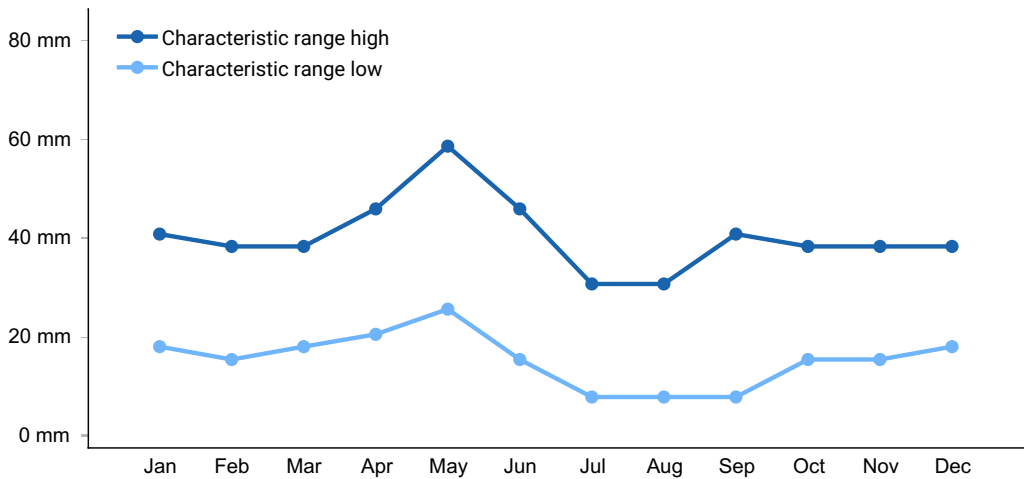


Figure 1. Monthly precipitation range

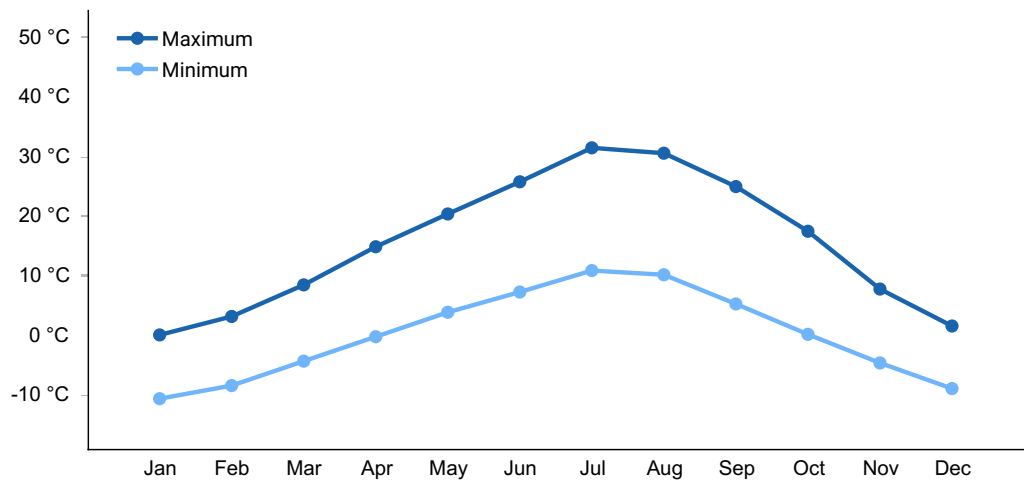


Figure 2. Monthly average minimum and maximum temperature

Influencing water features

Soil features

The soils are very deep moderately well to well drained silty clay loams and silt clay loams. They formed in lacustrine deposits. Clay amounts increase with depth in the soil profile, resulting in silty clay loam, silty clay, and clay subsoil textures. Permeability is very slow. These soils are characterized by a xeric soil moisture regime and either a frigid or mesic soil temperature regime.

Table 4. Representative soil features

Parent material	(1) Lacustrine deposits
Surface texture	(1) Silty clay (2) Silty clay loam
Drainage class	Moderately well drained to well drained
Permeability class	Very slow
Soil depth	152 cm
Surface fragment cover ≤ 3 "	0–1%
Surface fragment cover > 3 "	0%
Available water capacity (Depth not specified)	12.7–16.76 cm
Calcium carbonate equivalent (Depth not specified)	1–15%
Electrical conductivity (Depth not specified)	0–4 mmhos/cm
Sodium adsorption ratio (Depth not specified)	0–5
Soil reaction (1:1 water) (Depth not specified)	7.4–8.4
Subsurface fragment volume ≤ 3 " (Depth not specified)	0%
Subsurface fragment volume > 3 " (Depth not specified)	0%

Ecological dynamics

The dominant visual aspect is basin big sagebrush and bluebunch wheatgrass. Composition by weight is approximately 50 to 60 percent grass, 10 to 20 percent forbs, and 25 to 35 percent shrubs.

In the last few thousand years, the South Slope Loamy 12-16 ARTRT/PSSPS site has evolved in a semi-arid climate characterized by hot, dry summers and cold winters.

Herbivory has historically occurred on the site at low levels of utilization. Herbivores include mule deer, lagomorphs and small rodents.

Fire has historically occurred on this site every 20 to 50 years.

The Historic Climax Plant Community (HCPC), the Reference State (State 1), moves through many phases depending on the natural and man-made forces that impact the community over time. State 1, described later, indicates some of these phases. The Reference Plant Community is Phase A. This site is dominated by bluebunch wheatgrass and basin big sagebrush. Subdominant species include western wheatgrass, arrowleaf balsamroot, tapertip hawksbeard, and antelope bitterbrush. There are a variety of other grasses, forbs and shrubs that occur in the plant community in minor amounts. The plant species composition of Phase A is listed later under "Reference Plant Community Phase Plant Species Composition".

Total annual production is 1,200 pounds per acre (1,344 Kg/ha) in a normal year. Production in a favorable year is 1,600 pounds per acre (1,792 Kg/ha). Production in an unfavorable year is 800 pounds per acre (896 Kg/ha).

Structurally, cool season deep rooted perennial bunchgrasses are dominant, followed by medium height shrubs being more dominant than perennial forbs while shallow rooted bunchgrasses are subdominant.

FUNCTION:

Big game use the site in spring, summer and fall. Mule deer make slight use of the site in mild winters and moderate to heavy use in severe winters. Raptors hunt the site. There is some use by a variety of other small animals.

It is suited for livestock use in the spring, fall and early winter. It provides little recreation value.

The South Slope Loamy 12-16 ARTRT/PSSPS site can be degraded by improper grazing management due to accelerated erosion.

Impacts on the Plant Community.

Influence of fire:

The South Slope Loamy 12-16 ARTRT/PSSPS site historically had a fire frequency of approximately 20 to 50 years. Bluebunch wheatgrass is usually maintained in the community after fire. Basin big sagebrush is mostly killed. Sandberg bluegrass, western wheatgrass, and bottlebrush squirreltail can increase in the community with fire. Low green rabbitbrush can increase. With fires more frequent than the historic levels, invasive annuals and noxious perennials can invade the plant community. Cheatgrass can be a

troublesome invader on this site, preventing perennial grass and shrub re-establishment and increasing the fire frequency.

Influence of improper grazing management:

Season-long grazing and/or excessive utilization can be very detrimental to this site. This type of management leads to reduced vigor of the bunchgrasses. With reduced vigor, recruitment of these species declines. Bottlebrush squirreltail, western wheatgrass, and Sandberg bluegrass increases. As the bunchgrass species decline, the plant community becomes susceptible to increase in basin big sagebrush and some other shrubs and noxious and invasive species. Forbs usually increase. Cheatgrass will invade the site. Under mismanagement, accelerated erosion can occur and gullies could form.

Proper grazing management that addresses frequency, duration, timing and intensity of grazing can help maintain the integrity of the plant community.

Weather influences:

Above normal precipitation in April, May and June can dramatically increase total annual production. These weather patterns can also increase viable seed production of desirable species to provide for recruitment. Extended drought reduces vigor of the perennial grasses and palatable shrubs. Extreme drought may cause plant mortality. An early, hard frost can occasionally kill some plants.

Influence of Insects and disease:

Outbreaks can affect health of the vegetation. An outbreak of a particular insect is usually influenced by weather but no specific data is available for this site. Mormon cricket and grasshopper outbreaks occur periodically. Outbreaks seldom cause plant mortality since defoliation of the plant occurs only once during the year of the outbreak. Antelope bitterbrush can be severely affected by the western tent caterpillar (*Malacosoma fragilis*). Two consecutive years of defoliation by the tent caterpillar can cause mortality in bitterbrush.

Influence of noxious and invasive plants:

Invasive annual and perennial species compete with desirable plants for moisture and nutrients. The result is reduced production and change in composition of the understory. Cheatgrass can be very invasive. Once it becomes established the fire frequency increases. As a result, the shrub component can be lost.

Influence of wildlife:

Relatively low numbers of wildlife use this site and impact it little. Mule deer use the site in the winter.

Watershed:

Decreased infiltration and increased runoff occur when basin big sagebrush is removed with frequent fires, particularly following the fire event. The increased runoff also increases sheet and rill erosion. The long-term effect is a transition to a different state. When hydrologic condition of the vegetation cover is good, natural erosion is slight.

Plant Community and Sequence:

Transition pathways between common vegetation states and phases:

State 1.

Phase A to B. Develops with fire (approximately every 20 to 50 years).

Phase A to C. Develops under improper grazing management and no fire.

Phase C to A. Develops under a prescribed grazing management program and no fire.

Phase B to A. Develops from prescribed grazing and no fire.

State 1, Phase B to 2.

Develops with frequent fire and improper grazing management.

State 1, Phase C to 2. Develops with continued improper grazing management and fire.

State 2 to Unknown site.

Excessive soil loss and changes in the hydrologic cycle caused by improper grazing management or frequent fire cause this state to cross the threshold and retrogress to a new site with reduced potential.

Practice Limitations:

There are slight to moderate limitations on this site for vegetation management and facilitating practices due to slope. There are severe limitations for rangeland seeding due to slope. Brush management should be well planned or cheatgrass can become dominant.

Plant Community Narrative:

State 1, Reference State.

State 1, Phase A. Reference Plant Community Phase. The plant community in Phase A is dominated by bluebunch wheatgrass and basin big sagebrush. Subdominant species include western wheatgrass, arrowleaf balsamroot, tapertip hawksbeard, and antelope bitterbrush. There are a variety of other grasses, forbs, and shrubs that occur in the plant community in minor amounts. Natural fire frequency is approximately 20 to 50 years.

State 1, Phase B. The plant community in Phase B has developed after a fairly recent fire.

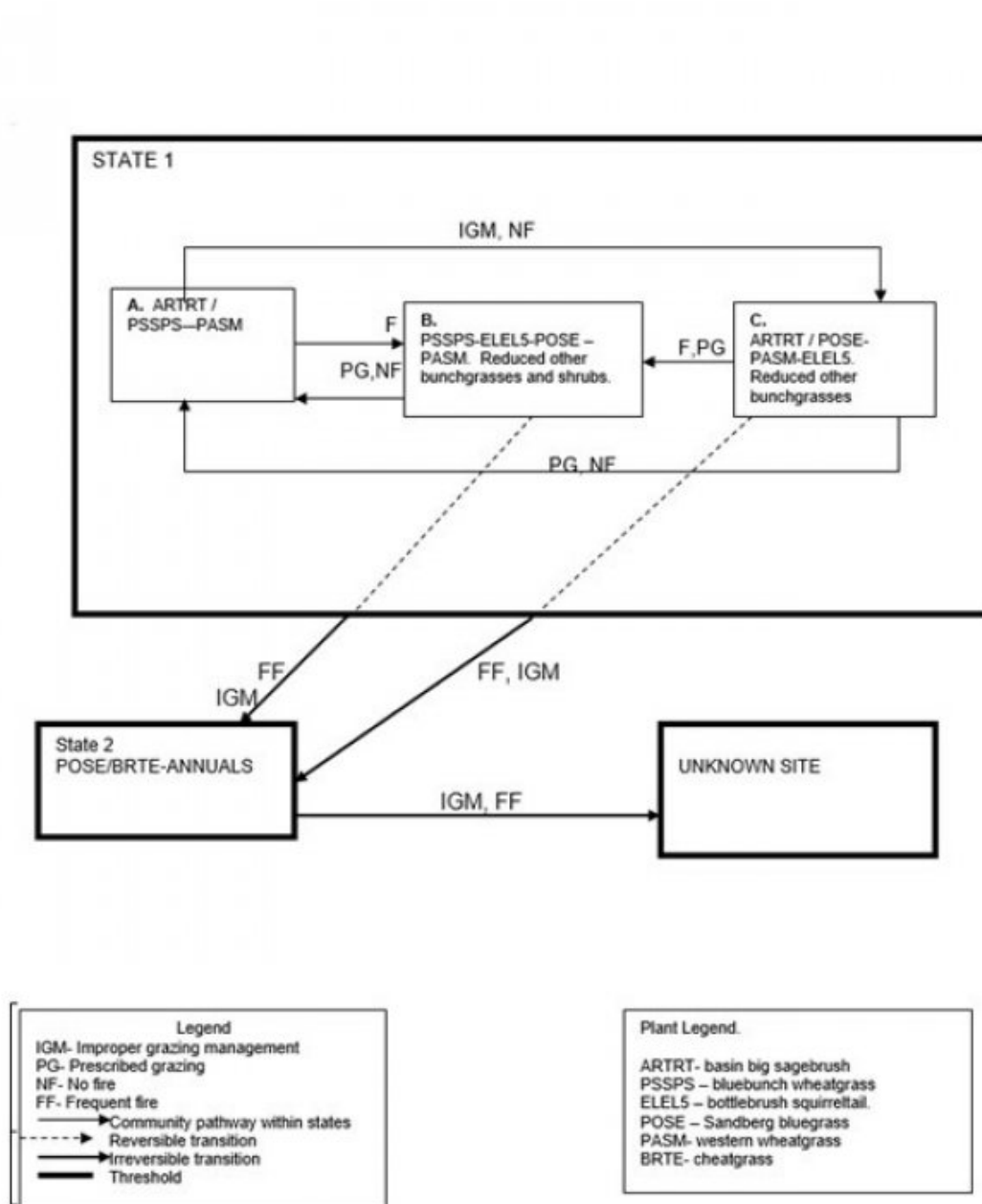
Fire intolerant shrubs such as basin big sagebrush and antelope bitterbrush have been significantly reduced or eliminated. Bluebunch wheatgrass is maintained in the stand. Bottlebrush squirreltail, Sandberg bluegrass, and western wheatgrass have increased. Other deep-rooted perennial bunchgrasses have been reduced and some have been killed by the fire. Low green rabbitbrush has increased slightly. Some cheatgrass may have invaded.

State 1, Phase C. Due to improper grazing management, bluebunch wheatgrass and other deep-rooted perennial bunchgrasses have been significantly reduced in amounts and are in low vigor. Sandberg bluegrass, western wheatgrass, and bottlebrush squirreltail have increased as well as basin big sagebrush. Antelope bitterbrush is reduced in vigor and may be hedged. Snakeweed has increased. Forbs have increased and cheatgrass has invaded the site.

State 2. The South Slope Loamy 12-16 ARTRT/PSSPS site has degraded into a plant community dominated by Sandberg bluegrass and annual grasses and forbs. Fine fuels are adequate to carry a fire in normal years. Frequent fires and/or improper grazing management have caused the degradation. Excessive soil loss has not occurred at this point but the site has crossed the threshold. It is not economical to return this plant community to State 1 with accelerating practices.

Unknown new site. The plant community has gone over the threshold to a new site. Site potential has been reduced. Significant soil loss has occurred. Infiltration has been reduced and run-off has become more rapid. This community has developed due to continued improper grazing management and/or fire.

State and transition model



State 1

Community 1.1

Basin big sagebrush/ bluebunch wheatgrass-western wheatgrass

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	247	465	678
Shrub/Vine	135	252	370
Forb	67	123	185
Total	449	840	1233

Additional community tables

Table 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1				—	
	bluebunch wheatgrass	PSSPS	<i>Pseudoroegneria spicata</i> <i>ssp. spicata</i>	314–628	—
	squirreltail	ELEL5	<i>Elymus elymoides</i>	27–54	—
	prairie Junegrass	KOMA	<i>Koeleria macrantha</i>	27–54	—
	Sandberg bluegrass	POSE	<i>Poa secunda</i>	27–54	—
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	27–54	—
Forb					
2				—	
	arrowleaf balsamroot	BASA3	<i>Balsamorhiza sagittata</i>	45–90	—
	tapertip hawksbeard	CRAC2	<i>Crepis acuminata</i>	45–90	—
	milkvetch	ASTRA	<i>Astragalus</i>	18–36	—
	desertparsley	LOMAT	<i>Lomatium</i>	18–36	—
	phlox	PHLOX	<i>Phlox</i>	18–36	—
	stickseed	HACKE	<i>Hackelia</i>	0–27	—
	scarlet globemallow	SPCO	<i>Sphaeralcea coccinea</i>	0–18	—
	beardtongue	PENST	<i>Penstemon</i>	0–18	—
Shrub/Vine					
3				—	
	basin big sagebrush	ARTRT	<i>Artemisia tridentata</i> <i>ssp.</i> <i>tridentata</i>	179–359	—
	antelope bitterbrush	PUTR2	<i>Purshia tridentata</i>	45–90	—
	yellow rabbitbrush	CHVI8	<i>Chrysothamnus</i> <i>viscidiflorus</i>	27–54	—
	broom snakeweed	GUSA2	<i>Gutierrezia sarothrae</i>	0–27	—
	plains pricklypear	OPPO	<i>Opuntia polyacantha</i>	0–18	—

Rangeland health reference sheet

Interpreting Indicators of Rangeland Health is a qualitative assessment protocol used to determine ecosystem condition based on benchmark characteristics described in the Reference Sheet. A suite of 17 (or more) indicators are typically considered in an assessment. The ecological site(s) representative of an assessment location must be known prior to applying the protocol and must be verified based on soils and climate. Current plant community cannot be used to identify the ecological site.

Author(s)/participant(s)	
Contact for lead author	
Date	12/06/2025
Approved by	Kendra Moseley
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. Number and extent of rills:

2. Presence of water flow patterns:

3. Number and height of erosional pedestals or terracettes:

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

5. Number of gullies and erosion associated with gullies:

6. Extent of wind scoured, blowouts and/or depositional areas:

7. **Amount of litter movement (describe size and distance expected to travel):**

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):**

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):**

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:**

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):**

12. **Functional/Structural Groups (list in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to):**

Dominant:

Sub-dominant:

Other:

Additional:

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):**

14. **Average percent litter cover (%) and depth (in):**

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):**

16. **Potential invasive (including noxious) species (native and non-native). List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site:**

17. **Perennial plant reproductive capability:**
