

Ecological site F027XY075NV Shallow Rocky Slope

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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): 027X–Fallon-Lovelock Area

Physiography

Found in the Great Basin Section of the Basin and Range Province of the Intermontane Plateaus this area is characterized by isolated uplifted fault block mountain ranges trending north to south that are separated by broad, hydrologically closed basins. The entire area occurs in the rain-shadow of the Sierra Nevada mountains and is influenced by Pleistocene Lake Lahontan which reached its most recent high stand about 12,000 years ago. There is substantial evidence suggesting the western Great Basin has been the site of pluvial-interpluvial cycles for at least the past two million years.

The mountains and valleys are dissected by the Humboldt, Truckee, Carson, and Walker Rivers and their tributaries, all of which terminate within MLRA 27. Extensive playas can be found throughout this area and are the result of drying of ancient Lake Lahontan. Elevation generally ranges from 3,300 to 5,900 feet (1,005 to 1,800 meters) in valleys, but on some mountain peaks it is more than 7,870 feet (2,400 meters).

Geology

Landforms and soils of this MLRA have been heavily influenced by fluctuating lake level over the last 40,000 years. There is a level line evident on the higher slopes marking the former extent of glacial Lake Lahontan. Almost half of this area has surface deposits of alluvial valley fill influenced by lacustrine sediment. The rest has andesite and basalt rocks of different ages. Mesozoic and Tertiary intrusives are concentrated along the western border of the area, and Lower Volcanic Rocks (17 to 43 million years old) are common on the eastern side of the area. Also, some scattered outcrops of Mesozoic sedimentary and volcanic rocks and tuffaceous sedimentary rocks are in the mountains within the interior of this MLRA.

Climate

The average annual precipitation is 5 to 10 inches (125 to 255 millimeters) in most of the area but is as much as 19 inches (485 millimeters) on high mountain slopes. Most of the rainfall occurs as high-intensity, convective thunderstorms during the growing season. The amount of precipitation is very low from summer to midautumn. The precipitation in winter occurs mainly as snow. The average annual temperature is 43 to 54 degrees F (6 to 12 degrees C). The freeze-free period averages 155 days and ranges from 110 to 195 days, decreasing in length with elevation.

Water

The amount of precipitation is very low, and water for irrigation is obtained principally from diversions on the four large rivers in the area and from water stored in the Lahontan, Rye Patch, and Weber Reservoirs. Pyramid Lake and Walker Lakes are terminal lakes for the Truckee and Walker Rivers, respectively. Much of the annual flow of both rivers is diverted for irrigation, causing lake levels to fall and levels of dissolved salts to increase causing problems for the native Lahontan cutthroat trout.

Soils

Accumulation of salts, tuffa deposits, eolian sediments with soluble salts influence most of the soils in this MLRA.

The dominant soil orders in this MLRA are Aridisols and Entisols. The soils in the area dominantly have a mesic soil temperature regime, an aridic soil moisture regime, and mixed mineralogy. They generally are well drained, are loamy or sandy and commonly skeletal, and are shallow to very deep.

Biological Resources

This area supports extensive areas of salt-desert shrub vegetation. Shadscale and Bailey’s greasewood are widespread, occurring both individually and together. Grasses are generally sparse, although Indian ricegrass is prominent, especially on the sandy soils. Fourwing saltbush, winterfat, spiny hopsage, wolfberry, ephedra, dalea, and bud sagebrush are common shrubs. Basin wildrye, creeping wildrye, alkali sacaton, saltgrass, black greasewood, rubber rabbitbrush, and big saltbush are important plants on saline bottom lands and terraces. A few marsh areas support cattail, bulrushes, sedges, and rushes. Big sagebrush, along with scattered Utah juniper and singleleaf pinyon, is associated with Thurber needlegrass, desert needlegrass, Sandberg bluegrass, and squirreltail on the higher elevation piedmont slopes and mountains.

Ecological site concept

This forestland community occurs on summits and sideslopes of mountains. Slopes are typically 30 to 75 percent. Elevations are 5500 to 7500 feet. Soils associated with this site are very shallow to shallow and well drained. The soils are skeletal, with 35 to over 50 percent gravels, cobbles or stones, by volume, distributed throughout their profile. This site was formerly known as *Juniperus osteosperma*/*Artemisia tridentata* ssp. *wyomingensis*-*Purshia stansburiana*/*Achnatherum thurberianum*-*Poa fendleriana*.

Associated sites

R027XY079NV	GRAVELLY CLAYPAN 8-10 P.Z. Occurs in the same mapunit on slightly deeper soil.
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Similar sites

R027XY070NV	DROUGHTY CLAYPAN 8-10 P.Z. Occurs in the same mapunit on slightly deeper soils.
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Table 1. Dominant plant species

Tree	(1) <i>Juniperus osteosperma</i>
Shrub	(1) <i>Artemisia tridentata</i> ssp. <i>wyomingensis</i> (2) <i>Purshia stansburiana</i>
Herbaceous	(1) <i>Achnatherum thurberianum</i> (2) <i>Poa fendleriana</i>

Physiographic features

The Shallow Rocky Slope site occurs on summits and sideslopes of mountains. Slopes are typically 30 to 75 percent. Elevations are 5500 to 7500 feet.

Table 2. Representative physiographic features

Landforms	(1) Mountain
Runoff class	Very high
Elevation	1,676–2,286 m
Slope	30–75%
Water table depth	183 cm
Aspect	Aspect is not a significant factor

Climatic features

The climate is semi arid with cool, moist winters and warm, dry summers. Average annual precipitation is 10 to about 12 inches. Mean annual air temperature is 45 to 50 degrees F. The average frost-free period is 90 to 120 days. No climate stations are available.

Table 3. Representative climatic features

Frost-free period (average)	120 days
Freeze-free period (average)	
Precipitation total (average)	305 mm

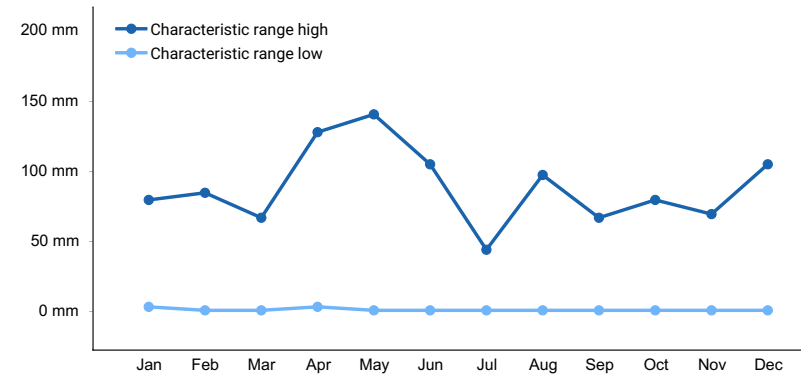


Figure 1. Monthly precipitation range

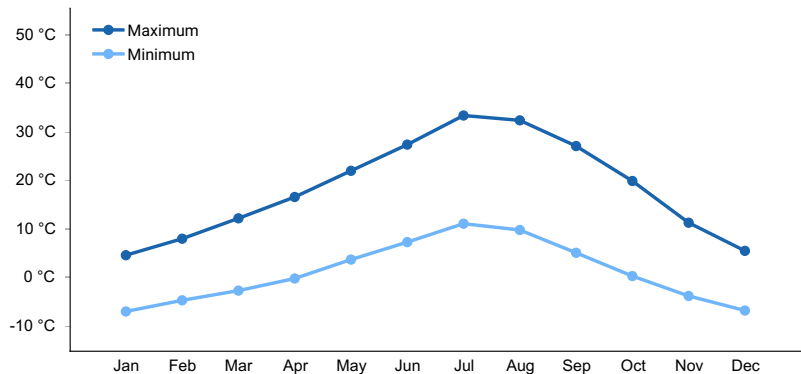


Figure 2. Monthly average minimum and maximum temperature

Influencing water features

There are no influencing water features associated with this site.

Soil features

Soils associated with this site are very shallow to shallow and well drained. These soils are skeletal, with 35 to over 50 percent gravels, cobbles or stones, by volume, distributed throughout their profile. Available water capacity is very low but trees and shrubs can extend their roots into fissures within the bedrock allowing them to utilize deep moisture. Runoff is very high and potential for sheet and rill erosion is moderate to severe depending on slope. Coarse fragments on the soil surface provide a stabilizing affect on surface erosion conditions. The soil series associated with this site include: Phliss and Sumya.

Table 4. Representative soil features

Parent material	(1) Residuum–metasedimentary rock (2) Colluvium–metasedimentary rock
Surface texture	(1) Extremely channery loam (2) Very channery loam (3) Very gravelly clay loam

Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderately slow
Depth to restrictive layer	18–51 cm
Soil depth	18–51 cm
Surface fragment cover <=3"	21–57%
Surface fragment cover >3"	6–23%
Available water capacity (0-101.6cm)	1.27–1.52 cm
Calcium carbonate equivalent (0-101.6cm)	0–5%
Electrical conductivity (0-101.6cm)	0–2 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0
Soil reaction (1:1 water) (0-101.6cm)	6.6–8.4
Subsurface fragment volume <=3" (Depth not specified)	21–57%
Subsurface fragment volume >3" (Depth not specified)	5–24%

Ecological dynamics

Utah juniper is not shade tolerant. It is a climax species in harsh areas where stands are open and regeneration can occur without competition for light.

Across the West, junipers have expanded their historical range in the years since European settlement, Utah juniper is used by many birds and animals, both wildlife and livestock, for cover and food. especially into sagebrush-grass communities below areas of traditional pinyon-juniper. Overgrazing, fire suppression, and climatic change have been identified as potential causes of juniper invasion. In the absence of fire or other disturbances, trees eventually dominate the site and crowd out herbaceous and shrub species.

Juniper litter has an allelopathic effect on some understory species, especially Sandberg bluegrass, and blue grama. This effect is particularly evident on heavy, poorly drained clay soils. Broadcasting grass seeds over litter appeared to lower the allelopathic effects.

Fire Ecology:

The fire return intervals for Utah juniper communities range from 10 to 30 years. Utah juniper is usually killed by fire, especially when trees are small. Wyoming big sagebrush is killed by fire and establishes after fire from a seedbank; from seed produced by remnant plants that escaped fire; and from plants adjacent to the burn that seed in. Fire effects on Stansbury cliffrose are variable. Fire may kill or severely damage plants. Late-season fire also increases the risk of mortality. Stansbury cliffrose is a weak sprouter that is generally killed by severe fire. Thurber's needlegrass is classified as moderately resistant, but depending on season of burn, phenology, and fire severity, this perennial bunchgrass is moderately to severely damaged by fire. Early season burning is more damaging to this needlegrass than late season burning. Muttongrass is unharmed to slightly harmed by light-severity fall fires. Muttongrass appears to be harmed by and slow to recover from severe fire.

Major Successional Stages of Forestland Development:

HERBACEOUS: Vegetation is dominated by grasses and forbs under full sunlight. This stage is experienced after a major disturbance such as crown fire. Skeleton forest (dead trees) remaining after fire or residual trees left following harvest have little or no affect on the composition and production of the herbaceous vegetation.

SHRUB-HERBACEOUS: Herbaceous vegetation and woody shrubs dominate the site. Various amounts of tree seedlings (less than 20 inches in height) may be present up to the point where they are obviously a major component of the vegetal structure.

SAPLING: In the absence of disturbance the tree seedlings develop into saplings (20 inches to 4.5 feet in height) with a range in canopy cover of about 5 to 10 percent. Vegetation consists of grasses, forbs and shrubs in association with tree saplings.

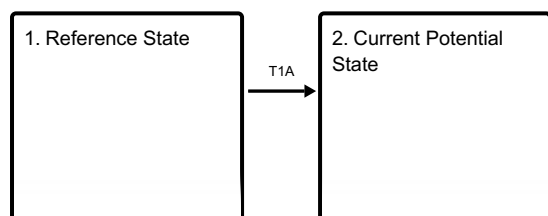
IMMATURE FORESTLAND: The visual aspect and vegetal structure are dominated by Utah juniper trees greater than 4.5 feet in height. The upper crown of dominant and co-dominant trees are cone or pyramidal shaped. Seedlings and saplings of Utah juniper are present in the understory. Dominants are the tallest trees on the site; co-dominants are 65 to 85 percent of the highest of dominant trees. Understory vegetation is moderately influenced by a tree overstory canopy of about 10 to 20 percent.

MATURE FORESTLAND: The visual aspect and vegetal structure are dominated by Utah juniper that have reached or are near maximal heights for the site. Dominant trees average greater than five inches in diameter at one-foot stump height. Upper crowns of Utah juniper are typically either irregularly or smoothly flat-topped or rounded. Tree canopy cover ranges from 20 to 35 percent. Understory vegetation is strongly influenced by tree competition, overstory shading, duff accumulation, etc. Few tree seedlings and/or saplings occur in the understory. Infrequent, yet periodic, wildfire is presumed to be a natural factor influencing the understory of mature juniper forest. This stage of community development is assumed to be representative of this forest site in the pristine environment.

OVER-MATURE FORESTLAND: In the absence of wildfire or other naturally occurring disturbances, the tree canopy on this site can become very dense. This stage is dominated by Utah juniper that have reached maximal heights for the site. Dominant and co-dominant trees average greater than five inches in diameter at one-foot stump height. Upper crowns are typically irregularly flat-topped or rounded. Understory vegetation is sparse or absent due to tree competition, overstory shading, duff accumulation, etc. Tree canopy cover is commonly greater than 50 percent.

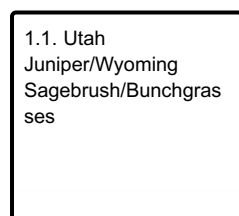
State and transition model

Ecosystem states

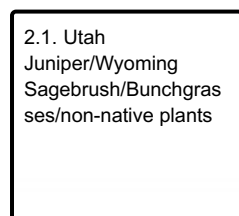


T1A - T1A - establishment of non-native plant species

State 1 submodel, plant communities



State 2 submodel, plant communities



State 1

Reference State

The reference state is representative of the natural range of variability prior to Euro-American settlement conditions. Community phase changes are primarily driven by time, drought, and infrequent wildfire. State dynamics are maintained by interactions between climatic patterns and disturbance regimes. Natural disturbances under pristine conditions included periodic burning set by native peoples, drought, insect attack, and herbivory by native fauna.

Community 1.1

Utah Juniper/Wyoming Sagebrush/Bunchgrasses

The reference plant community is dominated by Utah juniper. Wyoming big sagebrush is the principal understory shrub. Thurber's needlegrass and bluegrasses are the most prevalent understory grasses. Mountain big sagebrush occurs at the upper elevations of this site. An overstory canopy cover of 20 to 35 percent is assumed to be representative of tree dominance on this site in the pristine environment. Wildfire is recognized as a natural disturbance that strongly influenced the structure and composition of the climax vegetation of this woodland site. Overstory tree canopy composition is 100 percent Utah juniper.

Forest overstory. The visual aspect and vegetal structure are dominated by Utah juniper that have reached or are near maximal heights for the site. Dominant trees average greater than five inches in diameter at one-foot stump height. Upper crowns of Utah juniper are typically either irregularly or smoothly flat-topped or rounded. Tree canopy cover ranges from 20 to 35 percent. Understory vegetation is strongly influenced by tree competition, overstory shading, duff accumulation, etc. Few tree seedlings and/or saplings occur in the understory. Infrequent, yet periodic, wildfire is presumed to be a natural factor influencing the understory of mature juniper forest. This stage of community development is assumed to be representative of this forest site in the pristine environment.

Forest understory. Understory vegetative composition is about 40 percent grasses, 10 percent forbs and 50 percent shrubs and young trees when the average overstory canopy is medium (20 to 35 percent). Average understory production ranges from 200 to 500 pounds per acre with a medium canopy cover. Understory production includes the total annual production of all species within 4½ feet of the ground surface.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Shrub/Vine	101	177	252
Grass/Grasslike	90	157	224
Forb	22	39	56
Tree	11	20	28
Total	224	393	560

State 2

Current Potential State

This state is similar to the reference state with the presence of non-native in the understory.

Community 2.1

Utah Juniper/Wyoming Sagebrush/Bunchgrasses/non-native plants

Similar to Community Phase 1.1, except 2.1 has established non-native plants. The establishment of non-native plants decreases resilience and resistance to disturbance.

Transition T1A

State 1 to 2

Introduction of non-native annuals that have the capability to significantly alter disturbance regimes from the natural

range of variability. Once introduced these non-native can not be removed from system.

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	Primary Perennial Grasses			78–188	
	Thurber's needlegrass	ACTH7	<i>Achnatherum thurberianum</i>	39–94	–
	muttongrass	POFE	<i>Poa fendleriana</i>	39–94	–
2	Secondary Perennial Grasses			22–90	
	Sandberg bluegrass	POSE	<i>Poa secunda</i>	4–20	–
	squirreltail	ELEL5	<i>Elymus elymoides</i>	4–20	–
	needle and thread	HECO26	<i>Hesperostipa comata</i>	4–20	–
	basin wildrye	LECI4	<i>Leymus cinereus</i>	4–20	–
	James' galleta	PLJA	<i>Pleuraphis jamesii</i>	2–4	–
	Indian ricegrass	ACHY	<i>Achnatherum hymenoides</i>	2–4	–
Forb					
3	Perennial Forbs			22–56	
	buckwheat	ERIOG	<i>Eriogonum</i>	4–20	–
	lupine	LUPIN	<i>Lupinus</i>	4–20	–
	beardtongue	PENST	<i>Penstemon</i>	4–20	–
	phlox	PHLOX	<i>Phlox</i>	4–20	–
Shrub/Vine					
4	Primary Shrubs			59–130	
	Stansbury cliffrose	PUST	<i>Purshia stansburiana</i>	39–94	–
5	Secondary Shrubs			13–61	
	mountain big sagebrush	ARTRV	<i>Artemisia tridentata</i> ssp. <i>vaseyana</i>	4–20	–
	mormon tea	EPVI	<i>Ephedra viridis</i>	4–20	–
	currant	RIBES	<i>Ribes</i>	4–20	–
Tree					
6	Evergreen			20–36	
	Utah juniper	JUOS	<i>Juniperus osteosperma</i>	20–36	–

Animal community

Livestock Interpretations:

This site is suited to cattle and sheep grazing (where terrain permits) during the spring, summer and fall. Grazing management should be keyed to Thurber's needlegrass production. This grass is highly nutritious. New plants are established entirely from seed and grazing practices should allow for ample seed production and seedling establishment. Livestock will often concentrate on this site taking advantage of the shade and shelter offered by the tree overstory. Livestock browse Wyoming big sagebrush, but may use it only lightly when palatable herbaceous species are available. Wyoming big sagebrush is preferred browse for wild ungulates. Pronghorn usually browse Wyoming big sagebrush heavily.

Initial stocking rate

Stocking rates vary with such factors as kind and class of grazing animal, season of use and fluctuations in climate.

Actual use records for individual sites, a determination of the degree to which the sites have been grazed, and an evaluation of trend in site condition offer the most reliable basis for developing initial stocking rates.

Wildlife Interpretations:

This site has high value for mule deer during the winter. Juniper trees provide shelter from winter storms and juniper foliage is also browsed during the winter. Sites where water is available offer good quail habitat and are visited seasonally by mourning dove. It is also used by various song birds, rodents, reptiles and associated predators natural to the area. Thurber needlegrass is valuable forage for wildlife.

Hydrological functions

Runoff is very high. Permeability is moderately slow. The hydrologic cover condition of this site is poor in a representative stand. The average runoff curve is about 85 for group C soils and about 90 for group D. Soils. (See Section 4, NRCS National Engineering Handbook for runoff quantities and hydrologic curves.)

Recreational uses

The trees on this site provide a welcome break in an otherwise open landscape. It has potential for hiking, cross-country skiing, camping, and deer and upland game hunting.

Wood products

This forestland community is of very low site quality for tree production. Site index ranges from about 15 to 35 (Howell, 1940).

Productivity Class: 0.1 to 0.2

CMAI*: 1.0 to 2.7 ft³/ac/yr;

0.06 to 0.20 m³/ha/yr.

Culmination is estimated to be at >100 years.

*CMAI: is the culmination of mean annual increment or highest average growth rate of the stand in the units specified.

Fuelwood Production: 1 to 3 cords per acre for stands averaging 5 inches in diameter at 1 foot height with a medium canopy cover. There are about 274,000 gross BTUs heat content per cubic foot of Utah juniper. Solid wood volume in a cord varies but usually ranges from 65 to 90 cubic feet. Assuming an average of 75 cubic feet of solid wood per cord, there are about 20.6 million BTUs of heat value in a cord of Utah juniper fire wood.

Posts (7 foot): About 10 to 20 posts per acre in stands of medium canopy.

MANAGEMENT GUIDES AND INTERPRETATIONS

1. LIMITATIONS AND CONSIDERATIONS

- a. Potential for sheet and rill erosion is moderate to severe depending on slope.
- b. Moderate equipment limitations on steeper slopes and moderate to severe equipment limitations on sites having extreme surface stoniness.
- c. Proper spacing is the key to a well managed, multiple use and multi-product juniper forest.

2. ESSENTIAL REQUIREMENTS

- a. Adequately protect from wildfire.
- b. Protect soils from accelerated erosion.
- c. Apply proper grazing management.

3. SILVICULTURAL PRACTICES

Silvicultural treatments are not reasonably applied on this site due to poor site quality and severe limitations for equipment and tree harvest.

Other products

Utah juniper wood is very durable. Traditional products of Utah juniper are charcoal, fence posts, and fuelwood. It probably has considerable potential in the charcoal industry and in wood fiber products. The berries have been used by Indians for food. Native Americans made tea from big sagebrush leaves. They used the tea as a tonic, an antiseptic, for treating colds, diarrhea, and sore eyes and as a rinse to ward off ticks. Big sagebrush seeds were eaten raw or made into meal.

Other information

Wyoming big sagebrush is used for stabilizing slopes and gullies and for restoring degraded wildlife habitat, rangelands, mine spoils and other disturbed sites. It is particularly recommended on dry upland sites where other shrubs are difficult to establish.

Table 7. Representative site productivity

Common Name	Symbol	Site Index Low	Site Index High	CMAI Low	CMAI High	Age Of CMAI	Site Index Curve Code	Site Index Curve Basis	Citation
Utah juniper	JUOS	15	35	1	3	—	—	—	

Inventory data references

NASIS soil component data.

Type locality

Location 1: Pershing County, NV	
Township/Range/Section	T28N R34E S7
General legal description	Upper watershed for Limerick and American Canyons, Humboldt Range, Pershing County, Nevada. This site also occurs in Churchill and Lyon Counties, Nevada.

Other references

Fire Effects Information System (Online; <http://www.fs.fed.us/database/feis/plants/>).

Howell, J. 1940. Pinyon and juniper: a preliminary study of volume, growth, and yield. Regional Bulletin 71. Albuquerque, NM: USDA, NRCS; 90p.

USDA-NRCS Plants Database (Online; <http://www.plants.usda.gov>).

Jordan, M., 1974. An Inventory of Two Selected Woodland Sites in the Pine Nut Hills of Western Nevada.

USDA-NRCS. 1980. National Forestry Manual - Part 537. Washington, D.C.

Contributors

DK/GD

Approval

Kendra Moseley, 6/03/2024

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	06/03/2024
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:
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17. **Perennial plant reproductive capability:**
-