USDA Natural Resources
Conservation Service

Ecological site R030XC001CA
Granitic Loamy Ustic Fan Remnants 8-10 inches

Last updated: 2/25/2025
Accessed: 05/13/2025

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): 030X–Mojave Basin and Range

MLRA Description:

Major Land Resource Area (MLRA) 30, Mojave Desert, is found in southern California, southern Nevada, the extreme southwest corner of Utah and northwestern Arizona within the Basin and Range Province of the Intermontane Plateaus. Elevations within the MLRA range from basin floors below sea level to mountains over 12,000 feet (3650 meters) high. The climate of the area is hot and dry with mostly hyperthermic and thermic soil temperature regimes and aridic soil moisture regimes. However, at higher elevations of this MLRA, generally above 5,000 feet, soil temperature regimes can be mesic, cryic and frigid with xeric soil moisture regimes. Due to the extreme elevational range found within this MLRA, land resource units (LRUs) were designated to group the MLRA into similar land units.

LRU Description:

The Bi-Modal Semi-Arid (XC) Land Resource Unit (LRU), represents a semi-arid zone as defined by the United Nations Food and Agriculture Organization and is a semi-arid region distinguished by other semi-arid regions of the Mojave by the amounts of summer precipitation it receives. Semi-arid regions in the western Mojave can experience hot and very dry summers whereas regions within the XC LRU can receive more than 2.5 inches (63.5 mm) of rain during the months of July, August and September. The Bi-Modal Semi-Arid LRU is found primarily in eastern Mojave such as in Nevada at the higher elevations, in California in the New York, Providence, Castle and Clark Mountain Ranges as well as the Cerbat and Virgin Mountains of Arizona. Elevations range from approximately 4000 to 12,000 feet (1500 to 3650 meters) and precipitation ranges 8 to 18 inches (200 – 450 mm) per year in the form of rain. Snow is not uncommon in this LRU with the chance of receiving 3 to 48 inches of snow per year.

Due to the relatively high volume of summer rainfall, soil moisture regimes may have been designated as ustic-aridic, however emerging soil moisture data suggests the xeric-aridic soil moisture regime may be more appropriate and is likely to dominate this LRU. Soils within this LRU also have a cool thermic or cooler soil temperature regime. The combination of cooler temperatures [mean annual air temperatures lower than 62 degrees F (17 degrees C)] with summer monsoonal rains help to create a unique climate within the Mojave Desert which may be more similar to the Southern Nevada Basin and Range (MLRA). Vegetation at the lower elevations of this LRU includes blackbrush, Joshua tree, juniper, pinyon pine, and mountain big sagebrush. At the higher elevations, vegetation includes oaks, Mojave sagebrush, Ponderosa pine, white fir, limber pine and the Great Basin bristlecone pine.

Ecological site concept

This ecological site occurs on gently sloping (10 percent slope or less) fan remnants with very deep, coarse loamy soils at elevations of 4900 to 5300 feet. Alluvium is predominantly from granite sources. Mesic soil temperatures and deep loamy soils support a productive shrub community dominated by big sagebrush (Artemisisa tridentata), with a regularly distributed emergent tree layer of Utah Juniper at low cover. Perennial bunch grasses are an

important component of the reference plant community, including black grama (*Bouteloua eriopoda*, blue grama (*B. gracilis*. These grasses are supported by summer monsoonal events and a relatively high precipitation range (8-10 inches). Loamy deep soils support a productive grass component.

This site is part of group concept R030XC238CA.

Associated sites

R030XC002CA	**Shallow Loamy-Skeletal Ustic Low Slopes** This site occurs on adjacent rock pediments and low hills with shallow loamy-skeletal soils.

Similar sites

R030XC002CA	**Shallow Loamy-Skeletal Ustic Low Slopes** Occurs on very shallow to shallow soils on pediments and hills. Desert bitterbrush is a co-dominant species with big sagebrush. Production is lower and perennial grasses are not a significant component of this ecological site.
R030XC035NV	**LOAMY 9-11 P.Z.** Occurs on inset fans on relatively undeveloped soils derived from limestone. Needleandthread is the dominant grass, fourwing saltbush is an important species, and production is higher.

Table 1. Dominant plant species

Tree	(1) *Juniperus osteosperma*
Shrub	(1) *Artemisia tridentata*
Herbaceous	(1) *Bouteloua eriopoda* (2) *Bouteloua gracilis*

Physiographic features

This ecological site occurs on fan remnants at elevations of approximately 4900 to 5300 feet. Slopes may range from 2 to 10 percent, but slopes under 5 percent are typical. This site experiences very rare to rare flash flooding.

Table 2. Representative physiographic features

Landforms	(1) Fan remnant
Flooding frequency	Very rare to rare
Elevation	4,900–5,300 ft
Slope	2–10%
Aspect	Aspect is not a significant factor

Climatic features

The mean annual precipitation is between 8 to 10 inches (200 to 250 mm) and the mean annual air temperature ranges from 59 to 62.5 degrees F (15-17 degrees C) across the elevation range of the site. For outlying areas just outside of this temperature and precipitation range, temperature and precipitation are directly proportional. For example, areas where climate models suggest the air temperature is higher than 17 degrees C should also show the area receives more than 10 inches of precipitation, otherwise the site should be in the 6-8 precipitation zone.

This ecological site is characterized by hot summers, cold winters, periodic drought, and a bimodal precipitation pattern. The Society of Range Management (1989) define drought as "... prolonged dry weather when precipitation is less than 75% of the average amount". By this definition, it is not uncommon for this site to experience 2 to 3 drought years every 10 years. Consecutive drought years rarely occur. During drought years, mean annual precipitation can be as little as 3 inches while wet years can receive as much as 23 inches of rain.

The temperature can fluctuate more than 25 degrees between night and day, especially during the transition from warm to cool seasons and vice versa. The sum of July, August and September rains typically exceed 2.5 inches which supports a suite of warm season plant species not common to western Mojave. Average minimum monthly air temperatures can be as low as 37 degrees F in winter months with average maximum monthly air temperatures as high as 94 degrees F in July.

Table 3. Representative climatic features

Frost-free period (average)	251 days
Freeze-free period (average)	305 days
Precipitation total (average)	10 in

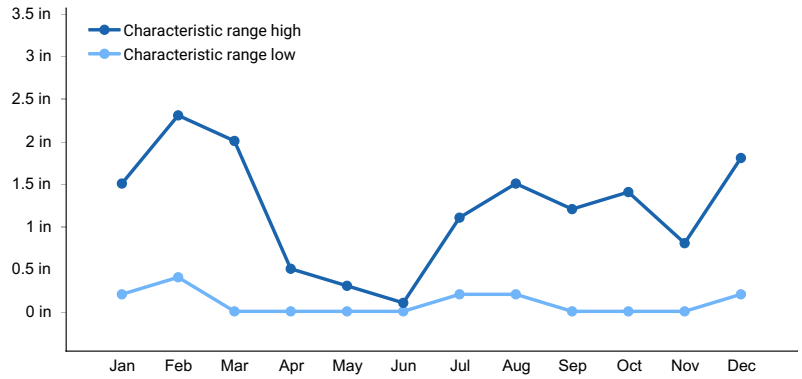


Figure 1. Monthly precipitation range

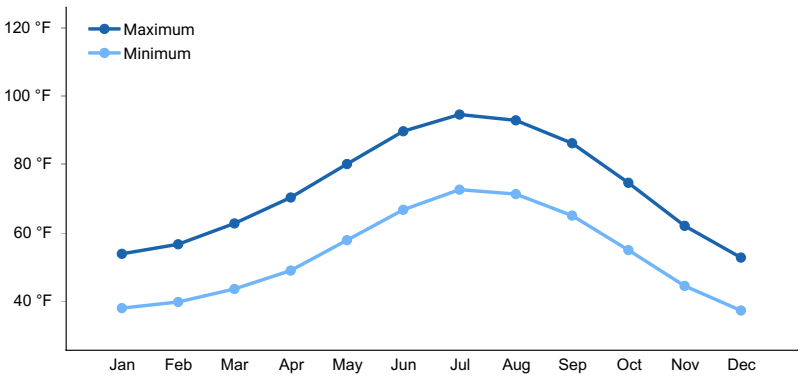


Figure 2. Monthly average minimum and maximum temperature

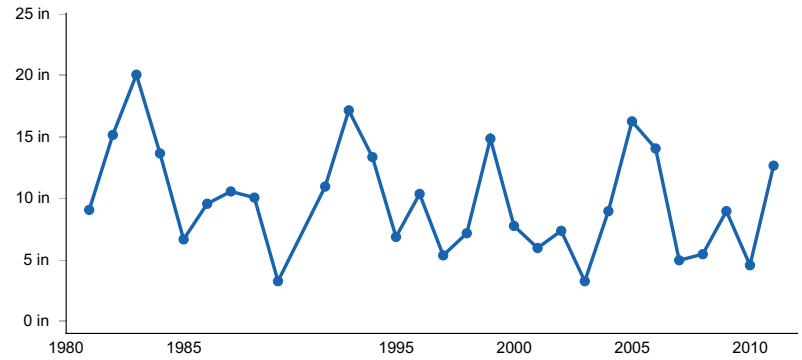


Figure 3. Annual precipitation pattern

Climate stations used

- (1) SEARCHLIGHT [USC00267369], Searchlight, NV
- (2) MITCHELL CAVERNS [USC00045721], Baker, CA

Influencing water features

Soil features

The soils associated with this ecological site are very deep and well drained. These soils formed in alluvium derived from mixed parent material, including granite, andesite and igneous sources. Surface textures are typically gravelly loamy sand or gravelly loamy fine sand. Subsurface horizons are loamy, gravelly loam, gravelly fine sandy, fine sandy loam, and very gravelly sandy loam. A thick argillic horizon begins at 2 to 3 inches below the soil surface.

This ecological site is associated with the following soil series: Cedarwash (coarse-loamy, superactive, mixed, Ustic Haplargids).

Table 4. Representative soil features

Parent material	(1) Alluvium–granite
Surface texture	(1) Gravelly sandy loam (2) Fine sandy loam
Family particle size	(1) Loamy
Drainage class	Well drained
Soil depth	60 in
Surface fragment cover <=3"	10–65%

Ecological dynamics

State and transition model

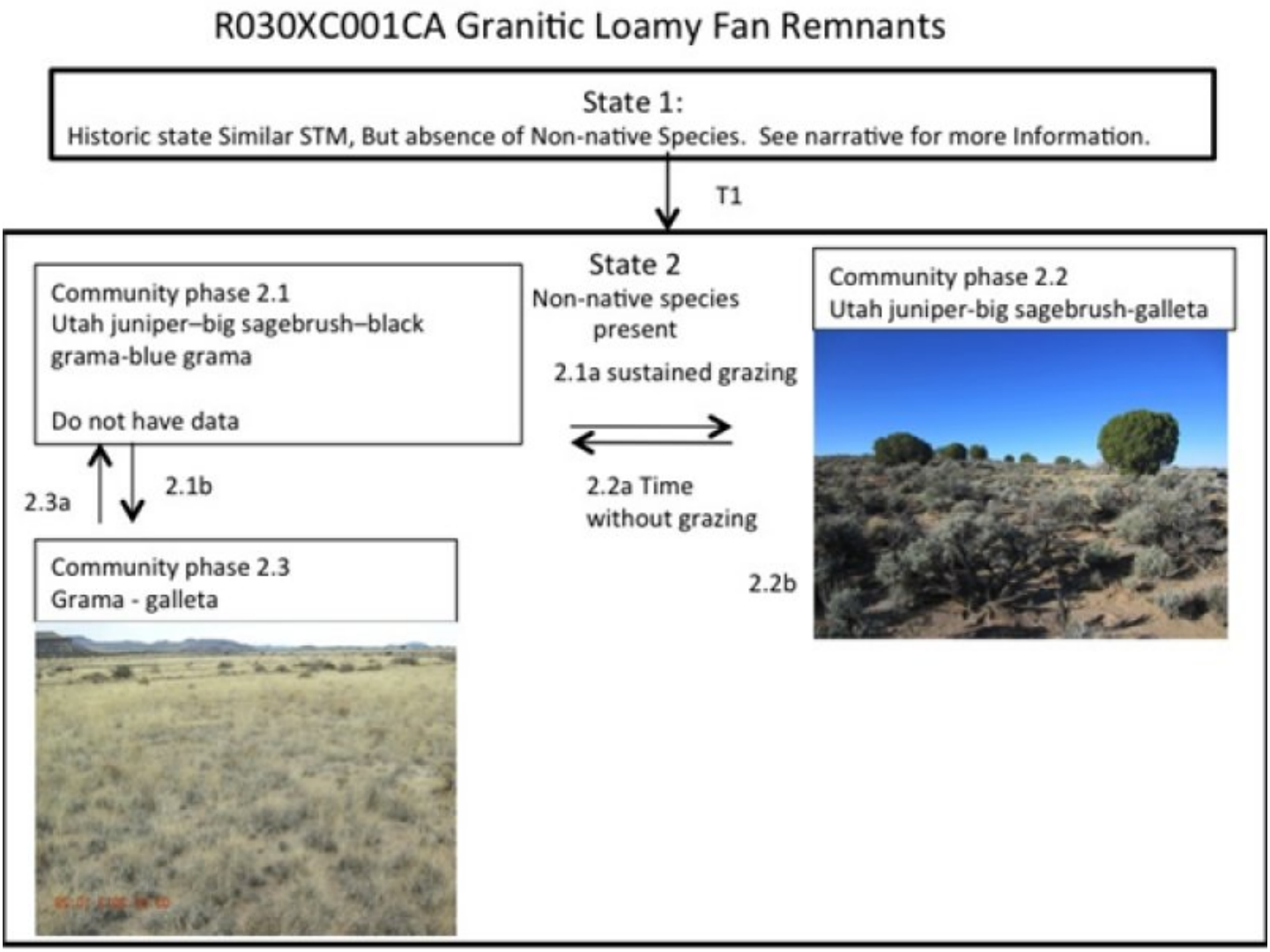


Figure 5. Granitic loamy ustic fan remnants

State 1
Historic State

State 1 represents the historic range of variability for this ecological site. This state no longer exists due to the ubiquitous naturalization of non-native species in the Mojave Desert. Periodic drought and infrequent fire were the natural disturbances influencing this ecological site. Data for this State does not exist, but it would have been similar

to State 2, except with only native species present. See State 2 narrative for more detailed information.

State 2
Reference State

State 2 represents the current range of variability for this site. Non-native annuals, including red-stem stork's bill (*Erodium cicutarium*) and cheatgrass (*Bromus tectorum*) are naturalized in this plant community. Their abundance varies with precipitation, but they are at least sparsely present (as current years growth or present in the soil seedbank).

Community 2.1
Utah juniper - Big sagebrush - grama

We do not yet have data for this phase.

Community 2.2
Utah juniper - Big sagebrush - galleta

Figure 6. Community Phase 2.2

This community phase develops with sustained moderate to heavy grazing. Big sagebrush and secondary shrub cover increases, and the perennial grass component decreases. Galleta (*Pleuraphis jamesii*) and squirreltail grass (*Elymus elymoides*) increase in importance, while black grama and blue grama decline or are lost completely. Forb cover and production increases; rose heath (*Chaetopappa ericoides*) often increases with grazing. This plant community has a greater amount of bare ground, less stable soils, and increased likelihood of soil erosion from wind and water. These factors are made worse by continued grazing and drought.

Community 2.3
Black grama - blue grama - galleta

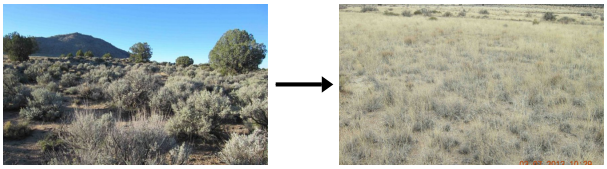
Figure 8. Community Phase 2.3

This community phase develops after fire. Big sagebrush and Utah juniper are killed by fire, and are absent. The community is strongly dominated by perennial grasses, and black grama, blue grama, big galleta, galleta and mesa dropseed are dominant species. Forb and shrub presence is minimal. The composition of this plant community depends on grass vigor and composition at time of burning, the amount and timing of precipitation in the first two seasons after fire, and the timing and severity of the fire. Black grama will respond quickly after fire if it was in good condition prior to burning, and if adequate summer precipitation falls during the first two seasons after fire. Big galleta and galleta are more drought tolerant, and may be favored over black grama if precipitation is less optimal, or cool season dominated. Blue grama is fire tolerant and recovers quickly. Frequent fires (< 5 year interval) will sustain a grassland community, but may shift dominance to galleta, big galleta or blue grama while black grama declines in importance. If drought follows fire, recovery of grass species will occur much more slowly. Grazing should be light, and should be restricted to the non-growing season (winter). Heavy grazing of the recent post-burn community, especially during drought and in the growing season (spring and summer), will put this community at risk. Only cover data is available for this community phase (as of 08/22/13). These data, which represent the community 8 years post-fire with grazing are given in the below table: Group Code Scientific Name Common Name Cover Perennial grasses BOER4 *Bouteloua eriopoda* black grama 10-35 Perennial grasses BOGR5 *Bouteloua gracilis* blue grama 0-10 Perennial grasses PLRI3 Pleruaphis rigida big galleta 5 Perennial grasses SPFL Sporabilis flexuosa mesa dropseed 0-trace Perennial grasses MUPO2 *Muhlenbergia porteri* bush muhly 0-trace Perennial grasses DAPU7 *Dasyochloa pulchella* low woollygrass 2 Trees JUOS *Juniperus osteosperma* Utah juniper 0-trace Shrubs ARTR2 *Artemisia tridentata* big sagebrush 0-trace Shrubs EPNE *Ephedra nevadensis* Nevada jointfir 1-2 Shrubs GUMI *Gutierrezia microcephala* threadleaf snakeweed trace-6 Shrubs LYCO2 *Lycium cooperi* peachthorn 0-trace Shrubs CYAC Cylindropuntia acanthicarpa buckhorn cholla 0-trace Shrubs YUBA *Yucca baccata* banana yucca trace Shrubs OPPOE *Opuntia polyacantha* var. erinacea grizzlybear pricklypear 0-trace Shrubs ERCO23 *Ericameria cooperi* Cooper"""""s goldenbush 0-15 Shrubs KRLA2 *Krascheninnikovia lanata* winterfat 0-trace Native Perennial Forbs SPAM2 *Sphaeralcea ambigua* desert globemallow 0-trace Native Annual Grasses BOBA2 *Bouteloua barbata* sixweeks grama 0-1 Non-native Annual Forbs ERCI6 *Erodium cicutarium* red stem stork"""""s bill 10-30 Non-Native Annual Grasses POAN Poan annua annual bluegrass 0-trace

Pathway 2.2a
Community 2.2 to 2.1

This pathway occurs with adequate rest from grazing, allowing for recovery of palatable perennial grasses such as black grama, blue grama, and big galleta.

Pathway 2.2b
Community 2.2 to 2.3



Utah juniper - Big sagebrush - galleta

Black grama - blue grama - galleta

This pathway occurs with fire.

Pathway 2.3a
Community 2.3 to 2.1

This pathway occurs with time without fire, adequate precipitation, and appropriate grazing management. Big sagebrush and Utah juniper will colonize the site with off-site seed dispersal, provided seed sources remain close by. The time to recovery depends on initial severity of the fire, post-fire climatic conditions, distance to off-site seed sources, and management.

Transition 1
State 1 to 2

This transition occurred with the naturalization of non-native species in the Mojave desert, occurring with the

Spanish explorers in the late 18th century. This transition is irreversible.

Additional community tables

Table 5. Community 2.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Tree					
1	**Trees**			0–2	
	Utah juniper	JUOS	*Juniperus osteosperma*	0–2	0–2
Shrub/Vine					
2	**Shrubs**			250–500	
	big sagebrush	ARTR2	*Artemisia tridentata*	150–450	20–45
	bastardsage	ERWR	*Eriogonum wrightii*	0–50	0–5
	purple sage	SADO4	*Salvia dorrii*	0–35	0–3
	threadleaf snakeweed	GUMI	*Gutierrezia microcephala*	0–30	0–3
	Nevada jointfir	EPNE	*Ephedra nevadensis*	0–20	0–1
	Cooper's goldenbush	ERCO23	*Ericameria cooperi*	0–5	0–1
	Eastern Mojave buckwheat	ERFA2	*Eriogonum fasciculatum*	0–5	0–1
	narrowleaf goldenbush	ERLI6	*Ericameria linearifolia*	0–5	0–1
	grizzlybear pricklypear	OPPOE	*Opuntia polyacantha var. erinacea*	0–5	0–1
	fourwing saltbush	ATCA2	*Atriplex canescens*	0–5	0–1
	buck-horn cholla	CYAC8	*Cylindropuntia acanthocarpa*	0–5	0–1
	turpentinebroom	THMO	*Thamnosma montana*	0–5	0–1
	banana yucca	YUBA	*Yucca baccata*	0–5	0–1
Grass/Grasslike					
3	**Native Perennial Grasses**			20–140	
	James' galleta	PLJA	*Pleuraphis jamesii*	10–130	1–6
	squirreltail	ELEL5	*Elymus elymoides*	0–10	2–10
	big galleta	PLRI3	*Pleuraphis rigida*	0–10	0–2
	floating bur-reed	SPFL	*Sparganium fluctuans*	0–10	0–1
	mesa dropseed	SPFL2	*Sporobolus flexuosus*	0–10	0–1
	desert needlegrass	ACSP12	*Achnatherum speciosum*	0–5	0–1
	black grama	BOER4	*Bouteloua eriopoda*	0–5	0–1
	low woollygrass	DAPU7	*Dasyochloa pulchella*	0–1	0–1
5	**Native Annual Grasses**			0–10	
	sixweeks grama	BOBA2	*Bouteloua barbata*	0–10	0–5
Forb					
4	**Native Perennial Forbs**			1–40	
	rose heath	CHER2	*Chaetopappa ericoides*	0–40	0–3
	threadstem sandmat	CHRE4	*Chamaesyce revoluta*	0–1	0–1
	wishbone-bush	MILAV	*Mirabilis laevis var. villosa*	0–1	0–1
	desert globemallow	SPAM2	*Sphaeralcea ambigua*	0–1	0–1
	whitemargin sandmat	CHAL11	*Chamaesyce albomarginata*	0–1	0–1

6	**Native Annual Forbs**			0–2	
	silkcotton purslane	POHA5	*Portulaca halimoides*	0–2	0–1
7	**Non-native Annual Forbs**			0–5	
	redstem stork's bill	ERCI6	*Erodium cicutarium*	0–5	0–1

Inventory data references

Community phase 2.2:
2013CA7953001
2012CA795802

Community phase 2.3:
2013CA7953017
2013CA7953016

Contributors

Alice L. Miller

Approval

Sarah Quistberg, 2/25/2025

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	05/13/2025
Approved by	Sarah Quistberg
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:**