USDA Natural Resources
Conservation Service

Ecological site R040XD028CA
Frequently Flooded, Low Intensity Ephemeral Stream

Last updated: 10/17/2024
Accessed: 11/21/2024

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): 040X–Sonoran Basin and Range

MLRA Statement:
Major land resource area (MLRA) 31 is the Lower Colorado Desert. This area is in the extreme southeastern part of California, in areas along the Colorado River, and in Western Arizona. The area is comprised of rough, barren, steep, and strongly dissected mountain ranges, generally northwest to southwest trending that are separated by intermontane basins. Elevation ranges from approximately 275 feet below sea level at the lowest point in the Salton Trough to 2700 feet along low northwest to southeast trending mountain ranges. The average annual precipitation is 2 to 6 inches with high temporal and spatial variability. Winter temperatures are mild, summer temperatures are hot, and seasonal and diurnal temperature fluctuations are large. Monthly minimum temperature averages range from 40 to 80 degrees F (4 to 27 degrees C). Monthly maximum temperature averages range from 65 to 110 degrees F (18 to 43 degrees C) (WRCC 2002). Temperatures are rarely below 28 degrees F, and extremely rarely fall below 24 degrees F. Precipitation is bimodal, with approximately 20 to 40 percent of annual precipitation falling between July and September. This summer rainfall, in combination with very hot temperatures and very few to no days of hard freeze are what characterize this MLRA and distinguish it from the Mojave Desert (MLRA 30).

XD LRU concept:

The XD LRU is an extremely hot and dry portion of the MLRA. Mean annual precipitation is about 4 inches or less where the majority of the precipitation can arrive in only a couple storm events during any given year. The very few hard freezing days allows this region to have Plant Hardiness Zones of 9b or warmer. This LRU covers most of the Lower Colorado Desert except elevations above 500 m where Plant Hardiness Zones are less than 9b.

Ecological site concept

This site is a small ephemeral stream having a stream order between 1 and 2 often draining low sloping land forms where stream velocity is low enough that only gravel and smaller particles are transported rather than being capable of transporting cobbles and stones.

Similar sites

R040XD010CA	**Valley Wash** R031XY010CA Valley Wash is dominated by blue paloverde (Parkinsonia florida). It has higher productivity and density.

Table 1. Dominant plant species

Tree	(1) *Parkinsonia florida*
Shrub	(1) *Larrea tridentata*

Herbaceous	Not specified

Physiographic features

This ecological site occurs in broad drainageways. It occurs at elevations of 0 to 1000 feet and has slopes ranging from 1 to 5 percent. Frequent flooding is typical, but may be occasional. Flooding duration is very brief to brief, and runoff is negligible to very low.

Table 2. Representative physiographic features

Landforms	(1) Drainageway
Flooding duration	Extremely brief (0.1 to 4 hours) to very brief (4 to 48 hours)
Flooding frequency	Frequent
Ponding frequency	None
Elevation	0–305 m
Slope	1–5%
Water table depth	152 cm
Aspect	Aspect is not a significant factor

Climatic features

The Colorado Desert of California represents the northwestern most portion of the Sonora Desert. The subtropical Colorado Desert results from the descent of cold air which is heated by compression and arrives hot and dry at the earth's surface. Precipitation is frontal in nature during the winter and convectional in the summer. Reduced summer rainfall and high potential evapotranspiration make the Colorado Desert one of the most arid regions in North America. Summer temperatures frequently exceed 105 degrees F. The average annual precipitation ranges from 2 to 6 inches with most falling as rain. Snowfall is rare. Approximately 35% of annual precipitation occurs from July to September as a result of intense convection storms. Spring months are the windiest.

Table 3. Representative climatic features

Frost-free period (characteristic range)	287-365 days
Freeze-free period (characteristic range)	365 days
Precipitation total (characteristic range)	102 mm
Frost-free period (actual range)	248-365 days
Freeze-free period (actual range)	365 days
Precipitation total (actual range)	102-127 mm
Frost-free period (average)	322 days
Freeze-free period (average)	365 days
Precipitation total (average)	102 mm

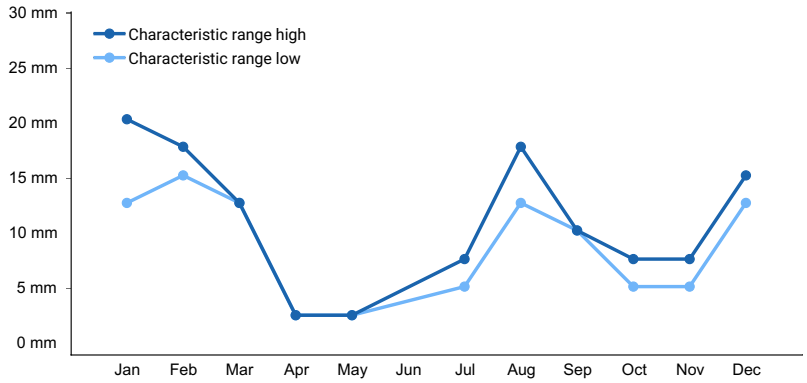


Figure 1. Monthly precipitation range

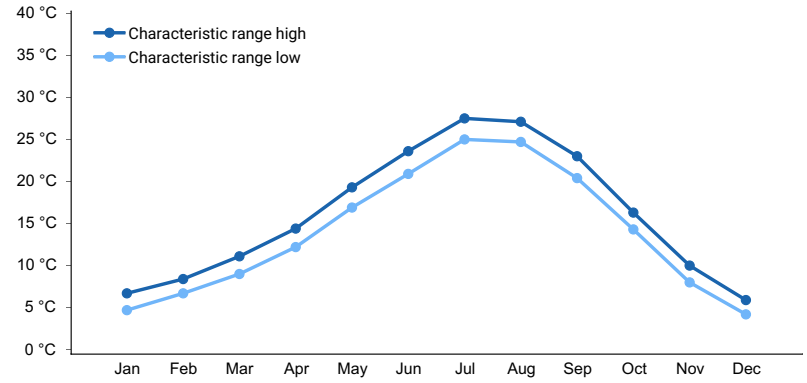


Figure 2. Monthly minimum temperature range

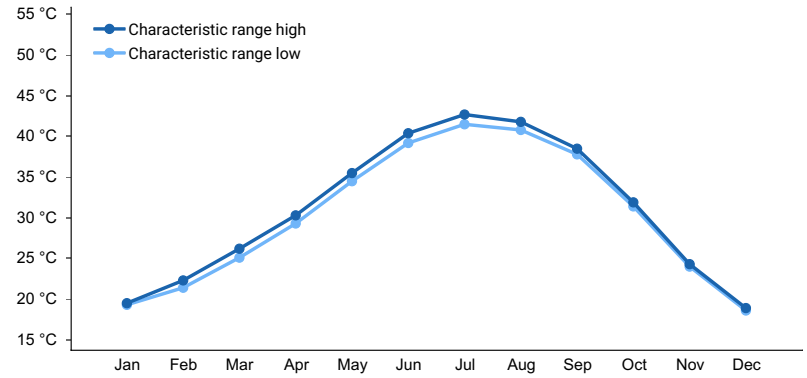


Figure 3. Monthly maximum temperature range

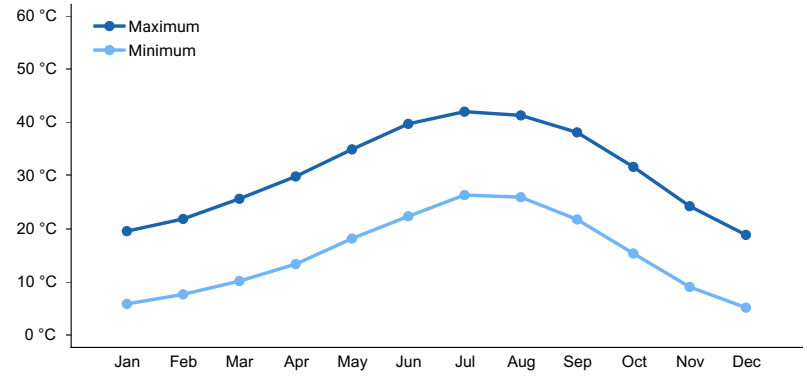


Figure 4. Monthly average minimum and maximum temperature

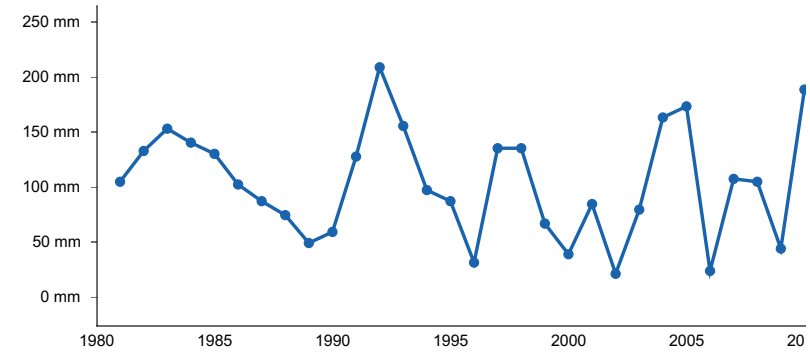


Figure 5. Annual precipitation pattern

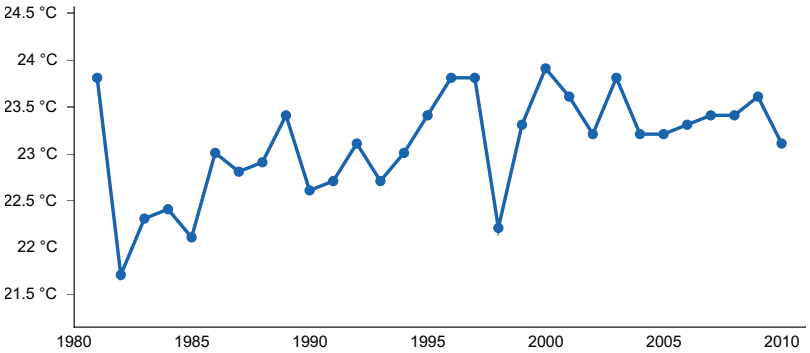


Figure 6. Annual average temperature pattern

Climate stations used

- (1) DESERT CTR 2 NNE [USC00042410], Desert Center, CA
- (2) IRON MTN [USC00044297], Vidal, CA
- (3) BLYTHE AP [USW00023158], Blythe, CA
- (4) HAYFIELD PUMPING PLT [USC00043855], Desert Center, CA

Influencing water features

Frequent flooding is typical, but may be occasional. Flooding duration is very brief to brief, and runoff is negligible to very low.

Soil features

This ecolgical site is found on alluvial soils derived from mixed sources. Soils are very deep and have extremely gravelly, sandy surface textures. Subsurface textures are sandy-skeletal. For rock fragments less than 3 inches in diameter, the percent surface cover ranges from 65 to 75 percent, and subsurface volume ranges from 50 to 60 percent. For rock fragments greater than 3 inches in diameter, the percent surface cover ranges from 5 to 15 percent, and subsurface volume ranges from 10 to 15 percent. Soils excessively drained, and permeability is rapid to very rapid.

This ecological site is found on the following soil series: Rizzo (Sandy-skeletal, mixed, hyperthermic Typic Torriorthents)

This ecological site has been correlated to the following map units and soil components in the Colorado Desert Soil Survey Area (CA803).

Map unit ID; Map unit name; Component; Phase; Percent
1212; Stormjade-Rock outcrop association, 30 to 75 percent slopes; Rizzo; frequently flooded; 5
2050; Havasulake-Rizzo association, 1 to 8 percent slopes; Rizzo;frequently flooded; 6
2055; Catfishbay association, 0 to 8 percent slopes; Rizzo;frequently flooded; 2
2056; Catfishbay loamy fine sand, 4 to 15 percent slopes; Rizzo; frequently flooded; 3

2415; Rizzo association, dry, 2 to 4 percent slopes; Rizzo; frequently flooded; 65

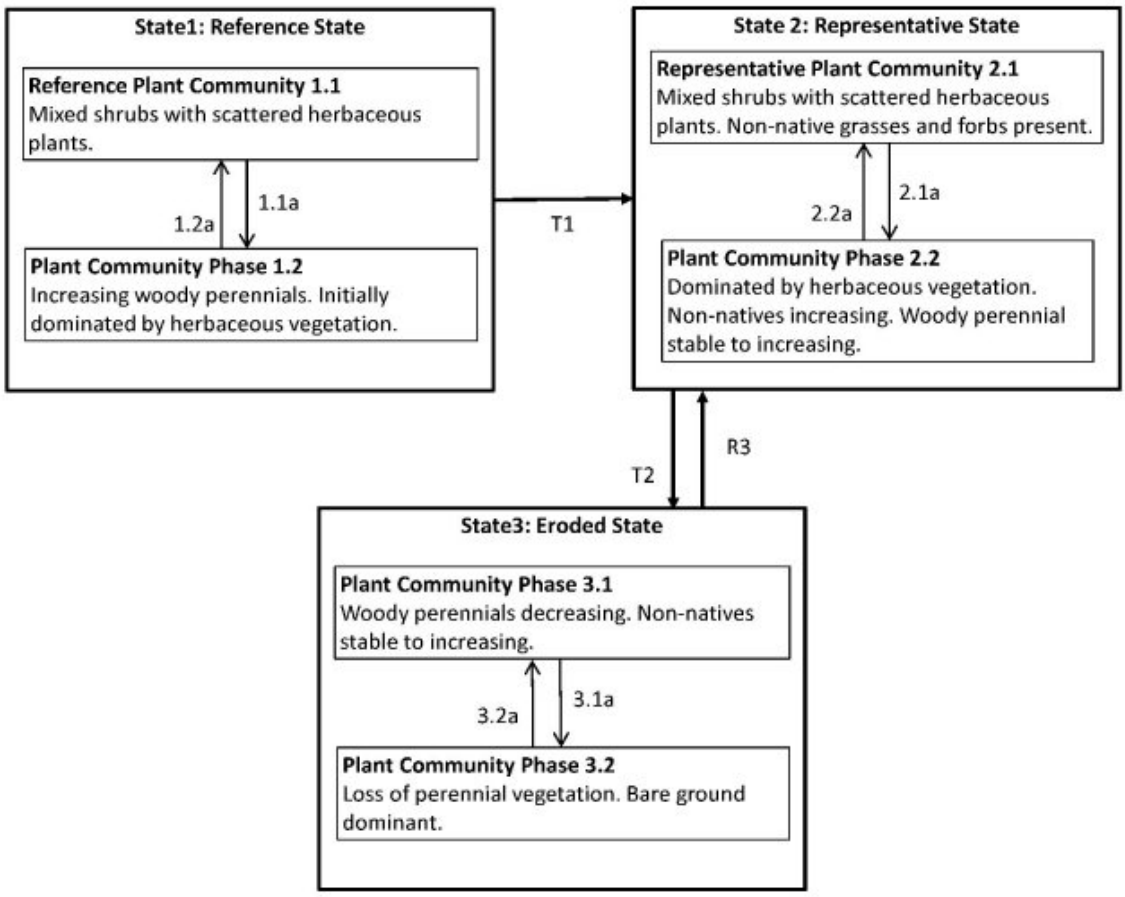
Table 4. Representative soil features

Surface texture	(1) Extremely gravelly sand
Family particle size	(1) Sandy
Drainage class	Excessively drained
Permeability class	Rapid to very rapid
Soil depth	152–203 cm
Surface fragment cover <=3"	60%
Surface fragment cover >3"	5–15%
Calcium carbonate equivalent (0-101.6cm)	0–1%
Electrical conductivity (0-101.6cm)	0–2 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–4
Soil reaction (1:1 water) (0-101.6cm)	7.8–8.4
Subsurface fragment volume <=3" (Depth not specified)	50–60%
Subsurface fragment volume >3" (Depth not specified)	10–15%

Ecological dynamics

Major factors affecting this ecological site are its hydrology and climate. The dominant species are adapted to hyperthermic conditions. The large width of the drainageway allows for areas of differing flooding intensities. The most frequently flooded areas are dominated by and blue paloverde (*Parkinsonia florida*). Small amounts of other species tolerant of water disturbance are desert lavender (*Hyptis emoryi*) and smoketree (*Psorothamnus spinosus*), ironwood (*Olneya tesota*), catclaw acacia (*Acacia greggii*). Areas of less frequent disturbance include species such as brittlebush (*Encelia farinosa*), burrobrush (*Hymenoclea salsola*), and creosote bush (*Larrea tridentata*).

State and transition model



State 1
Reference State

The reference state is representative of the natural range of variability under pristine conditions. It is maintained by periodic flooding in response to heavy rainfall events and has increased available moisture and nutrients. Fire is rare in this system. This ecological site experiences seasonal flooding and is important for redistributing moisture and nutrients throughout the landscape. Timing of disturbances combined with weather events determines plant community dynamics.

Community 1.1
Reference Plant Community

The reference plant community is diverse. The dominant species is blue paloverde (*Parkinsonia florida*). Other species include ironwood (*Olneya tesota*), desert lavender (*Hyptis emoryi*), smoketree (*Psorothamnus arborescens*), catclaw acacia (*Acacia greggii*), burrobrush (*Hymenoclea salsola*), creosote bush (*Larrea tridentata*), and brittlebush (*Encelia farinosa*).

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Shrub/Vine	146	256	364
Grass/Grasslike	56	99	140
Forb	22	38	56
Total	**224**	**393**	**560**

Community 1.2
Plant Community 1.2

This plant community is characteristic of a post-disturbance plant community phase. Initially, it is heavily dominated by herbaceous vegetation and short-lived perennials. Sprouting shrubs quickly recover and provide a favorable environment for establishment of shrub seedlings. This plant community is ‘at-risk’ of invasion by non-natives. Non-native species are able to take advantage of increased availability of critical resources following disturbances.

Pathway 1.1a
Community 1.1 to 1.2

Pathway 1.2a
Community 1.2 to 1.1

Absence from disturbance and natural regeneration over time.

State 2
Representative State

The Representative State is characterized by the presence of non-native species in the understory. A biotic threshold is crossed with the introduction of non-natives that are difficult to remove from the system and have they potential to significantly alter disturbance regimes from their historic range of variation. Non-native annuals will persist once introduced into the plant community, due to their annual growth form, abundant seed production and long term seed viability. Non-native annuals such as red brome and cheatgrass are potential invaders on this ecological site. These non-native annuals are highly flammable and promote wildfires where fires historically have been infrequent.

Community 2.1
Plant Community Phase 2.1

Species composition is similar to the reference plant community. Ecological processes have not been compromised at this time, however, ecological resilience is reduced by the presence of non-natives. This plant community phase will respond differently following disturbance, when compared to the reference plant community. Management focused on decreasing the amount of anthropogenic disturbance is important for maintaining the health of perennial native species that protect the site against erosion.

Community 2.2
Plant Community Phase 2.2

This plant community is characteristic of a post-disturbance plant community. It is dominated by herbaceous vegetation, which may or may not be non-native, woody perennials are increasing. Nevada ephedra, desert almond and desert willow commonly sprout from rhizomes following disturbance. Sprouting species provide favorable sites for germination of species such as brittlebush, ratany, and bursage which reproduce sexually and are prolific seed producers. This plant community is ‘at-risk’ of increased erosion due to reduction of deep rooted perennials and increased non-native annuals.

Pathway 2.1a
Community 2.1 to 2.2

Seasonal flooding, wildfire, disease or insect attack.

Pathway 2.2a
Community 2.2 to 2.1

Absence of disturbance and natural regeneration over time.

State 3
Eroded State

This state is characterized by reduced cover of woody perennials. Bare ground is increasing, leading to increased erosion, decreased infiltration and loosening of the soil surface causing channeling. An abiotic threshold has been crossed preventing the natural repair of this plant community. Feedbacks keeping this state stable include reduced perennial vegetative cover causing increased runoff and decreased infiltration preventing the establishment of desirable perennial vegetation.

Community 3.1
Plant Community Phase 3.1

This plant community is characteristic of a short disturbance return interval. Long-lived woody perennials are decreasing. The ability of this site to dissipate energy during large flow events is severely reduced contributing to ecological damage downstream.

Community 3.2
Plant Community Phase 3.2

This plant community is characterized by the loss of long-lived woody perennials. Ecological processes have been altered including connectivity within the watershed, ground water recharge and habitat quality. Soil and soil nutrients are being redistributed down stream, leading to down cutting and channel widening.

Pathway 3.1a
Community 3.1 to 3.2

Seasonal flooding, wildfire, disease or insect attack.

Pathway 3.2a
Community 3.2 to 3.1

Absence from disturbance and natural regeneration over time, allow some perennials to return to the system increasing stability.

Transition T1
State 1 to 2

Introduction of non-native species due to a combination of factors including: 1) surface disturbance, 2) changes in the kinds of animals and their grazing patterns, 3) drought and/or 4) changes in fire history.

Transition T2
State 2 to 3

Large scale reoccurring disturbance, natural or anthropogenic.

Restoration pathway R3
State 3 to 2

Ecological processes can be restored to the site, but non-natives remain. Possible restoration techniques include stabilizing the site by reestablishing native perennials and the use of artificial rip-rap to dissipate energy and reestablish the flood plain.

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**			17–59	
	big galleta	PLRI3	*Pleuraphis rigida*	17–39	–
	bush muhly	MUPO2	*Muhlenbergia porteri*	1–20	–
2	**Secondary perennial grasses**			8–39	
	bush muhly	MUPO2	*Muhlenbergia porteri*	1–20	–
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	2–8	–
3	**Annual grasses**			0–20	
Forb					
4	**Perennial**			8–39	
5	**Annual**			0–39	
Shrub/Vine					
6	**Primary shrubs**			72–290	
	creosote bush	LATR2	*Larrea tridentata*	17–78	–
	burrobush	AMDU2	*Ambrosia dumosa*	8–39	–
	woolly fruit bur ragweed	AMER	*Ambrosia eriocentra*	8–39	–
	desertbroom	BASA2	*Baccharis sarothroides*	9–30	–
	Emory's baccharis	BAEM	*Baccharis emoryi*	8–29	–
	Mojave yucca	YUSC2	*Yucca schidigera*	2–20	–
	Nevada jointfir	EPNE	*Ephedra nevadensis*	3–20	–
	Eastern Mojave buckwheat	ERFAP	*Eriogonum fasciculatum var. polifolium*	3–20	–
	burrobrush	HYSA	*Hymenoclea salsola*	8–20	–
	desert willow	CHLI2	*Chilopsis linearis*	3–11	–
	catclaw acacia	ACGR	*Acacia greggii*	3–11	–
7	**Secondary shrubs**			17–59	
	cattle saltbush	ATPO	*Atriplex polycarpa*	2–20	–
	sweetbush	BEJU	*Bebbia juncea*	2–20	–
	brittlebush	ENFA	*Encelia farinosa*	2–20	–
	Mojave rabbitbrush	ERPA29	*Ericameria paniculata*	2–20	–
	ratany	KRAME	*Krameria*	2–20	–
	desert-thorn	LYCIU	*Lycium*	2–20	–
	desert almond	PRFA	*Prunus fasciculata*	2–20	–
	purple sage	SADOI	*Salvia dorrii ssp. dorrii var. incana*	2–20	–
	Mexican bladdersage	SAME	*Salazaria mexicana*	2–20	–
	Schott's yucca	YUSC	*Yucca ×schottii*	2–8	–

Approval

Kendra Moseley, 10/17/2024

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	11/21/2024
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:**

---

17. **Perennial plant reproductive capability:**
