USDA Natural Resources
Conservation Service

Ecological site R030XB020NV
LOAMY BOTTOM

Last updated: 2/18/2025
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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): 030X–Mojave Basin and Range

The Mojave Desert Major Land Resource Area (MLRA 30) 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. The Mojave Desert is a transitional area between hot deserts and cold deserts where close proximity of these desert types exert enough influence on each other to distinguish these desert types from the hot and cold deserts beyond the Mojave. Kottek et. al 2006 defines hot deserts as areas where mean annual air temperatures are above 64 F (18 C) and cold deserts as areas where mean annual air temperatures are below 64 F (18 C). Steep elevation gradients within the Mojave create islands of low elevation hot desert areas surrounded by islands of high elevation cold desert areas.

The Mojave Desert receives less than 10 inches of mean annual precipitation. Mojave Desert low elevation areas are often hyper-arid while high elevation cold deserts are often semi-arid with the majority of the Mojave being an arid climate. Hyper-arid areas receive less than 4 inches of mean annual precipitation and semi-arid areas receive more than 8 inches of precipitation (Salem 1989). The western Mojave receives very little precipitation during the summer months while the eastern Mojave experiences some summer monsoonal activity.

In summary, the Mojave is a land of extremes. Elevation gradients contribute to extremely hot and dry summers and cold moist winters where temperature highs and lows can fluctuate greatly between day and night, from day to day and from winter to summer. Precipitation falls more consistently at higher elevations while lower elevations can experience long intervals without any precipitation. Lower elevations also experience a low

frequency of precipitation events so that the majority of annual precipitation may come in only a couple precipitation events during the whole year. Hot desert areas influence cold desert areas by increasing the extreme highs and shortening the length of below freezing events. Cold desert areas influence hot desert areas by increasing the extreme lows and increasing the length of below freezing events. Average precipitation and temperature values contribute little understanding to the extremes which govern wildland plant communities across the Mojave.

Arid Eastern Mojave Land Resource Unit (XB)

LRU notes

The Mojave Desert is currently divided into 4 Land Resource Units (LRUs). This ecological site is within the Arid Eastern Mojave LRU where precipitation is bi-modal, occurring during the winter months and summer months. The Arid Eastern Mojave LRU is designated by the 'XB' symbol within the ecological site ID. This LRU is found across the eastern half of California, much of the mid-elevations of Nevada, the southernmost portions of western Utah, and the mid-elevations of northwestern Arizona. This LRU is essentially equivalent to the Eastern Mojave Basins and Eastern Mojave Low Ranges and Arid Footslopes of EPA Level IV Ecoregions

Elevations range from 1650 to 4000 feet and precipitation is between 4 to 8 inches per year. This LRU is distinguished from the Arid Western Mojave (XA) by the summer precipitation, falling between July and September, which tends to support more warm season plant species. The 'XB' LRU is generally east of the Mojave River and the 117 W meridian (Hereford et. al 2004). Vegetation includes creosote bush, burrobush, Nevada jointfir, ratany, Mojave yucca, Joshua tree, cacti, big galleta grass and several other warm season grasses. At the upper portions of the LRU, plant production and diversity are greater and blackbrush is a common dominant shrub.

Ecological site concept

This site is found along perennial streams, usually at the outer margins of a stream terrace where flooding disturbance is infrequent as in a strath terrace.

This is a group concept and provisional STM that also covers R030XB032NV.

Associated sites

R030XB005NV	**Arid Active Alluvial Fans**
R030XB019NV	**Eroded Fan Remnant Pavette 4-6 P.Z.**
R030XB021NV	**STREAMBANK**

R030XB028NV	**VALLEY WASH**

Similar sites

R030XB032NV	**DRY FLOODPLAIN** Same ecological site concept.
R030XY046NV	**OUTWASH PLAIN** ATPO dominant shrub; less productive site; no mesquite
R030XB021NV	**STREAMBANK** POFR2 major species; occurs immediately adjacent to flowing streams

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Atriplex canescens* (2) *Prosopis*
Herbaceous	(1) *Sporobolus airoides*

Physiographic features

This site occurs on floodplains, and stream terraces. Slope gradients range from 0 to 8 percent, but gradients of 0 to 2 percent are most typical. Elevations are 460 to 4000 feet.

Table 2. Representative physiographic features

Landforms	(1) Flood plain (2) Strath terrace (3) Stream terrace
Flooding duration	Very brief (4 to 48 hours) to brief (2 to 7 days)
Flooding frequency	Rare to frequent
Ponding frequency	None
Elevation	140–1,219 m
Slope	0–8%
Water table depth	107–152 cm
Aspect	Aspect is not a significant factor

Climatic features

The climate of the Mojave Desert has extreme fluctuations of daily temperatures, strong seasonal winds, and clear skies. The climate is arid and is characterized with cool, moist winters and hot, dry summers. Most of the rainfall falls between November and April.

Summer convection storms from July to September may contribute up to 25 percent of the annual precipitation. Average annual precipitation is 3 to 8 inches. Mean annual air temperature is 55 to 76 degrees F. The average growing season is about 140 to 360 days.

Table 3. Representative climatic features

Frost-free period (average)	360 days
Freeze-free period (average)	
Precipitation total (average)	203 mm

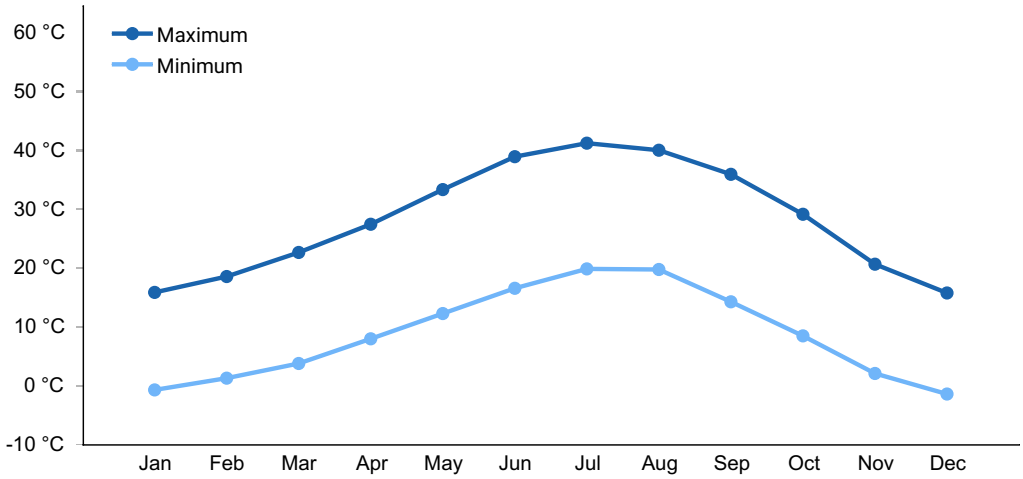


Figure 1. Monthly average minimum and maximum temperature

Influencing water features

This site is subject to flash flooding during spring runoff and convective summer storms.

Soil features

The soils of this site are very deep and formed in mixed rock sources. Textures are gravelly sandy loams to silt loams. Water intake rates are moderately rapid and available water capacity is very low to medium. These soils are somewhat poorly to excessively drained and runoff is low. The soil series associated with this site include Anthony, Calico, Gila, Haymont, Holtville, Ripley, Tobler, Toquop, Vinton, and Virgin River.

Table 4. Representative soil features

Surface texture	(1) Gravelly loam (2) Silt loam (3) Loam
Family particle size	(1) Loamy
Drainage class	Somewhat poorly drained to excessively drained

Permeability class	Moderately rapid
Soil depth	183–213 cm
Surface fragment cover <=3"	4–5%
Surface fragment cover >3"	2–4%
Available water capacity (0-101.6cm)	5.08–17.27 cm
Calcium carbonate equivalent (0-101.6cm)	1–20%
Electrical conductivity (0-101.6cm)	0–32 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–60
Soil reaction (1:1 water) (0-101.6cm)	7.4–9

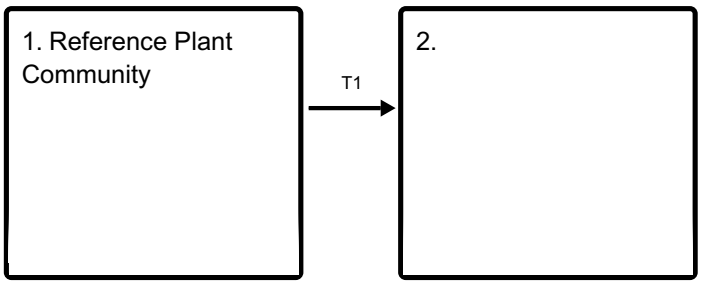
Ecological dynamics

As ecological condition deteriorates, mesquite and rabbitbrush increase as alkali sacaton, and fourwing saltbush decrease. Species likely to invade this site are salt cedar and annual forbs and grasses.

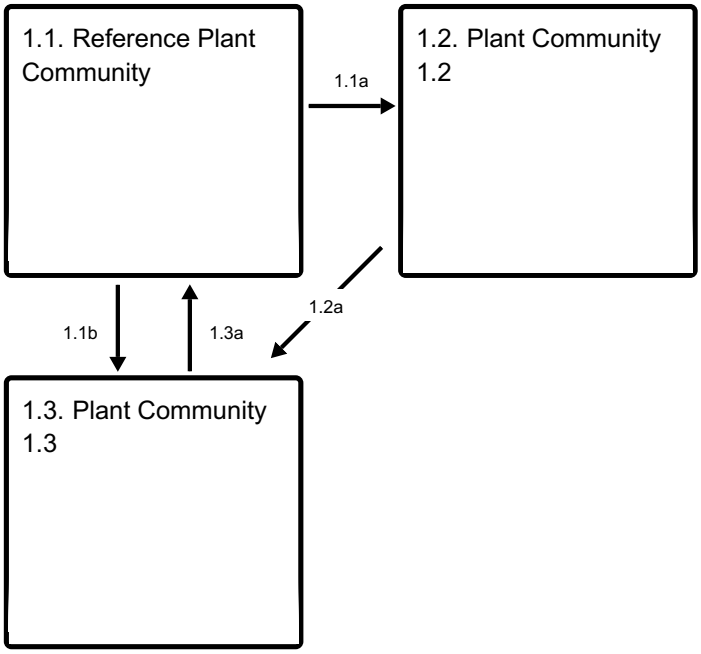
Fire Ecology:
Fire in the Mojave Desert are infrequent and of low severity because production of annual and perennial herbs seldom provides a fuel load capable of sustaining fire. Fire top-kills or kills fourwing saltbush, depending upon ecotype. Fourwing saltbush may sprout after top-kill. Following top-kill by fire, numerous sprouts arise from the underground buds. Mortality is low in honey mesquite, particularly in lowland areas where root systems are well developed. Screwbean mesquite can survive fire, by reprouting from the base.Torrey's saltbush produces abundant seeds and is fire resistant. Torrey's saltbush has been shown to have reduced flammability due to high moisture and ash contents. Alkali sacaton is classified as tolerant of, but not resistant to fire. Top-killing by fire is probably frequent, and the plants can be killed by severe fire. Fire most likely top-kills big galleta. Big galleta sprouts from rhizomes following fire. Damage to big galleta from fire varies, depending on whether big galleta is dormant when burned. If big galleta is dry, damage may be severe. However, when plants are green, fire will tend to be less severe and damage may be minimal, with big galleta recovering quickly. Fire top-kills saltgrass. Saltgrass establishes after fire through seed and/or lateral spread by rhizomes.

State and transition model

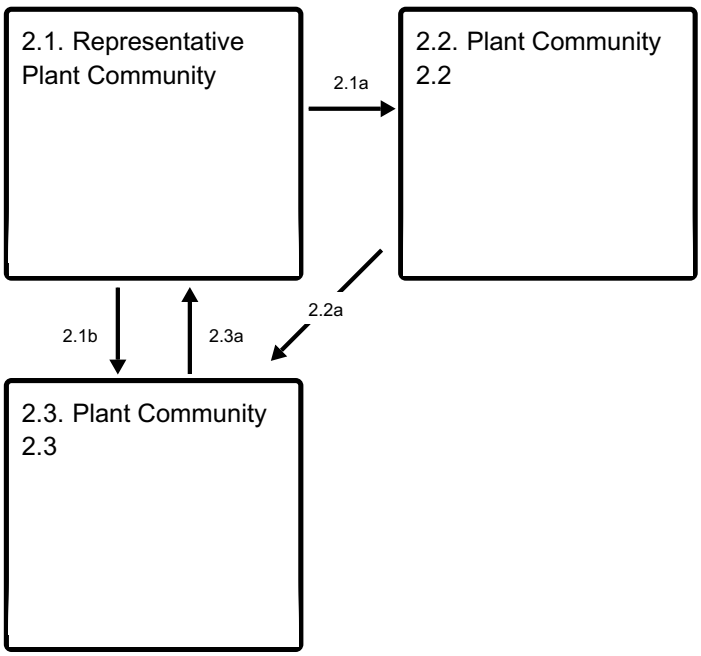
Ecosystem states



State 1 submodel, plant communities



State 2 submodel, plant communities



State 1
Reference Plant Community

Community 1.1

Reference Plant Community

The reference plant community is dominated by fourwing saltbush, mesquite, big saltbush and alkali sacaton. Potential vegetative composition is about 50% grasses, 5% forbs and 45% shrubs. Approximate ground cover (basal and crown) is 15 to 30 percent.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	448	841	1401
Shrub/Vine	404	757	1261
Forb	45	84	140
Total	**897**	**1682**	**2802**

Community 1.2
Plant Community 1.2

This plant community is characterized by increased woody vegetation including mesquite and big saltbush. Drought conditions favor the expansion of shrubs into previously grass dominated sites. Alkali sacaton and Juncus have low tolerance for shade and drought and experience decreased vigor and reproductive capacity. Saltgrass remains stable or increases, due to its tolerance of drought and disturbed conditions.

Community 1.3
Plant Community 1.3

This plant community is characteristic of an early seral plant community. Wildfire resulting from drought removes woody vegetation and temporarily increases understory grass and grass-likes. Native vegetation recovers quickly. Alkali sacaton, Juncus and saltgrass reproduce from rhizomes and are tolerant of wildfire. Historically, ranges with saltgrass regularly experienced wildfire and may increase in cover following fire. This plant community is ‘at-risk’ of invasion by non-native species. Non-natives are able to take advantage of increased availability of critical resources following wildfire or other disturbance.

Pathway 1.1a
Community 1.1 to 1.2

Lowering of the water table, long-term drought and/or inadequate rest and recovery.

Pathway 1.1b
Community 1.1 to 1.3

Infrequent wildfire removes existing vegetation.

Pathway 1.2a
Community 1.2 to 1.3

Wildfire, prolonged drought, disease and/or insect attack.

Pathway 1.3a
Community 1.3 to 1.1

Release from drought leads to recovery on the herbaceous species and time allows for the reestablishment of shrubs.

State 2

Community 2.1
Representative Plant Community

This plant community is compositionally similar to the reference plant community with the presence of non-natives. Ecological processes are not compromised at this time, however, ecological resilience is reduced making it more difficult for this plant community to recover following disturbance. Management should focus on maintaining natural ground water levels, slowing the spread of non-natives and reducing surface disturbances.

Community 2.2
Plant Community 2.2

This plant community is characterized by increased woody vegetation, native and non-native. Deep rooted shrubs and trees tolerate lower ground water levels and drought conditions better than shallow rooted forbs and grasses. This plant community phase is considered ‘at-risk’. Saltcedar is a very efficient competitor against native species, especially where salinity levels are increased and water table levels are lower. Management should focus on eliminating saltcedar as soon as it is detected. Methods used to manage the spread of saltcedar including combinations of herbicide, mechanical and biological controls. Saltcedar is capable of extracting water from unsaturated soil horizons (facultative phreatophyte) leading to decreased available ground water and increased salinity of the soil causing long-term impacts on plant community dynamics.

Community 2.3
Plant Community 2.3

This plant community is characterized by sprouting shrubs and recovering native species. Non-natives may increase following wildfire. Dominant native grasses and grass-likes are tolerant of periodic wildfire and may increase in cover. Saltcedar and Russian olive sprout

from surviving root crown following fire and may increase in invasibility without careful management.

Pathway 2.1a
Community 2.1 to 2.2

Long-term drought conditions favor increased woody vegetation.

Pathway 2.1b
Community 2.1 to 2.3

Wildfire removes existing vegetation.

Pathway 2.2a
Community 2.2 to 2.3

Wildfire removes existing vegetation.

Pathway 2.3a
Community 2.3 to 2.1

Natural regeneration, absence of wildfire and management focused on controlling non-natives.

Transition T1
State 1 to 2

Introduction of non-natives due to a combination of factors including; surface disturbance, changes in the kinds of animals and their grazing patterns, drought and/or changes in fire history.

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**			504–1009	
	alkali sacaton	SPAI	*Sporobolus airoides*	336–504	–
	saltgrass	DISP	*Distichlis spicata*	84–252	–
	big galleta	PLRI3	*Pleuraphis rigida*	84–252	–
2	**Secondary Perennial Grasses**			34–135	
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	9–50	–
	squirreltail	ELEL5	*Elymus elymoides*	9–50	–
	basin wildrye	LECI4	*Leymus cinereus*	9–50	–
Forb					
3	**Perennial**			34–84	
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	9–50	–
	squirreltail	ELEL5	*Elymus elymoides*	9–50	–
	dock	RUMEX	*Rumex*	9–50	–
4	**Annual**			1–34	
	basin wildrye	LECI4	*Leymus cinereus*	9–50	–
Shrub/Vine					
5	**Primary shrubs**			420–841	
	fourwing saltbush	ATCA2	*Atriplex canescens*	252–420	–
	Torrey's saltbush	ATTO	*Atriplex torreyi*	84–168	–
	honey mesquite	PRGL2	*Prosopis glandulosa*	43–127	–
	screwbean mesquite	PRPU	*Prosopis pubescens*	43–127	–
	rubber rabbitbrush	ERNA10	*Ericameria nauseosa*	34–84	–
6	**Secondary shrubs**			84–252	
	catclaw acacia	ACGR	*Acacia greggii*	17–50	–
	cattle saltbush	ATPO	*Atriplex polycarpa*	17–50	–
	jointfir	EPHED	*Ephedra*	17–50	–
	Mexican bladdersage	SAME	*Salazaria mexicana*	17–50	–

Animal community

Livestock Interpretations:
This site is suited to livestock grazing. Grazing management should be keyed to perennial grass and palatable shrub production. Alkali sacaton is a valuable forage species. Plants are tolerant to moderate grazing and can produce abundant herbage utilized by livestock. Big galleta is considered a valuable forage plant for cattle and domestic sheep. Its coarse, rigid culms make it relatively resistant to heavy grazing and trampling. Saltgrass's value as forage depends primarily on the relative availability of other grasses of higher nutritional value and palatability. It can be an especially important late summer grass in arid environments after other forage grasses have deceased. Saltgrass is rated as a fair to good forage species only because it stays green after most other grasses dry. Livestock generally avoid saltgrass due to its coarse foliage. Saltgrass is described as an increaser under grazing pressure. Fourwing saltbush is one of the most palatable shrubs in the West. It provides nutritious forage for all classes of livestock. Fourwing saltbush is adapted to browsing, and may show compensatory growth after stem removal. Old crown wood can produce vigorous sprouts after new growth is browsed; however, plants decline when subjected to overuse. Numerous domestic animals consume and disperse honey mesquite seed. The fruit of honey mesquite is valuable forage for livestock. Cattle, horses, domestic sheep and goats, mules, and burros eat large quantities of the ripe fruit during summer and fall. Livestock do not consume the foliage to any great extent. Foliage consumption is high only during drought years, especially in the early spring when other forage is sparse. Honey mesquite increases on ranges where heavy overgrazing has removed more palatable species. Cattle are also known to eat screwbean mesquite pods. However it is possible that the spines of screwbean mesquite deter some browsers. Although screwbean mesquite is an important part of the diet for many species, it is not recommended as animal feed. Torrey's saltbush is important and is used to some extent as livestock forage. Leaves and seeds of Torrey's saltbush are eaten by many species of livestock.

Stocking rates vary over time depending upon season of use, climate variations, site, and previous and current management goals. A safe starting stocking rate is an estimated stocking rate that is fine tuned by the client by adaptive management through the year and from year to year.

Wildlife Interpretations:
Fourwing saltbush provides valuable habitat and year-round browse for wildlife. Mesquite browse is generally not a very important wildlife food source. Wild turkeys, round-tailed ground squirrels, cottontails, and woodrats consume some leaves. Jackrabbits consume large amounts of honey mesquite. The sweet, nutritious seed pods of honey mesquite are highly palatable to all types of small and large wildlife species. Screwbean mesquite is important as cover and food to wildlife. Species noted to eat mesquite pods or leaves were white-winged doves, ravens, hooded skunks, and deer. Leaves and seeds of big saltbrush are eaten by many species like the mule deer and pronghorn antelope. Alkali sacaton and saltgrass provide cover for a variety of bird species, small mammals, and arthropods and

forage for several big game wildlife species.

Hydrological functions

Runoff is low. Permeability is moderately rapid.

Other products

Screwbean mesquite was a food source for many Native American tribes. In addition, the pods or meal could be used to make beverages and a syrup was made by boiling the pods.

Other information

Alkali sacaton is one of the most commonly used species for seeding and stabilizing disturbed lands. Due to alkali sacaton’s salt tolerance, is recommended for native grass seeding on subirrigated saline sites. Big galleta's clumped growth form stabilizes blowing sand. Given its extensive system of rhizomes and roots which form a dense sod, saltgrass is considered a suitable species for controlling wind and water erosion. Screwbean mesquite has been used in revegetation efforts in areas dominated by tamarisks. It can be planted on sites with higher salt concentrations than many other native riparian species can tolerate. Torrey's saltbush is a recommended revegetation species in riparian areas and has also been used in revegetation projects in other habitats and outside its native distribution. It has been utilized in soil stabilization and improvement or creation of habitat and forage for wildlife.

Type locality

Location 1: Lincoln County, NV	
Township/Range/Section	T11S R70E S30
General legal description	Approximately 13 miles north-northwest of Mesquite, Nevada. About ¼ mile northeast of Toquop Wash intersection with powerline road, Lincoln County, Nevada. This site also occurs in Clark, southern Nye, and southern Lincoln Counties, Nevada.

Other references

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

Hereford, R., R.H. Webb and C. I. Longpre. 2004. Precipitation history of the Mojave Desert region, 1893-2001 (No. 117-03).

Kottek, M., Grieser, J., Beck, C., Rudolf, B., & Rubel, F. (2006). World map of the Köppen-Geiger climate classification updated. Meteorologische Zeitschrift, 15(3), 259-263.

Salem, B. B. (1989). Arid zone forestry: a guide for field technicians (No. 20). Food and Agriculture Organization (FAO).

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

Contributors

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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.

Author(s)/participant(s)	PATTI NOVAK-ECHENIQUE
Contact for lead author	State Rangeland Management Specialist
Date	05/02/2013
Approved by	Kendra Moseley
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** Rills are none.

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2. **Presence of water flow patterns:** Water flow patterns are none to few where this site occurs on axial stream floodplains. They may be long (>1 m) and connected.

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3. **Number and height of erosional pedestals or terracettes:** Pedestals are none.

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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 is ± 15%; surface rock fragments up to 5%; grass & shrub canopy cover up to 30%.

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5. **Number of gullies and erosion associated with gullies:** None

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6. **Extent of wind scoured, blowouts and/or depositional areas:** None

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7. **Amount of litter movement (describe size and distance expected to travel):** Fine litter (foliage from grasses and annual & perennial forbs) expected to move distance of slope length during intense summer convection storms or rapid snowmelt events. Persistent litter (large woody material) will remain in place except during large rainfall events.

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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):** Soil stability values should be 3 to 6 on most soil textures found on this site. Areas of this site occurring on soils that have a physical crust will probably have stability values less than 3. (To be field tested.)

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Surface structure is typically platy or cloddy. Soil surface colors are browns and soils are typified by an ochric epipedon. Organic matter of the surface 2 to 3 inches is typically 1% to 2%. Organic matter content can be more or less depending on micro-topography.

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Perennial herbaceous plants slow runoff and increase infiltration. Shrub canopy and associated litter break raindrop impact.

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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):** Compacted layers are not

typical. Platy or massive sub-surface horizons or subsoil argillic horizons are not to be interpreted as compacted layers.

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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: Mojave Desert shrubs > warm-season perennial bunchgrass

    Sub-dominant: cool-season perennial bunchgrass > perennial forbs > annual forbs

    Other:

    Additional:

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Dead branches within individual shrubs common and standing dead shrub canopy material may be as much as 25% of total woody canopy; some of the mature bunchgrasses (<20%) have dead centers.

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14. **Average percent litter cover (%) and depth (in):** Within plant interspaces (20-30%) and depth of litter is <½ inch.

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** For normal or average growing season ± 1500 lbs/ac. Favorable years ±2500 lbs/ac and unfavorable years ±800 lbs/ac

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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:** Potential invaders on this site include red brome, redstem, salt cedar, filaree and Mediterranean grass.

17. **Perennial plant reproductive capability:** All functional groups should reproduce in average (or normal) and above average growing season years.