USDA Natural Resources
Conservation Service

Ecological site R030XB047NV
ALLUVIAL PLAIN

Last updated: 2/24/2025
Accessed: 05/14/2025

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

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 ecological site is found on lake plains, alluvial flats and fan skirts below 3600 feet where ponding is likely. High elevation mountains are not within the watersheds of this ecological site, with headwaters also below 3600 feet and a watershed size less than 75,000 acres.

This is a group concept and provisional STM that also covers the following ecological sites: R030XF026CA, R030XF027CA, R030XF029CA, R030XF031CA, R030XF032CA, R030XY047NV

Associated sites

R030XB004NV	**SANDY 5-7 P.Z.**
R030XB065NV	**SODIC SAND**
R030XY046NV	**OUTWASH PLAIN**

Similar sites

R030XY046NV	**OUTWASH PLAIN** AMDU2 and LATR2 major shrubs
R030XB050NV	**Calcic Dry Wash** Less productive site; occurs within, and immediately adjacent, to active floodplain of ephemeral stream channels.
R030XB065NV	**SODIC SAND** more productive site; PLRI3 dominant plant
R030XY047NV	**ALLUVIAL PLAIN** This is the same ecological site.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Atriplex polycarpa*
Herbaceous	(1) *Achnatherum hymenoides*

Physiographic features

This site occurs on alluvial flats, fan skirts, and lake plains on all exposures. Slopes range from 0 to 8 percent, but slope gradients of 0 to 4 percent are typical. Elevations are 1700 to 4100 feet.

Table 2. Representative physiographic features

Landforms	(1) Alluvial flat (2) Fan skirt (3) Lake plain
Flooding duration	Extremely brief (0.1 to 4 hours) to very brief (4 to 48 hours)
Flooding frequency	Very rare to rare
Ponding frequency	None
Elevation	518–1,250 m
Slope	0–8%

Aspect	Aspect is not a significant factor

Climatic features

The climate is hot and arid, with mild winters and very hot summers. Precipitation is greatest in the winter with a lesser secondary peak in summer, typical of the Mojave Desert. The average annual precipitation ranges from 3 to 5 inches with most of the moisture falling as rain during the period November through March. At least 30% of the annual precipitation occurs from July to September as a result of summer convection storms. Mean annual air temperature is 64 to 69 degrees F. The average frost-free period is 240 to 300 days.

Table 3. Representative climatic features

Frost-free period (average)	300 days
Freeze-free period (average)	
Precipitation total (average)	127 mm

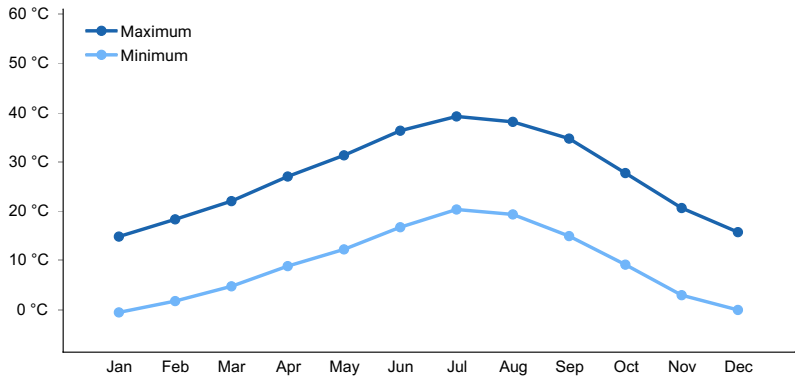


Figure 1. Monthly average minimum and maximum temperature

Influencing water features

There are no influencing water features associated with this site.

Soil features

The soils associated with this site are very deep alluvium derived from mixed sources. Available water capacity is low to moderate, runoff is low to very high, and the soils are well drained to somewhat excessively drained. The soils have a typic-aridic soil moisture regime. Soil reaction throughout the profile ranges from moderately to very strongly alkaline. The soils series associated with this site include:
Haymont, a coarse-silty, mixed, superactive, calcareous, thermic Typic Torriorthent;
Hypoint, a sandy, mixed, thermic Typic Torriorthent; and
Tipnat, a fine-loamy, mixed, superactive, thermic Typic Natrargid.

Table 4. Representative soil features

Surface texture	(1) Loamy sand (2) Gravelly sandy loam (3) Very fine sandy loam
Family particle size	(1) Loamy
Drainage class	Well drained to somewhat excessively drained
Permeability class	Moderately slow to rapid
Soil depth	183–213 cm
Surface fragment cover <=3"	20–25%
Surface fragment cover >3"	0%

Available water capacity (0-101.6cm)	7.62–25.4 cm
Calcium carbonate equivalent (0-101.6cm)	0–35%
Electrical conductivity (0-101.6cm)	0–5 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–45
Soil reaction (1:1 water) (0-101.6cm)	8.4–9.5
Subsurface fragment volume <=3" (Depth not specified)	0–35%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

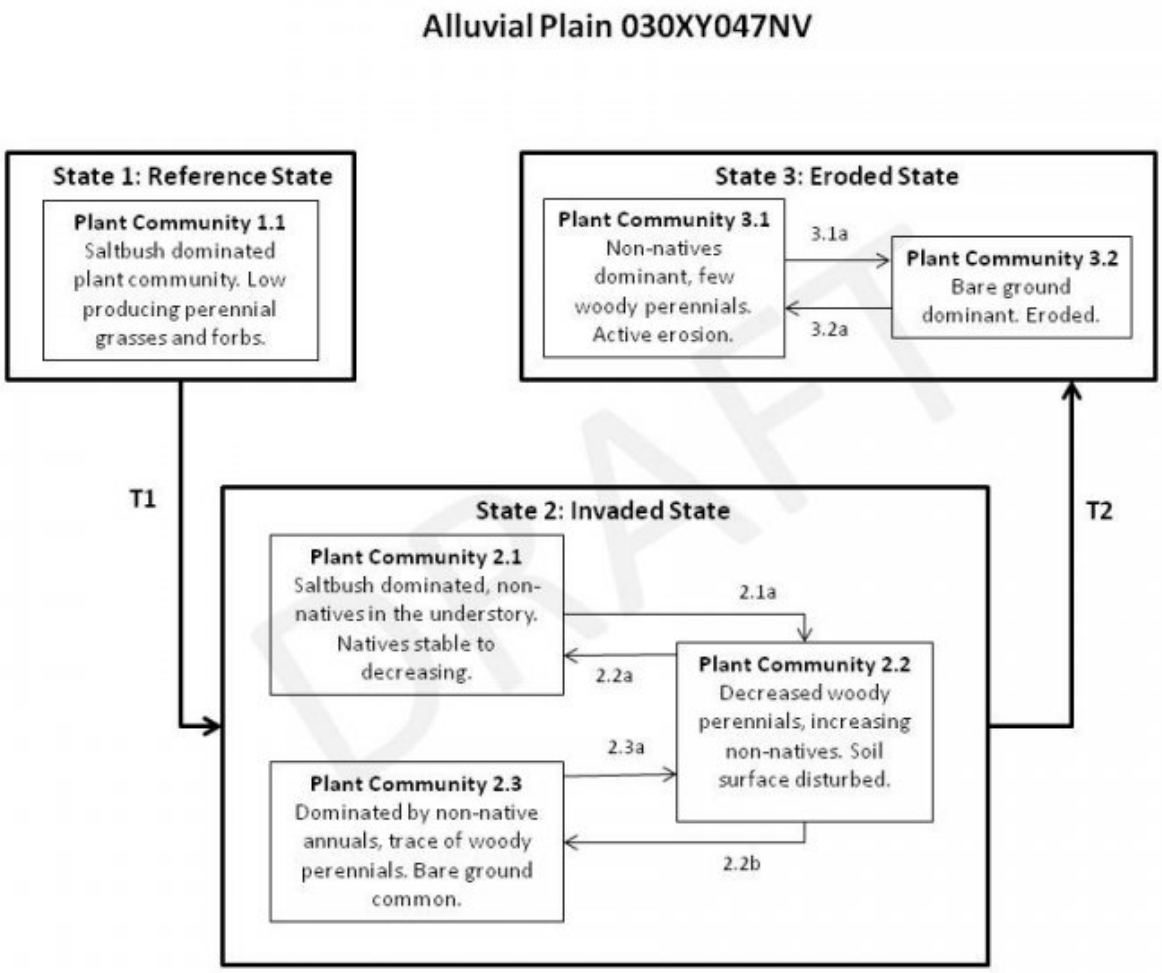
The plant communities of this site are dynamic in response to changes in disturbance regimes and weather patterns. Community phase changes are primarily driven by long term drought. Historically, wildfire was infrequent and patchy, due to widely spaced vegetation and low herbaceous production.

Cattle saltbush flowers from May to August, with fruit ripening from October to December. Seeds are dispersed from November to May. Cattle saltbush is tolerant of alkaline conditions and relatively high pH, however, germination can be reduced if salt concentrations become too high. Large quantities of salt are accumulated in the shoots and on the leaf surface, this is thought to increase its salinity tolerance by reducing the salinity stress of photosynthetically active tissue (Kay et al. 1977).

Cattle saltbush and all Atriplex species are well adapted to the Mojave Desert environment. They are examples of extreme drought resistance, surviving more than a week at -6 Megapascals of water potential. The spatial distribution of vegetation of this site impacts runoff, infiltration, sediment redistribution and nutrient cycling. Patches of vegetation increase fine sediment deposition and reduce runoff producing positive feedback dynamics in the plant community. Shrub canopies shield the soil from radiation and rainfall (Puigdefabregas 2005). Shrubs partition the rainfall into interception, throughfall and stem flow. Interception diminishes net rainfall, while stemflow concentrates the water and results in deeper infiltration (Puigdefabregas 2005).

Fire Ecology:
The historic fire return interval for salt-desert shrub communities ranges from 35 to 100 years. Saltbush produces abundant seeds and is demonstrably fire resistant. Saltbush has been shown to have reduced flammability due to high moisture and salt content. Saltbush can survive at least some fires. Saltbush readily reproduces from seed following wildfire. 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. Indian ricegrass can be killed by fire, depending on severity and season of burn. Indian ricegrass reestablishes on burned sites through seed dispersed from adjacent unburned areas.

State and transition model



State 1
Reference State

The Reference State is representative of the natural range of variability under pristine conditions. The plant community is shrub dominated with few perennial grasses and forbs. Historically, this state experienced an extended fire return interval due to low fuel loading, resulting in long-lived stable salt-desert shrub plant communities. These communities were sparsely vegetated and soil stability was primarily provided by surface rock fragments and microbiotic soil crust.

Community 1.1
Reference Plant Community

The plant community is dominated by cattle saltbush. Potential vegetative composition is about 15% grasses and 5% forbs and 80% shrubs. Approximate ground cover (basal and crown) is ±7 percent.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Shrub/Vine	224	359	448
Grass/Grasslike	43	67	84
Forb	13	22	28
Total	**280**	**448**	**560**

State 2
Invaded State

The invaded state is characterized by the presence of non-native annuals in the understory. Plant communities in this state function very similarly to the reference state. A biotic threshold has been crossed with the introduction of non-native annuals that cannot be easily removed from the system and have the potential to alter disturbance regimes significantly from their natural range of variation. Introduced annuals such as red brome, Mediterranean grass and redstem filaree have invaded the reference plant community and have become a component of the herbaceous cover. This invasion of non-natives is attributed to a combination of factors including: 1) surface disturbances, 2) changes in the kinds of animals and their grazing patterns, 3) drought, and 4) changes in fire history. These non-natives annuals are highly flammable and promote wildfires where fires historically have been infrequent.

Community 2.1
Invaded Plant Community 2.1

This plant community is characterized by the presence of non-natives in the understory. Functionally this plant community is similar to the reference plant community. Ecological function has been not compromised at this time, however, ecological resilience is reduced by the presence of the non-natives and may respond differently following a disturbance. Dominant shrubs persist throughout invasion by non-native annuals, however native grasses and forbs are at a competitive disadvantage and suffer reduced vigor and reproductive capacity.

Community 2.2
Invaded Plant Community 2.2

This plant community is characterized by reduced perennial vegetation and microbiotic soil crust and increased non-native biomass. Soil surface degradation has decreased aggregate stability and organic matter. Management should focus on reducing disturbance levels and protecting native vegetation to ensure a seed source in the future.

Community 2.3
Invaded Plant Community 2.3

This plant community is characterized by a short disturbance return interval. The soil surface is continually disturbed, decreasing stability of the soil surface. Non-native annuals take advantage of the increased availability of resources. The loss of perennial vegetation leads to decreased infiltration and increased runoff. Feedbacks contributing to the stability of this plant community include loss of functional and structural groups and the density, rate of spread, and dominance of non-natives. This plant community is identified as “at risk”. Management should focus on stabilizing the soil surface and protecting remaining native vegetation. If abusive land use practices continue it is possible that this plant community will cross on irreversible threshold into an alternative state 3.

Pathway 2.1a
Community 2.1 to 2.2

Further anthropogenic disturbance removes shrubs and microbiotic soil crust reducing soil stability.

Pathway 2.2a
Community 2.2 to 2.1

Removing surface disturbance, over the long term, allows woody perennials to recover contributing to increased ecological resilience.

Pathway 2.2b
Community 2.2 to 2.3

Continued disturbance removes cattle saltbush and other shrubby vegetation. Non-native annuals increase.

Pathway 2.3a
Community 2.3 to 2.2

Removing anthropogenic disturbance allows shrubby vegetation to reestablish on the site.

State 3
Eroded State

The Eroded State is characterized by increased bare ground and reduced soil stabilization. Prolonged soil surface disturbance has caused this site to cross an abiotic threshold. The loss of vegetation and soil crust has decreased the stability of the site. Ecological processes such as nutrient cycling and water storage are severely reduced.

Community 3.1
Plant Community 3.1

Vegetation is dominated by non-native annuals. Soil stability is severely reduced due to lack of perennial vegeation and active erosion easily occurs, even during typical rain and wind events.

Community 3.2
Plant Community 3.2

This plant community is characterized by a total loss of vegetation and soil crust, bare ground is dominant. Active soil erosion easily occurs.

Pathway 3.1a
Community 3.1 to 3.2

Continued surface disturbance.

Pathway 3.2a
Community 3.2 to 3.1

Non-native annuals germinate and establish even on a severely eroded site.

Transition T1
State 1 to 2

Introduction of non-natives due to anthropogenic impacts, including OHV use, dry land farming, changes in grazing animals and patterns, linear corridors, mining, military training operations and settlements, also drought and changes in fire history.

Transition T2
State 2 to 3

Continued soil surface disturbance, loss of perennial vegetation and soil crust.

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**			22–67	
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	22–67	–
2	**Secondary Perennial Grasses**			6–36	
	big galleta	PLRI3	*Pleuraphis rigida*	1–9	–
Forb					
3	**Perennial Forbs**			1–36	
	desert globemallow	SPAM2	*Sphaeralcea ambigua*	1–13	–
4	**Annual Forbs**			1–45	
	spineflower	CHORI2	*Chorizanthe*	1–13	–
	desert trumpet	ERIN4	*Eriogonum inflatum*	1–13	–
Shrub/Vine					
5	**Primary Shrubs**			269–336	
	cattle saltbush	ATPO	*Atriplex polycarpa*	269–336	–
6	**Secondary Shrubs**			22–90	
	burrobush	AMDU2	*Ambrosia dumosa*	1–22	–
	fourwing saltbush	ATCA2	*Atriplex canescens*	1–22	–
	desertholly	ATHY	*Atriplex hymenelytra*	1–22	–
	Torrey's saltbush	ATTO	*Atriplex torreyi*	1–22	–
	creosote bush	LATR2	*Larrea tridentata*	1–22	–
	desert-thorn	LYCIU	*Lycium*	1–22	–
	Mojave seablite	SUMO	*Suaeda moquinii*	1–22	–

Animal community

Livestock Interpretations:
This site is suited to livestock grazing. Grazing management should be keyed to maintaining shrub and perennial grass species. Indian ricegrass is a valuable forage species.
Indian ricegrass has good forage value for domestic sheep, cattle and horses. It supplies a source of green feed before most other native grasses have produced much new growth.
Cattle saltbush is one of the most palatable shrubs in the West. Its protein, fat, and carbohydrate levels are comparable to alfalfa. It provides nutritious forage for all classes of livestock. Palatability is rated as good for domestic sheep and domestic goats; fair for cattle; fair to good for horses in winter, poor for horses in other seasons.

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:
Cattle saltbush provides valuable habitat and year-round browse for wildlife. Cattle saltbush also provides browse and shelter for small mammals. Additionally, the browse provides a source of water for black-tailed jackrabbits in arid environments. Granivorous birds, including scaled and other quail species, grouse and gray partridge, consume the fruits. Wild ungulates, rodent and lagomorphs readily consume all aboveground portions of the plant. Palatability is rated good for deer, elk, pronghorn and bighorn sheep.

Hydrological functions

Runoff is very low to very high. Permeability is slow to rapid. Rills are none. Water flow patterns are often numerous

on lake plains and alluvial flats. Sparse shrub canopy and associated litter provide some protection from raindrop impact.

Other products

Indian ricegrass was traditionally eaten by some Native American peoples. The Paiutes used seed as a reserve food source.
Seeds of cattle saltbush and fourwing saltbush were reportedly ground into flour. Other uses for fourwing saltbush may have been the use of the ground meal as an emetic, use of ground flowers or roots moistened with saliva in treating ant bites, and addition of ashes to water for dyeing meal greenish-blue.

Other information

Indian ricegrass is well-suited for surface erosion control and desert revegetation although it is not highly effective in controlling sand movement.
Cattle saltbush is a recommended revegetation species. It has been planted in projects with varied goals, including soil stabilization and improvement or creation of habitat and forage for wildlife and those with constraints, such as the need for quick growth or revegetation sites with high salinity.

Type locality

Location 1: Clark County, NV	
Township/Range/Section	T23 S R64 E S31
General legal description	About ½ mile east of US Highway 95, Eldorado Valley area, Clark County, 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).

Kay, B.L., C.R. Brown and W.L. Graves. 1977. Desert Saltbush. Mojave Revegetation Notes. UC Davis. No. 18.

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.

Puigdefabregas, J. 2005. The role of vegetation patterns in structuring runoff and sediment fluxes in drylands. Earth Surface Processes and Landforms. 30:133-147.

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).

Approval

Sarah Quistberg, 2/24/2025

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)	P.Novak-Echenique
Contact for lead author	State Rangeland Management Specialist
Date	10/19/2011
Approved by	Sarah Quistberg
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** None

---

2. **Presence of water flow patterns:** Waterflow patterns are rare to common depending on site location relative to major inflow areas from higher landscape positions.

---

3. **Number and height of erosional pedestals or terracettes:** Pedestals are rare with occurrence typically limited to areas within waterflow patterns.

---

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare Ground up to 85%

---

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

---

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

---

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. Persistent litter (large woody material) will remain in place except large rainfall events.

---

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 1 to 4 on most soil textures found on this site. (To be field tested.)

---

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Structure of soil surface is medium platy or massive. Soil surface colors are pale brown and soils are typified by an ochric epipedon. Organic matter of the surface 2 to 3 inches is less than 1 percent.

---

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Sparse shrub canopy and associated litter break provide some protection from

raindrop impact.

---

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 none. Massive sub-soil horizons, argillic or natric horizons should not be interpreted as compaction.

---

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: Tall shrubs (cattle saltbush)

    Sub-dominant: associated low-statured, shrubs (white bursage, shadscale, etc.) > deep-rooted, cool season, perennial bunchgrasses >annual forbs> perennial forbs = shallow-rooted, warm-season, perennial bunchgrasses

    Other:

    Additional:

---

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 30% of total woody canopy; mature bunchgrasses commonly (<20%) have dead centers.

---

14. **Average percent litter cover (%) and depth (in):** Between plant interspaces and under canopy 10-15% and depth <0.25 inches

---

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** For normal or average growing season ± 400lbs/ac; Favorable years 500 lbs/ac and unfavorable years 250 lbs/ac

---

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 include red brome, Mediterranean grass, redstem filaree, Russian thistle and annual mustards.

---

17. **Perennial plant reproductive capability:** All functional groups should reproduce in average and above average growing season years. Little growth or reproduction occurs in drought years.
