USDA Natural Resources
Conservation Service

Ecological site R030XB127NV
SHALLOW SANDSTONE SLOPE 3-5 P.Z.

Last updated: 2/26/2025
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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 ecological site is found on hill and mountain landforms below 3000 feet elevation in the Colorado River watershed. Soils formed in colluvium and residuum derived from sedimentary or non-foliated metamorphic rock and have very shallow and shallow depth classes.

This is a group concept and provisional STM that also covers R030XA067NV.

Associated sites

R030XB017NV	**LIMY HILL 3-5 P.Z.**

Similar sites

R030XA002NV	**LIMESTONE HILL 5-7 P.Z.** PSFR minor species; EPTO major species
R030XB131NV	**CALCAREOUS PEDIMENT 3-5 P.Z.** silverleaf sunray important plant; occurs on upper fan piedmonts and rock pediments
R030XB002NV	**LOAMY HILL 5-7 P.Z.** PSFR minor species
R030XB003NV	**GYPSIC LOAM 5-7 P.Z.** ATCO rare to absent; LEFR2 and PEPA13 important shrubs w/PSFR
R030XB114NV	**SODIC LOAM 3-5 P.Z.** SUMO codominant plant; AMDU2 rare to absent
R030XB126NV	**GRAVELLY PEDIMENT 5-7 P.Z.** ATCO not the dominant shrub; PSFR-AMDU2-ATCO codominant
R030XB106NV	**GRAVELLY SLOPE 5-7 P.Z.** HIRI dominant plant; more productive site
R030XY049NV	**BREAKS 3-7 P.Z.** PRJU codominant plant
R030XY040NV	**SODIC TERRACE** ATCO-LYCIU codominant
R030XB006NV	**LOAMY 5-7 P.Z.** PSFR minor species; ARSP5 important plant
R030XB125NV	**CHANNERY HILL 3-5 P.Z.** AMDU2 codominant shrub
R030XB010NV	**LOAMY SLOPE 5-7 P.Z.** STSP3 dominant plant; more productive site
R030XB117NV	**GYPSIC SAND 3-5 P.Z.** ATCA2 and PEPA13 important shrubs
R030XB115NV	**GYPSIC SODIC LOAM 3-5 P.Z.** PEPA13 important shrub; soils have high amounts of gypsum

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Atriplex confertifolia* (2) *Psorothamnus fremontii*
Herbaceous	Not specified

Physiographic features

This site occurs on all exposures of low hills and pediments. Slopes range from 15 to over 50 percent. Elevations are 2000 to 3000 feet.

Table 2. Representative physiographic features

Landforms	(1) Hill (2) Pediment
Elevation	610–914 m
Slope	15–50%

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 moisture falling as rain from November to March. At least 30 percent of the total 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

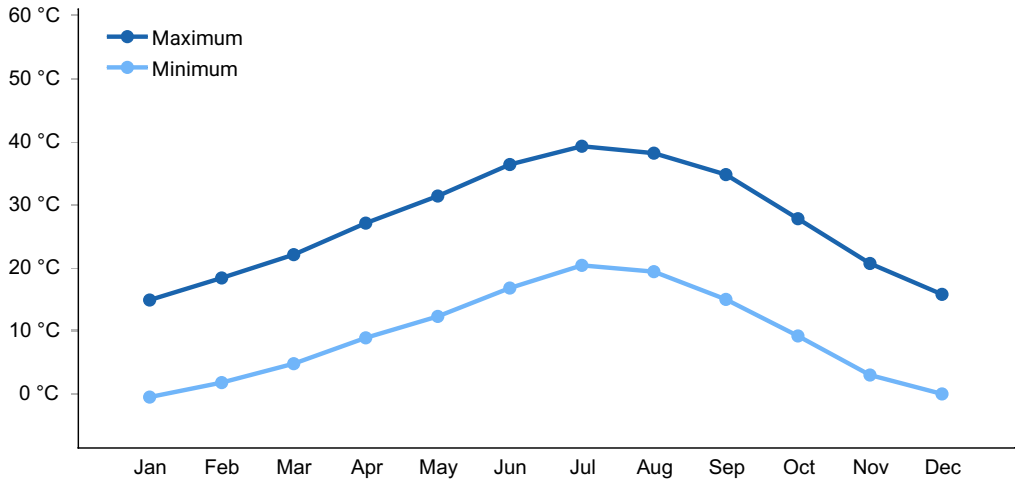


Figure 1. Monthly average minimum and maximum temperature

Influencing water features

There are no influencing water features associated with this site.

Soil features

The soil associated with this site are shallow and very shallow to bedrock and well drained. The soils have formed in residuum and colluvium from calcareous sandstone and limestone. These soils have very high runoff, moderate over very slow permeability and very low available water capacity.

Table 4. Representative soil features

Drainage class	Well drained
Permeability class	Moderate to very slow

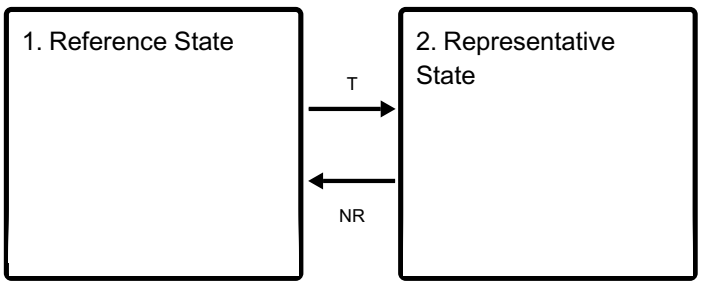
Ecological dynamics

As ecological condition deteriorates total shrub canopy decreases and large openings develop between individual shrubs. Creosotebush may increase. With a loss of perennial cover, non-native annual grasses and forbs often invade this site.

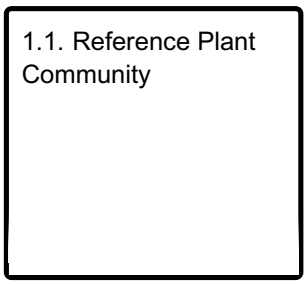
Fire Ecology:
Fires in the Mojave desert are infrequent and of low severity because production of annual and perennial herbs seldom provides a fuel load capable of sustaining fire. Fire generally kills white bursage. However, most white bursage plants burned because their canopies contained numerous small branches in proximity to herbaceous fuels. Shadscale communities are usually unaffected by fire because of low fuel loads, although a year of exceptionally heavy winter rains can generate fuels by producing a heavy stand of annual forbs and grasses. The mean fire return interval for shadscale communities range from 35 to 100 years. Increased presence of non-native annual grasses, such as cheatgrass, can alter fire regimes by increasing fire frequency under wet to near-normal summer moisture conditions. Fires in creosotebush scrub were an infrequent event in pre-settlement desert habitats, because fine fuels from winter annual plants were probably sparse, only occurring in large amounts during exceptionally wet winters. Fire kills many creosotebush. Creosotebush is poorly adapted to fire because of its limited sprouting ability. Creosotebush survives some fires that burn patchily or are of low severity.

State and transition model

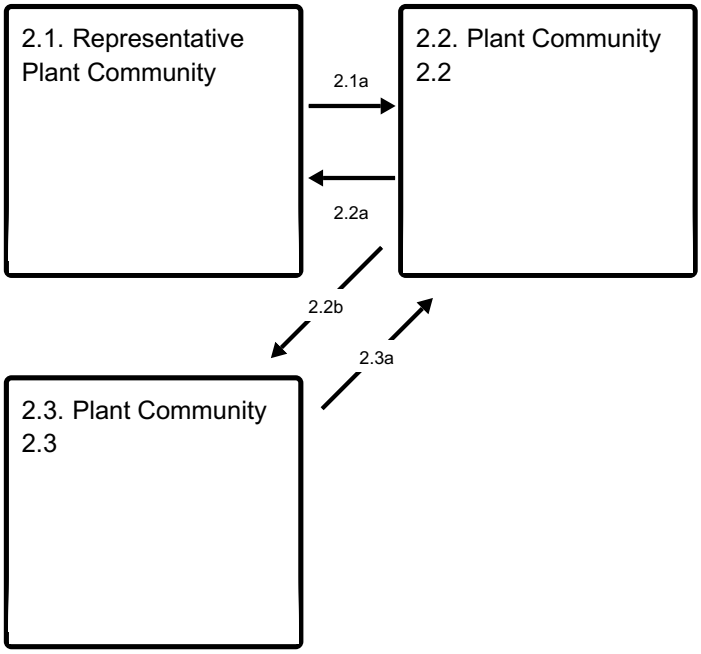
Ecosystem states



State 1 submodel, plant communities



State 2 submodel, plant communities



State 1
Reference State

The reference state is representative of the natural range of variability under pristine conditions. The plant community is shrub dominated with a minor component of perennial grasses. Plant community dynamics are primarily driven by long-term drought, insect outbreaks, and infrequent wildfire. Historically, this state experienced an extended fire return interval due to low fuel loading, which resulted in long-lived stable plant communities.

Community 1.1
Reference Plant Community

Shadscale and Fremont dalea dominate the reference plant community. Potential vegetative composition is about 5% annual and perennial grasses, 15% annual and perennial forbs, and 80% shrubs. Approximate ground cover (basal and crown) is less than 5 percent.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Shrub/Vine	45	135	224
Forb	8	25	41
Grass/Grasslike	3	9	15
Total	**56**	**169**	**280**

State 2
Representative State

The Representative 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, however, ecological resilience may be reduced by the presence of the non-natives. 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. These non-native annuals are highly flammable and promote wildfires where fires historically have been infrequent. Mature shrubs persists after this invasion by non-native annuals, however shrub seedlings and desirable grasses suffer reduced vigor and limited reproductive capability due to increased competition from non-natives.

Community 2.1
Representative Plant Community

This plant community is similar to the reference plant community with a trace of non-natives in the understory. Ecological function has been not compromised at this time. Ecological resilience is reduced by the presence of non-native species and this plant community phase will respond differently following a disturbance when compared to non-invaded plant communities.

Community 2.2
Plant Community 2.2

This plant community is characteristic of a post-disturbance plant community. It is initially dominated by herbaceous vegetation, woody perennials are increasing. Short lived and pioneering shrubs such as cattle saltbush, rabbit brush, California buckwheat, spiny hopsage, and burrobrush provide favorable microsites for the establishment of long lived shrub seedlings.

Community 2.3
Plant Community 2.3

This plant community is characterized by a short disturbance return interval. Non-native annuals take advantage of the increased availability of resources. This plant community is

identified as “at risk”. The loss of vegetative cover has reduced the ecological resistance and resilience. Management should be focused on limiting disturbances and protecting remnants of mature vegetation to ensure a seed source is available in the future.

Pathway 2.1a
Community 2.1 to 2.2

Frequent and repeated surface disturbances, wildfire, disease, insect attack, or any other type of incomplete vegetation removal.

Pathway 2.2a
Community 2.2 to 2.1

Absence from disturbance and natural regeneration over time.

Pathway 2.2b
Community 2.2 to 2.3

Frequent and repeated surface disturbances, wildfire, disease, insect attack, or any type of vegetation removal.

Pathway 2.3a
Community 2.3 to 2.2

Absence from disturbance and natural regeneration over time.

Transition T
State 1 to 2

Introduction of non-native species due to a combination of factors including; surface disturbance, changes in the kinds of animals and their grazing patterns, drought, changes in fire history or any other type of vegetation removal. Non-natives can alter disturbance regimes significantly from their natural or historic range and change ecological processes. Non-native annuals species have become naturalized in these systems creating an unlikely scenario to restore the site back to reference.

Restoration pathway NR
State 2 to 1

No Recovery (NR) - Non-native annuals species have become naturalized in these systems creating an unlikely scenario to restore the site back to reference.

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	**Perennial grasses**			1–13	
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	1–6	–
	purple threeawn	ARPU9	*Aristida purpurea*	1–6	–
	low woollygrass	DAPU7	*Dasyochloa pulchella*	1–6	–
	big galleta	PLRI3	*Pleuraphis rigida*	1–6	–
2	**Annual Grasses**			1–9	
Forb					
3	**Primary Perennial forbs**			3–13	
	desert globemallow	SPAM2	*Sphaeralcea ambigua*	3–13	–
4	**Perennial forbs**			1–9	
5	**Annual forbs**			1–9	
Shrub/Vine					
6	**Primary shrubs**			105–152	
	shadscale saltbush	ATCO	*Atriplex confertifolia*	84–101	–
	Fremont's dalea	PSFR	*Psorothamnus fremontii*	9–26	–
	burrobush	AMDU2	*Ambrosia dumosa*	9–17	–
	creosote bush	LATR2	*Larrea tridentata*	3–9	–
7	**Secondary shrubs**			3–26	
	Fremont's chaffbush	AMFR2	*Amphipappus fremontii*	2–9	–
	desertholly	ATHY	*Atriplex hymenelytra*	2–9	–
	cottontop cactus	ECPO2	*Echinocactus polycephalus*	2–9	–
	brittlebush	ENFA	*Encelia farinosa*	2–9	–
	Nevada jointfir	EPNE	*Ephedra nevadensis*	2–9	–
	white ratany	KRGR	*Krameria grayi*	2–9	–
	water jacket	LYAN	*Lycium andersonii*	2–9	–
	Mojave woodyaster	XYTO2	*Xylorhiza tortifolia*	2–9	–

Animal community

Livestock Interpretations:
This site has limited value for livestock grazing, due to the low forage production, steep slopes and stony surfaces. Shadscale provides good browse for domestic sheep and goats. Shadscale leaves and seeds are an important component of domestic sheep and cattle winter diets. Shadscale tends to be browse tolerant. Heavy grazing during the winter and/or spring reduces shadscale. Die-off can also occur during extended periods of high precipitation. Shadscale is tolerant of early spring light-intensity browsing. White bursage is of intermediate forage value. It is fair to good forage for horses and fair to poor for cattle and sheep. However, because there is often little other forage where white bursage grows, it is often highly valuable to browsing animals and is sensitive to browsing. Creosotebush is unpalatable to livestock. Consumption of creosotebush may be fatal to sheep.

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:
Shadscale is a valuable browse species providing a source of palatable, nutritious forage for a wide variety of wildlife. The fruits and leaves are a food source for deer, desert bighorn sheep and pronghorn antelope. White bursage is an important browse species for wildlife. Creosotebush is unpalatable to most browsing wildlife.

Hydrological functions

These soils have very high runoff, moderate over very slow permeability and very low available water capacity.

Other products

Seeds of shadscale were used by Native Americans for bread and mush. White bursage is a host for sandfood, a parasitic plant. Sandfood was a valuable food supply for Native Americans. Creosotebush has been highly valued for its medicinal properties by Native Americans. It has been used to treat at least 14 illnesses. Twigs and leaves may be boiled as tea, steamed, pounded into a powder, pressed into a poultice, or heated into an infusion.

Other information

White bursage may be used to revegetate disturbed sites in southwestern deserts. Once established, creosotebush may improve sites for annuals that grow under its canopy by trapping fine soil, organic matter, and symbiont propagules. It may also increase water

infiltration and storage.

Type locality

Location 1: Clark County, NV	
Township/Range/Section	T19S R64E S28
General legal description	Gale Hills area, east of Nellis Air Force Base; 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).

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).

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Contributors

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Approval

Sarah Quistberg, 2/26/2025

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	05/21/2025
Approved by	Sarah Quistberg
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:**

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2. **Presence of water flow patterns:**

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3. **Number and height of erosional pedestals or terracettes:**

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

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5. **Number of gullies and erosion associated with gullies:**

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6. **Extent of wind scoured, blowouts and/or depositional areas:**

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7. **Amount of litter movement (describe size and distance expected to travel):**

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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):**

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):**

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:**

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):**

12. **Functional/Structural Groups (list in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to):**

    Dominant:

    Sub-dominant:

    Other:

    Additional:

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):**

14. **Average percent litter cover (%) and depth (in):**

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):**

16. **Potential invasive (including noxious) species (native and non-native). List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought**

or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site:

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17. **Perennial plant reproductive capability:**
