USDA Natural Resources Conservation Service

Ecological site R030XB003NV
GYPSIC LOAM 5-7 P.Z.

Last updated: 3/11/2025
Accessed: 05/13/2025

General information

Provisional. A provisional ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model and enough information to identify the ecological site.

MLRA notes

Major Land Resource Area (MLRA): 030X–Mojave Basin and Range

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 occurs on hill and mountain slopes below 3800 feet elevation formed by uplifted sedimentary parent material high in gypsum. Soil depths are moderately deep to very deep with less than 15 percent of the soil surface covered by cobbles, stones and boulders.

Associated sites

R030XB005NV	**Arid Active Alluvial Fans**
R030XB019NV	**Eroded Fan Remnant Pavette 4-6 P.Z.**
R030XB028NV	**VALLEY WASH**

Similar sites

R030XB109NV	**GYPSIC BARREN 3-5 P.Z.** less productive site
R030XB117NV	**GYPSIC SAND 3-5 P.Z.** ACGR and ATCA2 important shrubs; LEFR2 rare to absent
R030XB118NV	**GYPSIC HILL 3-5 P.Z.** PESC4 dominant shrub; ENAR important on site
R030XA060NV	**GYPSIC LOAM 3-5 P.Z.** ATHY-SUAED codominant shrubs
R030XB079NV	**GYPSIC SLOPE 3-5 P.Z.** ATHY-SUAED codominant shrubs;less productive site
R030XB222AZ	**Gypsum Hills 6-9" p.z. Alkaline** Essentially the same ecological site concept as R030XB003NV.
R030XB026NV	**GYPSIC LOAM 3-5 P.Z.** ATHY codominant shrub; less productive site
R030XB115NV	**GYPSIC SODIC LOAM 3-5 P.Z.** ATCO dominant shrub; ENAR important on site

Table 1. Dominant plant species

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

Physiographic features

This site occurs on hills and pediments on all exposures. Slopes range from 2 to 30 percent, but slope gradients of 2 to 8 percent are most typical. Elevations are 1500 to about 3000 feet.

Table 2. Representative physiographic features

Landforms	(1) Hill (2) Pediment
Elevation	457–914 m

Slope	2–30%
Aspect	Aspect is not a significant factor

Climatic features

Average annual precipitation is 5 to 7 inches. Mean annual air temperature is 56 to 60 degrees F. The average growing season is about 180 to 210 days.

Table 3. Representative climatic features

Frost-free period (average)	210 days
Freeze-free period (average)	
Precipitation total (average)	178 mm

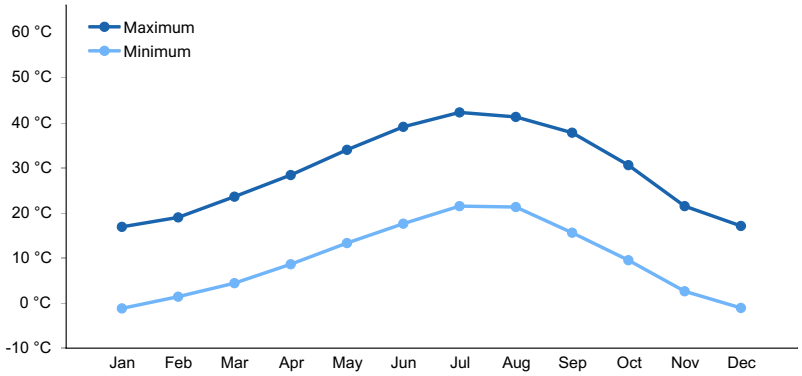


Figure 1. Monthly average minimum and maximum temperature

Influencing water features

There are no influencing water features associated with this site.

Soil features

The soils associated with this site are very high in gypsum. The soils are typically deep to the underlying material. Permeability is impermeable to slow and the soils are somewhat excessively drained. Available water capacity is very low to low and runoff is low. The soil series associated with this site include: Bracken.

Table 4. Representative soil features

Surface texture	(1) Gravelly fine sandy loam
Family particle size	(1) Loamy
Drainage class	Somewhat excessively drained
Permeability class	Slow
Soil depth	99–152 cm
Surface fragment cover <=3"	5–40%
Surface fragment cover >3"	1–2%
Available water capacity (0-101.6cm)	0.51–10.92 cm
Calcium carbonate equivalent (0-101.6cm)	0–10%
Electrical conductivity (0-101.6cm)	0–4 mmhos/cm

Sodium adsorption ratio (0-101.6cm)	0–5
Soil reaction (1:1 water) (0-101.6cm)	7.4–8.4
Subsurface fragment volume <=3" (Depth not specified)	5–25%
Subsurface fragment volume >3" (Depth not specified)	1–2%

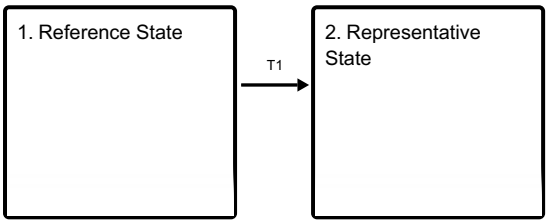
Ecological dynamics

As ecological condition deteriorates, total shrub canopy decreases and large openings develop between individual shrubs. Few introduced annual forbs or grasses will invade this site.

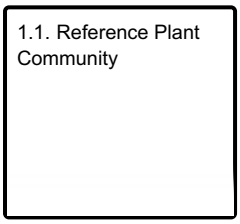
Fire Ecology:
Following fire, Virgin River encelia depends on off-site seed rather than on-site sprouts for regeneration. White ratany is partially or completely top-killed by fire. White ratany resprouts from the root crown after fire. Torrey's ephedra has medium fire tolerance and is similar to Nevada ephedra.

State and transition model

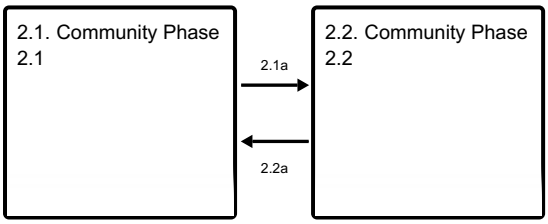
Ecosystem states



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 shadscale plant communities.

Community 1.1
Reference Plant Community

The reference plant community is dominated by Fremont dalea, desert pepperweed, Parry's sandpaper plant, and Virgin River encelia. Torrey's ephedra and white ratany are other important species associated with this site. Potential vegetative composition is about 95% shrubs and 5% native forbs and grasses. Approximate ground cover (basal and crown) is less than 15 percent (˜10%).

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Shrub/Vine	252	353	504
Grass/Grasslike	15	20	28
Forb	13	19	28
Total	**280**	**392**	**560**

State 2
Representative State

Introduced annuals such as red brome, schismus and redstem stork's bill have invaded the reference plant community and have become a dominant 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. PSFR and LEFR2 would persist after this invasion by non-native annuals, but the other shrubs and desirable grasses would either be unsuccessful in competing with the non-natives or removed from the system. The threshold that is crossed, is the introduction of non-native annuals that cannot be removed from the system and will alter disturbance regimes significantly from their natural or historic range of disturbances.

Community 2.1
Community Phase 2.1

This plant community is characterized by the presence of non-native species. Species composition and ecological function is similar to the reference plant community. However, ecological resilience may be reduced by the presence of non-natives. This plant community responds differently following disturbance, when compared to non-invaded plant communities.

Community 2.2
Community Phase 2.2

This plant community is characteristic of a post-disturbance plant community. Initially herbaceous biomass increases, which may or may not be dominated by non-native annuals. Herbaceous cover can create a continuous fuel load across the soil surface, increasing the chance of fire to impact this site. Sprouting shrubs quickly recover and serve as nurse plants for other shrub seedlings.

Pathway 2.1a
Community 2.1 to 2.2

Prolonged drought, wildfire, insect/disease attack or other localized disturbance.

Pathway 2.2a
Community 2.2 to 2.1

Absence from disturbance and natural regeneration over time.

Transition T1
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.

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	**Secondary Perennial grasses**			1–20	
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	2–8	–
	desert needlegrass	ACSP12	*Achnatherum speciosum*	2–8	–
	big galleta	PLRI3	*Pleuraphis rigida*	2–8	–
Forb					
2	**Perennial forbs**			1–20	
	globemallow	SPHAE	*Sphaeralcea*	2–12	–
3	**Annual forbs**			1–20	
Shrub/Vine					
4	**Primary shrubs**			232–476	
	desert pepperweed	LEFR2	*Lepidium fremontii*	59–138	–
	Fremont's dalea	PSFR	*Psorothamnus fremontii*	98–138	–
	Parry's sandpaper plant	PEPA13	*Petalonyx parryi*	39–78	–
	Virgin River brittlebush	ENVI	*Encelia virginensis*	20–59	–
	Torrey's jointfir	EPTO	*Ephedra torreyana*	8–31	–
	white ratany	KRGR	*Krameria grayi*	8–31	–
5	**Secondary shrubs**			8–39	
	catclaw acacia	ACGR	*Acacia greggii*	4–12	–
	burrobush	AMDU2	*Ambrosia dumosa*	4–12	–
	burrobrush	HYSA	*Hymenoclea salsola*	4–12	–
	creosote bush	LATR2	*Larrea tridentata*	4–12	–
	desert-thorn	LYCIU	*Lycium*	4–12	–
	Mexican bladdersage	SAME	*Salazaria mexicana*	4–12	–
	Joshua tree	YUBR	*Yucca brevifolia*	4–12	–

Animal community

Livestock Interpretations:
This site is suitable for livestock grazing. Cattle appear to occasionally browse desert pepperweed, but there seems to be no studies of its palatability. Virgin River encelia is important to the desert tortoise as a source of succulent forage in periods of low moisture. Abusive grazing practices have reduced or eliminated winterfat on some areas even though it is fairly resistant to browsing. Grazing season has more influence on winterfat than grazing intensity. Early winter grazing may actually be beneficial. Torrey’s ephedra is important winter forage for cattle and 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:
Virgin River encelia is important to the desert tortoise as a source of succulent forage in periods of low moisture. Encelia is a browse species of desert mule deer and desert bighorn Sheep. It is one of the most important browse

species for mule deer and desert bighorn sheep. Black-tailed jack rabbits rely almost exclusively on white ratany during the winter. Torrey's ephedra is an important browse species for big game. Torrey's ephedra is moderately palatable to many big game species, especially as winter browse.

Hydrological functions

Runoff is low. Permeability is impermeable to slow.

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 and southern Nye counties.

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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Approval

Kendra Moseley, 3/11/2025

Rangeland health reference sheet

Interpreting Indicators of Rangeland Health is a qualitative assessment protocol used to determine ecosystem condition based on benchmark characteristics described in the Reference Sheet. A suite of 17 (or more) indicators are typically considered in an assessment. The ecological site(s) representative of an assessment location must be known prior to applying the protocol and must be verified based on soils and climate. Current plant community cannot be used to identify the ecological site.

Author(s)/participant(s)	
Contact for lead author	
Date	05/13/2025
Approved by	Kendra Moseley
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):**

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

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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):**

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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:

    Sub-dominant:

Other:

Additional:

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

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

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

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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:**

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17. **Perennial plant reproductive capability:**
