Ecological site R030XB118NV
GYPSIC HILL 3-5 P.Z.

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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 3800 feet elevation. Soils are shallow and have a gypsic diagnostic subsurface horizon. Rock fragments larger than 3 inches diameter cover less than 15 percent of the soil surface. This is a group concept and provisional STM that also covers R030XB026NV.

Associated sites

R030XB019NV	**Eroded Fan Remnant Pavette 4-6 P.Z.**

Similar sites

R030XB079NV	**GYPSIC SLOPE 3-5 P.Z.** ATHY-SUAED codominant shrubs
R030XA123AZ	**Gypsum Hills 3-6" p.z.** Essentially the same ecological site concept.
R030XB026NV	**GYPSIC LOAM 3-5 P.Z.** Essentially the same ecological site concept.
R030XB208AZ	**Gypsum Hills 6-9" p.z.** Essentially the same ecological site concept.
R030XB003NV	**GYPSIC LOAM 5-7 P.Z.** LEFR2 important shrub; more productive site
R030XB038NV	**GRAVELLY PEDIMENT 3-5 P.Z.** ATHY dominant shrub; more productive site
R030XB109NV	**GYPSIC BARREN 3-5 P.Z.** PESC4 rare to absent; PSFR-PEPA13-EPTO codominant shrubs
R030XB115NV	**GYPSIC SODIC LOAM 3-5 P.Z.** ATCO dominant shrub; ENAR important on site
R030XB117NV	**GYPSIC SAND 3-5 P.Z.** PESC4 rare to absent; PSFR dominant plant

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Peucephyllum schottii*

Herbaceous	Not specified

Physiographic features

This site occurs on low hills and highly dissected pediments on all exposures. Slopes range from 8 to 50 percent, but slope gradients of 8 to 30 percent are most typical. Elevations are 1200 to about 3100 feet.

Table 2. Representative physiographic features

Landforms	(1) Hill (2) Pediment
Elevation	370 – 950 m
Slope	10 – 50 %

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 5 inches. Mean annual air temperature is 70 to 75 degrees F. The average growing season is about 300 to 360 days.

Table 3 Representative climatic features

Frost-free period (average)	360 days
Freeze-free period (average)	
Precipitation total (average)	130 mm

Influencing water features

There are no influencing water features associated with this site.

Soil features

The soils associated with this site are shallow and somewhat excessively drained. The soils are formed in residuum derived from gypsiferous sedimentary rocks. Gypsum content of the upper 20 inches of the soils averages 15 to 25 percent by weight of the less than 2 millimeter fraction. Water intake rates are very slow, available water capacity is low, and runoff is high to very high. Soil series correlated to this site include Guardian. Depth of the gypsic horizon is 2 to 19 inches.

Table 4. Representative soil features

Parent material	(1) Residuum – rock gypsum

Surface texture	(1) Gravelly fine sandy loam (2) Gravelly sandy loam
Family particle size	(1) Loamy
Drainage class	Somewhat excessively drained
Permeability class	Very slow
Soil depth	40 – 50 cm
Surface fragment cover <=3"	10 – 20 %
Surface fragment cover >3"	Not specified
Available water capacity (0-101.6cm)	6.35 – 6.6 cm
Calcium carbonate equivalent (0-101.6cm)	0 – 10 %
Electrical conductivity (0-101.6cm)	Not specified
Sodium adsorption ratio (0-101.6cm)	Not specified
Soil reaction (1:1 water) (0-101.6cm)	7.4 – 8.4
Subsurface fragment volume <=3" (Depth not specified)	10 – 20 %
Subsurface fragment volume >3" (Depth not specified)	Not specified

Ecological dynamics

The potential native plant community for this ecological site is dominated by pygmycedar and other drought tolerant shrubs. Pygmycedar is a native, erect, highly branched, evergreen shrub commonly found in rocky washes and hillsides in the Mojave Desert. Parry's sandpaper plant is an evergreen shrub with rough-pubescent leaves. Silverleaf sunray is considered a rare plant and is listed as a special status species by the BLM in Nevada. It commonly grows in dry, open, relatively barren areas with gypsic soils, volcanic gravel or loose sands. The dominant species on this site are largely understudied. There is limited knowledge of the ecology of pygmycedar or Parry's sandpaper plant providing ample opportunities for future research endeavors.

The slopes are moderately steep to steep and soil erosion is an important ecological driver. The high cover of biological soil crusts are important for soil stabilization, water infiltration, seed germination, and increased organic matter (USGS 2006). Gypsic soils are generally weakly aggregated which can result in serious erosion. The severity of the erosion is dependent on the gypsum content (FAO 1990). Gypsiferous soils are generally structureless, low in organic matter, and may become unstable in water making them a poor medium for plant growth. Gypsic horizons, however, can also be strongly aggregated and form hard crusts that control erosion and sometimes impede the downward movement of water and extension of roots (FAO 1990). The continuous petrogypsic horizon plays a significant role in plant community dynamics by increasing the available water holding capacity of the soil.

Gypsic crusts are common across this ecological site. Crusts form in the soils due to the lack of sufficient water to remove soluble salts (Dong et al. 2007). Microtopography created by crusts can form microcatchments for water, positively influencing soil moisture, causing suspended sediment to settle out, as well as, reinforcing the formation of soil crusts. Interactions between microboitic crusts and vascular plants are complex. They can be mutualistic, competitive, or neutral (Williams 1994). Soil crusts can encourage seedling establishment and survival, due to increased water holding capacity and availability of macronutrients (Belnap 1995). Crusts can also act as a competitor. Seeds may require morphological adaptations in order to penetrate and establish in well developed microbiotic crusts (Williams 1994). This relationship will help keep non-natives out of the system, under undisturbed conditions, while native plants will thrive because they have evolutionary adaptations to persist in this environment.

The combination of relatively steep slopes and gypsic soils makes this ecological site highly susceptible to erosion. Soils with high gypsum content lack plasticity, cohesion, aggregation and can become unstable in water (FAO 1990). Roads and trails resulting from heavy human traffic create areas where surface water accumulates, potentially causing severe down cutting. Serious erosion exposes the root crown can lead to wide spread mortality.

Historically, this ecological site experienced infrequent disturbances due to sparse vegetative cover insufficient for carrying fire or supporting grazers.

State and transition model

Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
Grass/Grasslike					
1	**Perennial Grasses**			1-7	
2	**Annual Grasses**			1-3	
Forb					
3	**Primary Perennial Forbs**			15-49	
	silverleaf sunray	ENAR	*Enceliopsis argophylla*	15-49	–
4	**Secondary Perennial Forbs**			1-7	
5	**Annual Forbs**			1-7	
Shrub/Vine					
6	**Primary Shrubs**			64-141	
	Schott's pygmycedar	PESC4	*Peucephyllum schottii*	49-71	–
	Parry's sandpaper plant	PEPA13	*Petalonyx parryi*	7-35	–
	Fremont's dalea	PSFR	*Psorothamnus fremontii*	1-21	–
	woody crinklemat	TICA3	*Tiquilia canescens*	7-15	–
7	**Secondary Shrubs**			7-21	
	catclaw acacia	ACGR	*Acacia greggii*	1-7	–
	burrobush	AMDU2	*Ambrosia dumosa*	1-7	–

	desertholly	ATHY	*Atriplex hymenelytra*	1-7	–
	Torrey's jointfir	EPTO	*Ephedra torreyana*	1-7	–
	creosote bush	LATR2	*Larrea tridentata*	1-7	–

Table 6. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 7. Community 2.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 8. Community 3.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 9. Community 3.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Animal community

Livestock Interpretations: This site has limited value for livestock grazing, due to the low forage production and steep slopes. 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.

Hydrological functions

Runoff is high to very high. Permeability is very slow. Hydrologic soil group is D.

Type locality

Location 1: Clark County, NV	
Township/Range/Section	T20S R67E S14
UTM zone	N
UTM northing	408805
UTM easting	728025
Latitude	36° 11′ 50″
Longitude	114° 27′ 50″
General legal description	About 1 mile west of Miners Cove along the west side of the Overton Arm of Lake Mead, Lake Mead National Recreation Area, Clark County, Nevada.

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Approval

Kendra Moseley, 3/10/2025

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	07/21/2010
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** Rills are few to common.

2. **Presence of water flow patterns:** Water flow patterns are few.

3. **Number and height of erosional pedestals or terracettes:** Pedestals are none to rare with occurrence typically limited to areas within water flow patterns.

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare Ground 10-20%.

5. **Number of gullies and erosion associated with gullies:** Gullies are 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 or rapid snowmelt events. Persistent litter (large woody material) will remain in place except during catastrophic 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 3 on the coarse 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):** Surface soil structure is typically moderate thin platy. Soil surface colors are light 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, associated litter, and microbiotic crust break raindrop impact.

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** None. Platy or massive sub-surface horizons or gypsic horizons are not to be interpreted as compacted layers.

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

    Sub-dominant: perennial forbs > perennial bunchgrasses = annual forbs > annual grasses

    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; mature bunchgrasses commonly (±15%) have dead centers.**

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14. **Average percent litter cover (%) and depth (in):** **Between plant interspaces (Trace)**

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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 ±125lbs/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:** **Invaders on this site include annuals such as red brome, red-stem filaree and Mediterranean grass.**

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17. **Perennial plant reproductive capability:** **All functional groups should reproduce in average growing season years.**
