Ecological site R030XB110NV
TABLELAND 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 within the hill and mountain landscape on mesas and plateaus below 3800 feet elevation. Soils are derived from sedimentary materials. Rock fragments over 3 inches diameter as well as bedrock cover more than 15 percent of the soil surface. This is a group concept and provisional STM that also covers R030XB101NV.

Associated sites

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

Similar sites

R030XB096NV	**GRAVELLY SAND 3-5 P.Z.** More productive site; occurs on thin sand sheets
R030XB101NV	**TABLELAND 5-7 P.Z.** MOUT dominant shrub; TICA3 minor shrub

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Tiquilia canescens* (2) *Psilostrophe cooperi*
Herbaceous	Not specified

Physiographic features

This site occurs on flat-topped summits of mesas and plateaus overlying tertiary sediments. Slopes range from 0 to 30 percent but slope gradients from 0 to 4 percent are most typical. Elevations are 1300 to 2500 feet.

Table 2. Representative physiographic features

Landforms	(1) Mesa (2) Hill (3) Plateau
Elevation	400 – 760 m
Slope	0 – 30 %

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 7 inches. Mean annual air temperature is 64 to 77 degrees F. The average growing season is about 240 to 350 days.

Table 3 Representative climatic features

Frost-free period (average)	350 days

Freeze-free period (average)	
Precipitation total (average)	180 mm

Influencing water features

There are no influencing water features associated with this site.

Soil features

The soil associated with this site are shallow to very shallow and moderately coarse to medium textured. The soil surface has a cover of gravel-sized, broken, hardpan fragments ranging from 45 to 60 percent. Water intake rates are moderately slow to moderately rapid and available water capacity is very low. Runoff is very high and the soils are well drained to somewhat excessively drained. Soil series associated with this site include Calwash and Teebar.

Table 4. Representative soil features

Parent material	(1) Alluvium – limestone
Surface texture	(1) Very gravelly fine sandy loam (2) Very cobbly fine sandy loam
Family particle size	(1) Loamy
Drainage class	Well drained to somewhat excessively drained
Permeability class	Moderately slow to moderately rapid
Soil depth	10 – 50 cm
Surface fragment cover <=3"	30 – 70 %
Surface fragment cover >3"	0 – 70 %
Available water capacity (0-101.6cm)	1.27 – 2.79 cm
Calcium carbonate equivalent (0-101.6cm)	20 – 50 %

Electrical conductivity (0-101.6cm)	Not specified
Sodium adsorption ratio (0-101.6cm)	0 – 10
Soil reaction (1:1 water) (0-101.6cm)	7.9 – 10
Subsurface fragment volume <=3" (Depth not specified)	30 – 50 %
Subsurface fragment volume >3" (Depth not specified)	0 – 20 %

Ecological dynamics

The soil surface of this ecological site is heavily armored with gravel sized broken hardpan fragments which functions much like desert pavement.

In this system, the clast cover is the dominant control of water and sediment distribution (Wood et al. 2005). Depth of soil water movement is strongly tied to surface clast distribution. Due to the high percentage of surface clasts and fine grained materials of the vesicular horizon, desert pavement sites experience minimal infiltration. Runoff is increased by this process, leading to maximum infiltration and deeper leaching when surface water reaches islands of vegetation on the landscape (Graham et al. 2008). Soils under desert pavements also have high concentrations of nitrate near the surface (Graham et al. 2008). These accumulations are largely a function of desert pavement hydrology. Since infiltration is severely impeded, soils underneath desert pavements experience minimum leaching and salts in the upper soil profile remain there. Nitrate is highly soluble, therefore it is quickly used by plants and excess nitrate is promptly leached away in moist soils. Researchers assume the high salinity and lack of available moisture beneath desert pavement prevent plant roots from accessing the nitrate stored there (Graham et al. 2008).

Desert pavement formed as a function of eolian erosion and deposition, therefore the site is not vulnerable to wind erosion if surface clasts are intact. If disturbed, the fine grained materials of the vesicular horizon will be released into the air potentially causing ecological and health problems (Yonovitz and Drohan 2009). Anthropogenic disturbances disrupt the pavement surface and increase erosion. However, studies have shown that soil functions related to pore morphology are not significantly affected by disturbance. Characteristics of the vesicular horizon, including the non-connected nature of the pores and its effect on restricting infiltration are able to rapidly recover to pre-disturbance conditions (Yonovits and Droham 2009). The implications of this are that the increased availability of nitrogen will not facilitate increase vegetative growth because infiltration will continue to be impeded even following disturbance.

Well-developed desert pavements can require thousands of years to form (Graham et al. 2008). Even at maturity, pavement surfaces are characterized by a dynamic stability. Stone mobility is an important aspect of pavement longevity. Disturbances can also be repaired by this process if not too extensive (Haff and Werner 1996). Natural mechanisms influencing stone mobility include animal movement and running water.

Fires in the Mojave Desert are infrequent and of patchy due to low fuel loading. Fire generally kills white bursage. However, most white bursage plants burned because their canopies contained numerous small branches in proximity to herbaceous fuels. Torrey’s ephedra has medium fire tolerance and is similar to Nevada ephedra. Nevada ephedra is top-killed by fire. Underground regenerative structures commonly survive when aboveground vegetation is consumed by fire. Nevada ephedra generally sprouts after fire damages aboveground vegetation and may increase in plant cover. 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. Range ratany is top-killed by fire. Range ratany resprouts from the root crown

after fire. Spiny menodora often survives fire because its foliage does not readily burn.

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**			1-9	
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	1-6	–
	threeawn	ARIST	*Aristida*	1-6	–
	low woollygrass	DAPU7	*Dasyochloa pulchella*	1-6	–
	big galleta	PLRI3	*Pleuraphis rigida*	1-6	–
	sand dropseed	SPCR	*Sporobolus cryptandrus*	1-6	–
2	**Annual Grasses**			1-9	
Forb					
3	**Perennial Forbs**			1-6	
	desert globemallow	SPAM2	*Sphaeralcea ambigua*	1-6	–
4	**Annual Forbs**			1-17	
Shrub/Vine					
5	**Primary Shrubs**			80-184	
	woody crinklemat	TICA3	*Tiquilia canescens*	41-59	–
	whitestem paperflower	PSCO2	*Psilostrophe cooperi*	9-34	–
	burrobush	AMDU2	*Ambrosia dumosa*	3-17	–
	creosote bush	LATR2	*Larrea tridentata*	9-17	–
	Torrey's jointfir	EPTO	*Ephedra torreyana*	4-13	–
	Nevada jointfir	EPNE	*Ephedra nevadensis*	4-12	–
	spiny menodora	MESP2	*Menodora spinescens*	3-9	–
	ocotillo	FOSP2	*Fouquieria splendens*	1-6	–
6	**Secondary Shrubs**			1-17	
	catclaw acacia	ACGR	*Acacia greggii*	2-6	–
	desert-thorn	LYCIU	*Lycium*	2-6	–
	Mojave yucca	YUSC2	*Yucca schidigera*	2-6	–

Table 6. Community 2.1 plant community composition

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

Table 7. Community 3.1 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. 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. Torrey’s ephedra is important winter forage for cattle and sheep. Torrey’s ephedra is moderately palatable to all domestic livestock especially as winter browse. Nevada ephedra is important winter range browse for domestic cattle, sheep and goats. Nevada ephedra is usually grazed heavily and seems to be perfectly safe for grazing livestock since it induces neither toxicity in ewes or cows, nor congenital deformities in lambs. Creosotebush is unpalatable to livestock. Consumption of creosotebush may be fatal to sheep. Range ratany is an important forage species for all classes of livestock. Palatability of range ratany is rated fair to good for cattle and sheep. Cattle will graze the stems of spiny menodora in the spring before the stems become woody and spiny. Spiny menodora has lower palatability than the other shrubs

but is consumed during early spring before spines mature. Ocotillo has no forage value for livestock. Ocotillo increases under protection from livestock grazing. Ocotillo produces tannins which may help in its defense against herbivory. 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: White bursage is an important browse species for wildlife. 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. Mule deer, bighorn sheep, and pronghorn browse Nevada ephedra, especially in spring and late summer when new growth is available. Mountain quail eat Ephedra seeds. Creosotebush is unpalatable to most browsing wildlife. Range ratany is an important forage species for deer. Mule deer browse range ratany year-long with seasonal peaks. Mule deer peak use is from February to April and from August to October. Elk will graze the stems of spiny menodora in the spring before the stems become woody and spiny. Habitats dominated or codominated by ocotillo are important to mule deer. Ocotillo is eaten by desert bighorn sheep.

Hydrological functions

Water intake rates are moderately slow to moderately rapid and available water capacity is very low. Runoff is very high.

Recreational uses

Aesthetic value is derived from the diverse floral and faunal composition and the colorful flowering of wild flowers and shrubs during the spring and early summer. This site offers rewarding opportunities to photographers and for nature study. This site is used for camping and hiking and has potential for upland and big game hunting.

Other products

White bursage is a host for sandfood, a parasitic plant. Sandfood was a valuable food supply for Native Americans. Some Native American tribes steeped the twigs and drank the tea as a general beverage. 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. The Papago Indians used an infusion of the twigs externally for treating sore eyes and internally for dysentery. The roots provided them with a red dye for wool and other materials. The dye was also used as an ink.

Other information

White bursage may be used to revegetate disturbed sites in southwestern deserts and is a nurse plant for creosotebush. 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. Nevada ephedra is useful for erosion control.

Type locality

Location 1: Clark County, NV	
Township/Range/Section	T22S R70E S11
General legal description	Northeast of Temple Bar, Clark County, Nevada. This site also occurs in Mesa tops near Lake Mead and along Colorado River, Clark County, Nevada.

Other references

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

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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)	P Novak-Echenique
Contact for lead author	State Rangeland Management Specialist
Date	07/16/2010
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** **Rills are none to rare. Rock fragments armor the soil surface against erosion.**

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2. **Presence of water flow patterns:** **Water flow patterns are none to rare. Rock fragments armor the soils preventing water flow patterns from developing.**

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3. **Number and height of erosional pedestals or terracettes:** **Pedestals and terracettes 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 variable (15-40%) depending on surface rock fragments.**

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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):** Litter typically remains in place. Fine litter (foliage from grasses and annual & perennial forbs) may move the 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.

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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 and varies depending on canopy cover. (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):** Soil surface structure is typically moderate medium to moderate thick platy. Soil surface colors are light and the soils have an ochric epipedon. Organic matter of the surface 2 to 3 inches is less than 1 percent.

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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 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):** None

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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

    Sub-dominant: perennial forbs > annual forbs > perennial grasses > 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 are common and standing dead shrub canopy material may be as much as 25% of total woody canopy.

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14. **Average percent litter cover (%) and depth (in):** Between plant interspaces (5%) and depth (<¼-inch). Litter is concentrated under shrubs and generally stays in place.

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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 ~150lbs/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:** **Red brome, red-stem filaree, mustards, and Mediterranean grass are invaders on this site.**

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17. **Perennial plant reproductive capability:** **All functional groups should reproduce in normal and above-normal rainfall years.**
