Ecological site R030XA046CA
Steep Granitic Slope
5-7" p.z.

Last updated: 2/18/2025
Accessed: 09/16/2026

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 Western Mojave Land Resource Unit (XA)

LRU notes

The Mojave Desert is currently divided into 4 Land Resource Units (LRUs). This ecological site is within the arid portions of the Mojave where precipitation primarily occurs during the winter months (Hereford et. al 2004). The lack of summer precipitation as well as cooler temperatures allows cool season species to occupy sites at lower elevations than they do in the Eastern Mojave. For example, sandberg bluegrass, winterfat and spiny hopsage are common at lower elevations in the Western Mojave than they are in the Eastern Mojave. Warm season species like big galleta rarely occur in the Western Mojave. The Arid Western Mojave LRU is designated by the 'XA' symbol within the ecological site ID and is roughly equivalent to Western Mojave Basins and Western Mojave Low Ranges and Arid Footslopes of EPA Level IV Ecoregions. Elevations range from 1650 to 4300 feet and precipitation is between 4 to 8 inches per year. The Arid Western Mojave LRU is distinguished from the Arid Eastern Mojave (XB) by the lack of summer precipitation which excludes many warm season plant species from occurring in this LRU. Vegetation includes creosote bush, rabbitbrush, shadscale saltbush, spiny hopsage, winterfat, Nevada jointfir, and Joshua tree. At the upper elevations of the LRU, plant production and diversity are greater and blackbrush is a common dominant shrub. The Arid Western Mojave LRU generally lacks the diversity of yucca, cacti and warm season species found in the Arid Eastern Mojave.

Ecological site concept

The Steep Granitic Slope 5-7" p.z. ecological site is found among the mountains and hills landscape on intrusive igneous material such as granodiorite between 1600 and 3000 feet elevation. Soils are sandy and very shallow to moderately deep. The central concept for this ecological site is within the Soil Surveys of Kern County, California, Southeastern Part (CA670) and Mojave Desert Area, Northwest Part, California on the Cutterbank components which are over 50% slope in the Cutterbank association, 15 to 60 percent slopes map unit.

Associated sites

R030XA054NV	**Limy Hill 5-7 P.Z.** R030XA054NV Limy Hill 5-7
R030XA050CA	**Volcanic Slope 5-7** R030XA050CA Volcanic Slope 5-7
R030XA042CA	**Sandy Wash** R030XA042CA Sandy Wash occurs in draingeways between hills. The major species is California broomsage (Lepidospartum squamatum).
R030XA047CA	**Shallow Granitic Slope 5-7" p.z.** R030XA047CA Shallow Granitic Slope 5-7

Similar sites

R030XA054NV	**Limy Hill 5-7 P.Z.** R030XA054NV Limy Hill 5-7

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Ambrosia dumosa* (2) *Psorothamnus arborescens*
Herbaceous	Not specified

Physiographic features

This ecological site is found on the backslopes of relict, uplifted lakebeds and on backslopes of hills. Slopes range from 30 to 75 percent.

Table 2. Representative physiographic features

Landforms	(1) Lakebed (2) Hill
Flooding frequency	None
Ponding frequency	None

Elevation	670 – 1,100 m
Slope	30 – 80 %
Aspect	Aspect is not a significant factor

Climatic features

The Mojave Desert experiences clear, dry conditions for a majority of the year. Winter temperatures are mild, summer temperatures are hot, and seasonal and diurnal temperature fluctuations are large. Monthly minimum temperature averages range from 30 to 80 degrees F (-1 to 27 degrees C). Monthly maximum temperature averages range from 60 to 110 degrees F (16 to 43 degrees C) (CSU 2002).

Average annual rainfall is between 2 and 8 inches (50 to 205 millimeters) (USDA 2006). Snowfall is more common at elevations above 4000 feet (1220 meters), but it may not occur every year (WRCC 2002). The Mojave Desert receives precipitation from two sources. Precipitation falls primarily in the winter as a result of storms originating in the northern Pacific Ocean. The Sierra Nevada and Transverse Ranges create a rain shadow effect, causing little precipitation to reach the Mojave Desert. Sporadic rainfall occurs during the summer as a result of convection storms formed when moisture from the Gulf of Mexico or Gulf of California moves into the region. Summer rainfall is more common and has a greater influence on soil moisture in the eastern Mojave Desert.

Windy conditions are also common in the Mojave Desert, particularly in the west and central Mojave Desert. Spring is typically the windiest season, with winds averaging 10-15 miles per hour (WRCC 2002). Winds in excess of 25 miles per hour and gusts in excess of 50 miles per hour are not uncommon (CSU 2002).

Although half of the Jawbone-Butterbredt ACEC Soil Survey is in the Mojave Desert (MLRA 30), the western and northwestern areas of the survey transition into the Southern Nevada Basin and Range (MLRA 29). As the Mojave Desert transitions into the Southern Nevada Basin and Range, the temperature range generally becomes cooler (WRCC 2002). Precipitation as rain and as snow also increases (USDA 2006). This survey area has a wide range of precipitation due to its location. Where the Mojave Desert influences are stronger, average annual precipitation ranges from 5 to 7 inches (127 to 178 millimeters). Where the Southern Nevada Basin and Range influences are stronger, average annual precipitation commonly ranges from 7 to 9 inches (178 to 229 millimeters), and may range up to 12 inches (305 millimeters) annually (WRCC 2002). At elevations above 4000 feet (1370 meters), average annual snowfall may reach 20 inches (WRCC 2002).

The data from the following climate stations were used to describe the climate in the Jawbone-Butterbredt ACEC Soil Survey (station number in parentheses):
Cantil, CA (041488)
Inyokern, CA (044278)
Mojave, CA (045756)
Tehachapi, CA (048826)

"Maximum monthly precipitation" represents average monthly precipitation.

Table 3 Representative climatic features

Frost-free period (average)	300 days
Freeze-free period (average)	320 days
Precipitation total (average)	180 mm

Influencing water features

Soil features

The soils associated with this site are found within the hills and mountains landscape. Slopes are steep and generally between 30 to 50 percent slope. are well drained and very shallow to moderately deep to bedrock. Soils are derived from intrusive igneous material like granodiorite.

This ecological site is found on soils classified as follows:
Cutterbank -- Loamy, mixed. superactive, calcareous, thermic, shallow Typic Torriorthents
Jawbone -- Mixed, thermic, shallow Typic Torripsamments

Soil survey area - Map unit symbol - Component
CA682 – 3010 – Jawbone, eroded
CA682 – 3301 – Cutterbank, steep (major)

Table 4. Representative soil features

Surface texture	(1) Fine sandy loam (2) Loamy sand
Family particle size	(1) Loamy
Drainage class	Well drained to somewhat excessively drained
Permeability class	Very slow
Soil depth	10 – 40 cm
Surface fragment cover <=3"	30 – 80 %
Surface fragment cover >3"	0 – 10 %
Available water capacity (0-101.6cm)	2.79 – 4.06 cm
Calcium carbonate equivalent (0-101.6cm)	Not specified
Electrical conductivity (0-101.6cm)	Not specified
Sodium adsorption ratio (0-101.6cm)	0 – 10

Soil reaction (1:1 water) (0-101.6cm)	10 – 8.4
Subsurface fragment volume <=3" (Depth not specified)	10 – 70 %

Ecological dynamics

The dominant species on this ecological site is white bursage (Ambrosia dumosa). Mojave indigobush (Psorothamnus arborescens) and California buckwheat (Eriogonum fasciculatum) are also common species. White bursage is often found in late seral communities with species such as creosote bush (Larrea tridentata), but it also colonizes disturbed sites through easy seed dispersal (Marshall 1994). Mojave indigobush can be found in small amounts communities dominated by late seral species such as creosote bush and blackbrush (Coleogyne ramosissima). California buckwheat tolerates a wide range of environmental conditions. It may be present in late seral communities, but it is often seen where a disturbance has occurred on both fine and large scales.

The continual erosion of the soils on this ecological site may provide a disturbance that encourages the species on this site. Wide lateral roots allow white bursage to persist on the shallow soils despite regular disturbances at the surface. In addition, white bursage has the ability re-establish easily on disturbed substrates (Prose et. al. 1987). The shallow soils may also be limiting for deeper-rooted species such as creosote bush (Larrea tridenta). Often found in washes, Mojave indigobush is tolerant to disturbance by water (Hickman 1993). In addition, the low presence of other species on this ecological site may allow Mojave indigobush to have a greater presence here than in other ecological sites where competition is greater.

The regular disturbance to the soils on this ecological site makes it susceptible to invasion by non-native annual plants. Few invasive annuals are currently present on this ecological site, but seeds may be easily transported to this site by animal or recreational activities. An increase in invasive species may increase the risk of fire on this ecological site by creating a more continuous, easily ignitable fuel bed (Clarke 2006). White bursage is generally killed by fire but can re-establish on a site by seed. California buckwheat also re-establishes by seed. Information on the regeneration abilities of Mojave indigobush following a disturbance was minimal. Minor species such as rayless goldenhead (Acamptopappus sphaerocephalus), green rabbitbrush (Ericameria teretifolia), and burrobrush (Hymenoclea salsola) may increase following a fire or other widespread disturbance. Widespread vegetation removal will also increase the rate of erosion from this site.

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 (%)
Shrub/Vine					
1	**Perennial Shrubs**			78-211	
	burrobush	AMDU2	*Ambrosia dumosa*	31-74	–
	Mojave indigobush	PSAR4	*Psorothamnus arborescens*	11-29	–
	Eastern Mojave buckwheat	ERFA2	*Eriogonum fasciculatum*	9-22	–
	shadscale saltbush	ATCO	*Atriplex confertifolia*	7-18	–
	creosote bush	LATR2	*Larrea tridentata*	6-16	–
	Mojave woodyaster	XYTO2	*Xylorhiza tortifolia*	3-10	–
	Nevada jointfir	EPNE	*Ephedra nevadensis*	3-9	–
	rayless goldenhead	ACSP	*Acamptopappus sphaerocephalus*	3-9	–
	burrobrush	HYSA	*Hymenoclea salsola*	2-7	–
	blackbrush	CORA	*Coleogyne ramosissima*	0-4	–
	littleleaf horsebrush	TEGL	*Tetradymia glabrata*	2-4	–
	cattle saltbush	ATPO	*Atriplex polycarpa*	0-1	–
	winterfat	KRLA2	*Krascheninnikovia lanata*	0-1	–

	green rabbitbrush	ERTE18	*Ericameria teretifolia*	0-1	–
	spiny hopsage	GRSP	*Grayia spinosa*	0-1	–
	shinyleaf sandpaper plant	PENI	*Petalonyx nitidus*	0-1	–
	Mexican bladdersage	SAME	*Salazaria mexicana*	0-1	–
Grass/Grasslike					
2	**Perennial Grasses**			2-7	
	Sandberg bluegrass	POSE	*Poa secunda*	2-4	–
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	0-2	–
Forb					
3	**Perennial Forbs**			3-7	
	desert pepperweed	LEFR2	*Lepidium fremontii*	2-4	–
	brownplume wirelettuce	STPA4	*Stephanomeria pauciflora*	1-2	–

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 (%)

Animal community

This ecological site is habitat for small mammals and rodents that can readily burrow into these soils. Desert tortoise (Gopherus agassizii) burrows have been observed on this ecological site.

Hydrological functions

This ecological site is very susceptible to erosion, particularly during heavy storms. Many rills and small channels have formed on the site due to its high erodibility.

Recreational uses

This ecological site is located in an off-highway vehicle recreation area. Travel through this ecological site is limited to existing trails and roads. Off-trail use can quickly accelerate erosion on this ecosite.

Other information

Fossils have been found in the lacustrine soils of this ecologial site.

Inventory data references

2 Dry weight rank transects (2004).

Type locality

Location 1: Kern County, CA	
UTM zone	N
UTM northing	3917571
UTM easting	408535

Latitude	35° 23′50″
Longitude	118° 0′26″
General legal description	This site is located within the Jawbone-Butterbredt ACEC off the powerline road near where SC103 enters Red Rock Canyon State Park.
Location 2: Kern County, CA	
UTM zone	N
UTM northing	3916546
UTM easting	408368
Latitude	35° 23′17″
Longitude	118° 0′32″
General legal description	This site is located in the Jawbone-Butterbredt ACEC off the powerline road near the entrance to Red Rock Canyon State Park via route SC103.

Other references

California State University (CSU) Desert Studies Center. 2002. Desert Climate. CSU Desert Studies Center, Soda Springs, CA. Online. http://biology.fullerton.edu/facilities/dsc/zz_climate.html. Accessed 28 November 2006.

Clarke, C. 2006. The year we lost the deserts. Earth Island Journal. 20(4): 24-56.

Hereford, R., R.H. Webb and C. I. Longpre. 2004. Precipitation history of the Mojave Desert region, 1893-2001 (No. 117-03).

Hickman, James C. (Ed.). 1993. The Jepson manual: higher plants of California. University of California Press, Berkeley, CA. 1400 pp.

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.

Marshall, K. Anna. 1994. Ambrosia dumosa. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/ [2007, May 7].

Prose, D.V., S.K. Metzger, and H.G. Wilshire. 1987. Effects of substrate disturbance on secondary plant succession. Journal of Applied Ecology 24: 305-313.

Salem, B. B. (1989). Arid zone forestry: a guide for field technicians (No. 20). Food and Agriculture Organization (FAO).

United States Department of Agriculture (USDA), Natural Resources Conservation Service. 2006. Land Resource Regions and Major Land Resource Areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296.

Warren, S. D. and D. J. Eldridge. 2003. Biological soil crusts and livestock in arid ecosystems are they compatible? Pages 401-416 in J.

Belnap and O. L. Lange, editors. Biological soil crusts: structure, function, and management. Springer-Verlag, Berlin, Germany.

Western Regional Climate Center (WRCC). 2002. Western U.S. Climate Historical Summaries [Online]. Desert Research Institute, Reno, NV. Online. http://www.wrcc.dri.edu/Climsum.html. Accessed 28 November 2006.

Contributors

Dustin Detweiler
Heath M. McAllister

Approval

Kendra Moseley, 2/18/2025

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	09/16/2026
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

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

   _____

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

   _____

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

   _____

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

---

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

---

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

---

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

---

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):**

---

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:**

---

17. **Perennial plant reproductive capability:**
