USDA Natural Resources
Conservation Service

Ecological site R030XB130CA
Lava Flow 3-5

Last updated: 2/26/2025
Accessed: 05/20/2025

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 ecological site is found on lava flows. Soils are very shallow to moderately deep, often among rubble land of basaltic rock. The landscape typically has less than 15% slope. Subsurface horizons generally have a pH greater than 8.5.

This is a group concept and provisional STM that also covers R030XB153CA

Associated sites

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

R030XB137CA	**Granitic Loam** Granitic Loam 3-5
R030XY047NV	**ALLUVIAL PLAIN** Alluvial Plain

Similar sites

R030XB126CA	**Saline Slope 3-5" P.Z.** Saline Slope 3-5
R030XB152CA	**Saline Hill 3-5" P.Z.** Saline Hill 3-5

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Atriplex hymenelytra*
Herbaceous	Not specified

Physiographic features

This site occurs on summits of lava flows. Elevations are 1870 to 1935 feet. Slopes range from 0 to 2 percent.

Table 2. Representative physiographic features

Landforms	(1) Lava flow
Flooding duration	Extremely brief (0.1 to 4 hours)
Flooding frequency	Rare
Ponding duration	Brief (2 to 7 days)
Ponding frequency	Rare
Elevation	570–590 m
Slope	0–2%
Aspect	Aspect is not a significant factor

Climatic features

The climate on this site is arid, characterized by warm, moist winters (30 to 60 degrees F) and hot, somewhat dry summers (70 to 110 degrees F). The average annual precipitation ranges from 2 to 6 inches with most falling as rain from November to March. Approximately 30% of the annual precipitation occurs from July to September as a result

of summer convection storms. Mean annual air temperature is 69 to 74 degrees F. The average frost-free period is 300 to 360 days.

Table 3. Representative climatic features

Frost-free period (average)	360 days
Freeze-free period (average)	360 days
Precipitation total (average)	152 mm

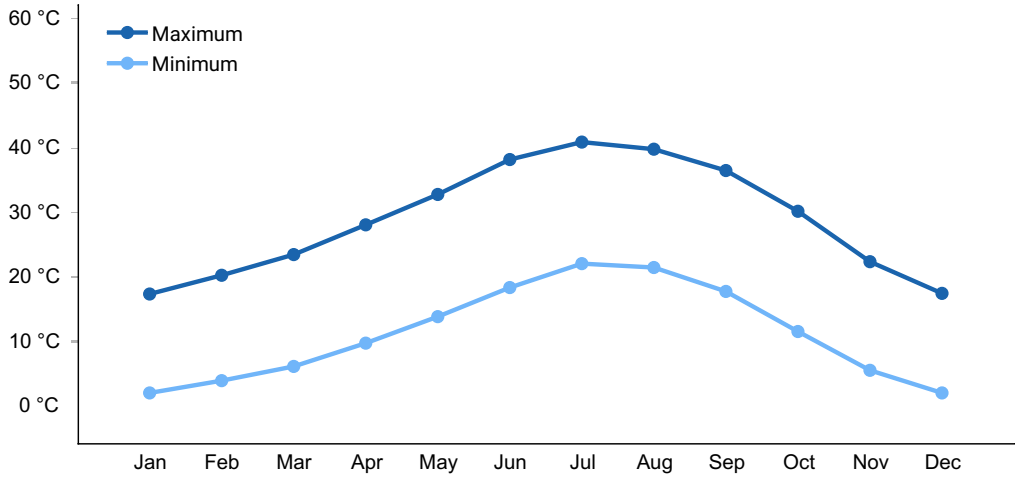


Figure 1. Monthly average minimum and maximum temperature

Influencing water features

There are no water features influencing this site.

Soil features

The soils that characterize this site are well drained and very shallow and shallow to bedrock. They are formed in residuum and colluvium from basalt and eolian material. Surface textures are extremely gravelly fine sandy loams. Subsurface textures are loams. Available water capacity is very low and permeability is moderate. Wind erosion hazard is negligible due to surface rock fragments. Effective rooting depth is 0 to 7 inches.

Representative_Soil Map Units
210 Kentonmill-Lava flows complex, 0-2% slopes

Table 4. Representative soil features

Surface texture	(1) Fine sandy loam (2) Loam
Family particle size	(1) Loamy
Drainage class	Somewhat excessively drained

Permeability class	Moderate
Soil depth	10–36 cm
Surface fragment cover <=3"	70%
Surface fragment cover >3"	15%
Available water capacity (0-101.6cm)	1.52–2.03 cm
Calcium carbonate equivalent (0-101.6cm)	0–15%
Electrical conductivity (0-101.6cm)	1–4 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	5–25
Soil reaction (1:1 water) (0-101.6cm)	8.6–9
Subsurface fragment volume <=3" (Depth not specified)	15%
Subsurface fragment volume >3" (Depth not specified)	1%

Ecological dynamics

This is a very stable plant community so long as the surface rock fragments are undisturbed. Disturbance would cause an increase in desert trumpet and wirelettuce and an introduction of non-native species such as red brome, schismus and red-stem filaree. White burrobush is the primary perennial pioneer species. This site has limited use for livestock grazing due to the abundance of rock outcrop and low forage production. The primary source of forage is limited to annual grasses and forbs and low amounts of white bursage and allscale saltbush.

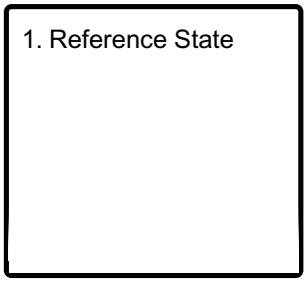
Species indigenous to this site are recommended for any revegetation efforts. Desert holly and white bursage are effective for erosion control and slope stabilization. Transplanting seedlings is more effective than direct seeding. Planting in late fall or early spring allows for acclimation to summer conditions. Transplants that are dormant during the hot, dry season are best maintained that way rather than attempting to force them to break dormancy and undergo new vegetative growth out of season. Supplemental irrigation is recommended for the first growing season, especially if winter rainfall has been sparse. Protection from rodents is also recommended.

The foliage of the saltbushes appears to have fire-retarding qualities associated with the salt content of the leaves. A severe fire, however, will typically kill the aboveground

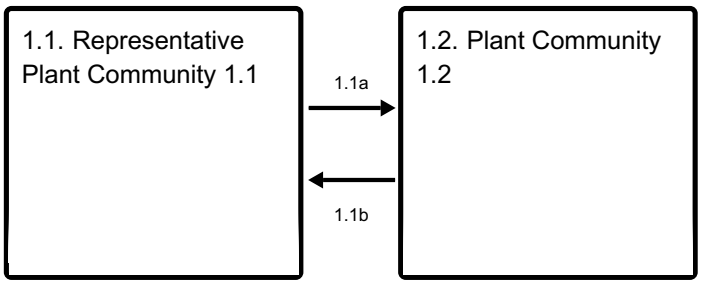
portions of the saltbushes. White bursage possesses limited sprouting ability and can be killed by fire. It can reestablish rapidly from off-site seed.

State and transition model

Ecosystem states



State 1 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 natural disturbance regimes 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
Representative Plant Community 1.1

The representative natural plant community is Desert Saltbush Scrub or Desert holly Series. This community is dominated by desert holly and white bursage. Potential vegetative composition is about 5% grasses, 10% forbs, and 85% shrubs. The historic plant community is an open canopy of shrubs less than 1 meter tall. Stands typically are strongly dominated by a single Atriplex species. Perennial grasses are sparse and annuals are seasonally present. This site is stable in this condition. The following table lists the major plant species and percentages by weight, air dry, of the total plant community that each contributes in an average production year. Fluctuations in species composition and relative production may change from year to year dependent upon abnormal precipitation or other climatic factors.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Shrub/Vine	95	191	286
Forb	11	22	34
Grass/Grasslike	6	11	17
Total	**112**	**224**	**337**

Table 6. Ground cover

Tree foliar cover	0%
Shrub/vine/liana foliar cover	4-9%
Grass/grasslike foliar cover	0-1%
Forb foliar cover	0-1%
Non-vascular plants	0%
Biological crusts	0%
Litter	0%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	0%

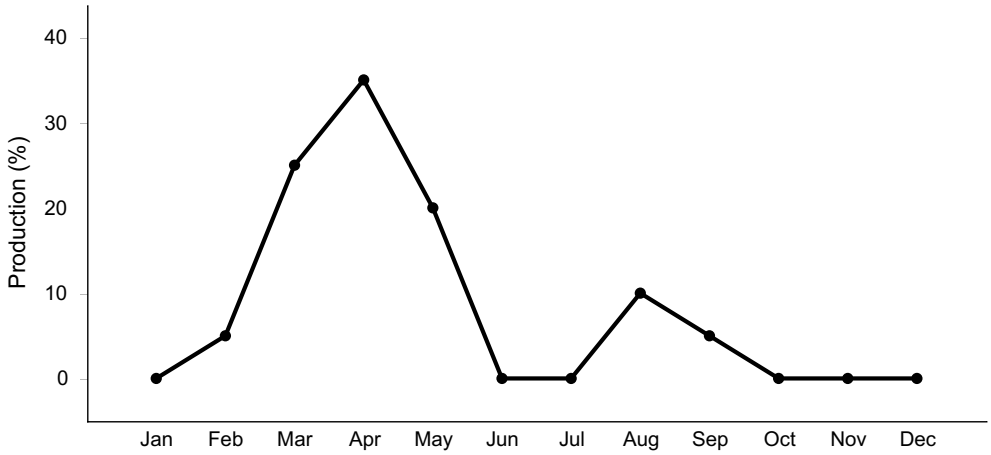


Figure 3. Plant community growth curve (percent production by month). CA3004, Burrobush XB. Growth starts in early spring, flowering and seed set occur by July. Dormancy occurs during the hot summer months. With sufficient summer/fall precipitation, some vegetation may break dormancy and produce a flush of new growth..

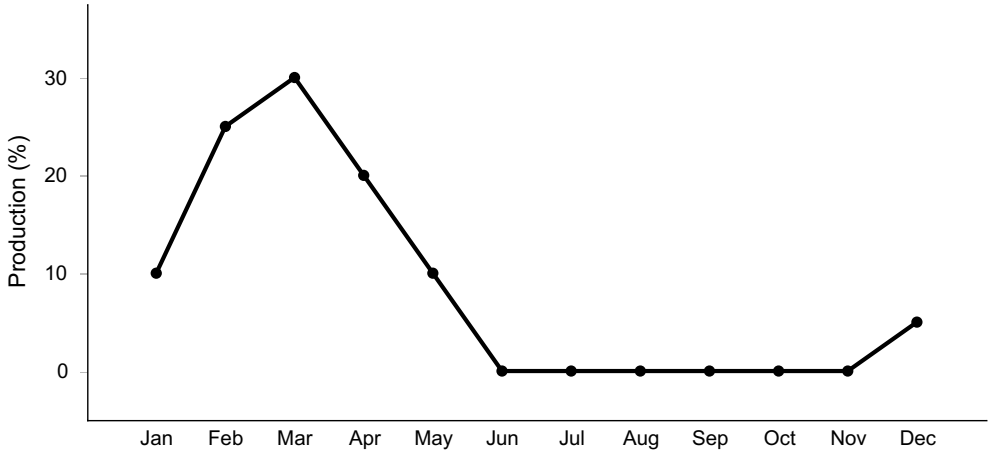


Figure 4. Plant community growth curve (percent production by month). CA3005, Desert Holly. Growth starts in early winter; flowering occurs from January to April. Seed set occurs by May..

Community 1.2
Plant Community 1.2

Shrub removal of any kind will increase herbaceous vegetation. Grazing with remove more palatable species, leaving less desirable species such as creosote bush and water jacket.

Pathway 1.1a
Community 1.1 to 1.2

Drought, wildfire, disease or insect attack or other activity which reduces shrub cover.

Pathway 1.1b
Community 1.2 to 1.1

Absence of disturbance and natural regeneration over time.

Additional community tables

Table 7. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Shrub/Vine					
1				90–280	
	desertholly	ATHY	*Atriplex hymenelytra*	45–179	–
	burrobush	AMDU2	*Ambrosia dumosa*	6–39	–
	water jacket	LYAN	*Lycium andersonii*	2–28	–
	cattle saltbush	ATPO	*Atriplex polycarpa*	2–6	–
Grass/Grasslike					
2				4–9	

Animal community

Mammals occurring on this site include white-tailed antelope squirrels, long-tailed pocket mice, canyon mice, woodrats, black-tailed jackrabbits and coyotes. Reptiles common to this site include side-blotched lizards, western whiptails and common chuckwallas. Snakes include speckled rattlesnake and coachwhips. Birds occurring on this site include mourning dove, Says phoebe, horned lark, black-throated sparrow, rock wren, loggerhead shrike and common raven.

Season of Use- Other Mgt. Considerations: This site has limited use for livestock grazing due to the abundance of rock outcrop and low forage production. The primary source of forage is limited to annual grasses and forbs and low amounts of white bursage and allscale saltbush.

General guide to initial stocking rate. Before making specific recommendations, an on-site evaluation must be made.

Pounds/acre
air dry AUM/AC AC/AUM
Normal Years 200

Hydrological functions

Runoff is negligible. Hydrologic group D - soils having very slow infiltration rates when thoroughly wetted and consisting chiefly of clay soils with a high swelling potential, soils with a permanent high water table, soils with a claypan or clay layer at or near the surface, and shallow soils over nearly impervious material. Hydrologic conditions: good - >70%

ground cover (includes litter, grass and brush overstory); fair - 30 to 70% ground cover; poor <30% ground cover.

Soil Series:Kentonmill
Hydrologic Group:D
Hydrologic Conditions and Runoff Curves:
Good 84; Fair 86; Poor 88

Recreational uses

This site is valued for open space and those interested in desert ecology. Flowering wildflowers and shrubs provide aesthetic value during the spring months.

Other information

Military Operations - Management for this site would be to protect if from excessive disturbance and maintain existing plant cover. Land clearing and other disturbances that destroy the vegetation, surface rock fragments and soil structure can result in soil compaction, reduced infiltration rates, soil blowing and the introduction of non-native plants.

Inventory data references

Sampling technique

_4_ NV-ECS-1
___ SCS-Range 417
_2_ Other

Type locality

Location 1: San Bernardino County, CA	
Township/Range/Section	T7N R6E S22
UTM zone	N
UTM northing	3838429
UTM easting	561386
General legal description	NE 1/4 Sec. 22, T7N R6E Approximately 10 miles southwest of Ludlow, CA UTM 11S 0561386e 3838429n; (Datum=NAS-C)

Other references

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).

Contributors

P. Novak-Echenique
Dustin Detweiler

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	05/20/2025
Approved by	Sarah Quistberg
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:**
