USDA Natural Resources
Conservation Service

Ecological site R030XB138CA
Granitic Slope 3-5

Last updated: 2/26/2025
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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 eroded fan remnants below 3100 feet elevation. Soils have a sodic horizon with less than 80 percent gravel covering the soil surface.

Associated sites

R030XB136CA	**Dry Wash** Dry Wash
R030XB140CA	**Shallow Hill 4-6" P.Z.** Limy Hill 5-7

Similar sites

R030XB062NV	**GRANITIC SLOPE 3-5 P.Z.** Granitic Slope 3-5
R030XB140CA	**Shallow Hill 4-6" P.Z.** Limy Hill 5-7

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Ambrosia dumosa* (2) *Senna armata*
Herbaceous	(1) *Dasyochloa pulchella*

Physiographic features

This site occurs on sideslopes of erosional fan remnants. Elevations are 1800 to 3200 feet. Slopes range from 8 to 30 percent.

Table 2. Representative physiographic features

Landforms	(1) Fan remnant
Elevation	549–975 m
Slope	8–30%
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, dry summers (70 to 100 degrees F). The average annual precipitation ranges from 3 to 5 inches with most falling as rain from November to March. Approximately 25% of the annual precipitation occurs from July to September as a result of summer convection storms. Mean annual air temperature is 64 to 70 degrees F.

The average frost-free period is 240 to 360 days.

Table 3. Representative climatic features

Frost-free period (average)	360 days
Freeze-free period (average)	
Precipitation total (average)	127 mm

Influencing water features

There are no influencing water features.

Soil features

The soils that characterize this site are very deep and somewhat excessively drained. They are formed in mixed alluvium. Surface textures are very gravelly sandy loams. Subsoil textures are very gravelly loamy coarse sands and very gravelly coarse sands. Available water capacity is very low and permeability is moderately rapid. Wind erosion hazard is slight. Effective rooting depth is 60 inches or more.

Representative_Soil Map Units
339 Eastrange-Dime association, 8-50% slopes

Ecological dynamics

The historic site potential is characterized by widely spaced shrubs, 0.5 to 2 meters tall. White bursage and desert senna form the most characteristic association. Perennial grasses and forbs are sparse. The composition and abundance of annual vegetation differs from year to year, depending on the time and amount of precipitation. This site is stable in this condition.

As ecological condition deteriorates, the perennial grasses will decrease. Short-lived perennials such as encelia, desert trumpet and wirelettuce will initially increase. Continued surface disturbance may reduce the cover of the short-lived perennials as well as the long-lived perennials such as creosotebush, desert senna, range ratany and Nevada ephedra. White bursage, a long-lived opportunistic species may initially increase, but with long-term disturbance, it too will decrease. With a loss of perennial cover, non-native annual grasses and forbs such as red brome, Arabian schismus and red-stem filaree. White burrobush is the primary perennial pioneer species.

Management for this site would be to protect it from excessive disturbance and maintain existing plant cover. Close roads and trails no longer being used and revegetate using native species indigenous to this site. Vehicle activity off of designated roads and tank trails can result in destruction of desert tortoise and small mammal burrows. Water developments would increase the species diversity of this site.

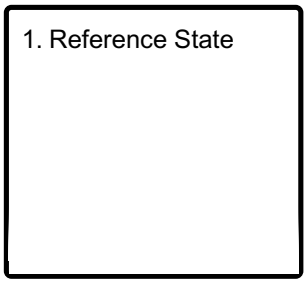
Revegetation of Disturbed Areas - Species indigenous to this site are recommended for any revegetation efforts. White bursage is valuable for erosion control and cover restoration. Creosotebush may also be used to rehabilitate disturbed sites. Once established, creosotebush may improve sites for annual forbs and grasses. 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.

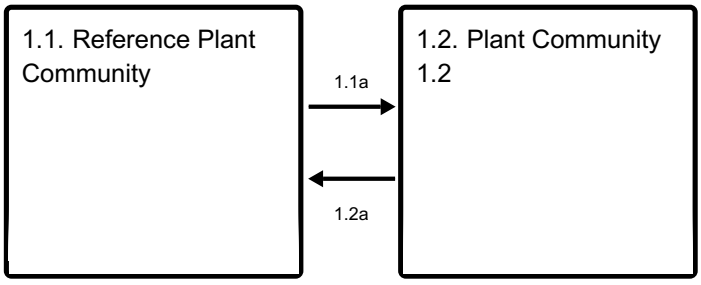
Desert communities are usually unaffected by fire because of low fuel loads, although a year of exceptionally heavy winter rains can generate fuels by producing a heavy stand of annual forbs and grasses. When fires do occur, the effect on the ecosystem may be extreme due to the harsh environment and the slow rate of recovery. White bursage and creosotebush possess limited sprouting ability, thus, can be killed by fire. White bursage, however, can rapidly re-establish from 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. It is maintained by periodic flooding in response to heavy rainfall events and has increased available moisture and nutrients. Fire is rare in this system. This ecological site experiences seasonal flooding and is important for redistributing moisture and nutrients throughout the landscape. Timing of disturbances combined with weather events determines plant community dynamics.

Community 1.1
Reference Plant Community

The representative natural plant community is Mojave Creosotebush Scrub or White Bursage Series. This community is dominated by white bursage and desertsenna. Potential vegetative composition is about 10% grasses, 10% forbs, and 80% shrubs. 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 4. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Shrub/Vine	90	179	314
Grass/Grasslike	11	22	39
Forb	11	22	39
Total	**112**	**223**	**392**

Table 5. Ground cover

Tree foliar cover	0%
Shrub/vine/liana foliar cover	4-12%
Grass/grasslike foliar cover	0-2%
Forb foliar cover	0-2%
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%

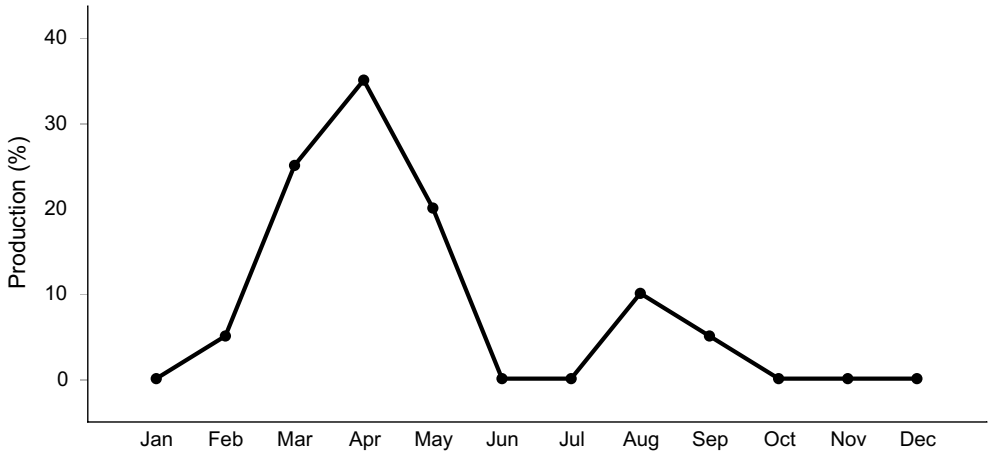


Figure 2. Plant community growth curve (percent production by month).

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..

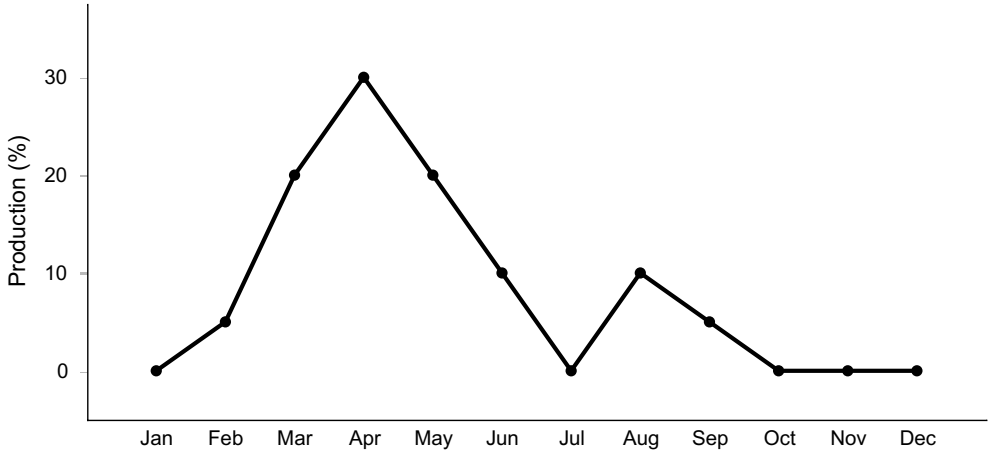


Figure 3. Plant community growth curve (percent production by month). CA3015, Creosote bush XB. Growth starts in early spring with flowering and seed set occurring by July. Dormancy occurs during the hot summer months. With sufficient summer/fall precipitation, some vegetation may break dormancy and produce a flush of growth..

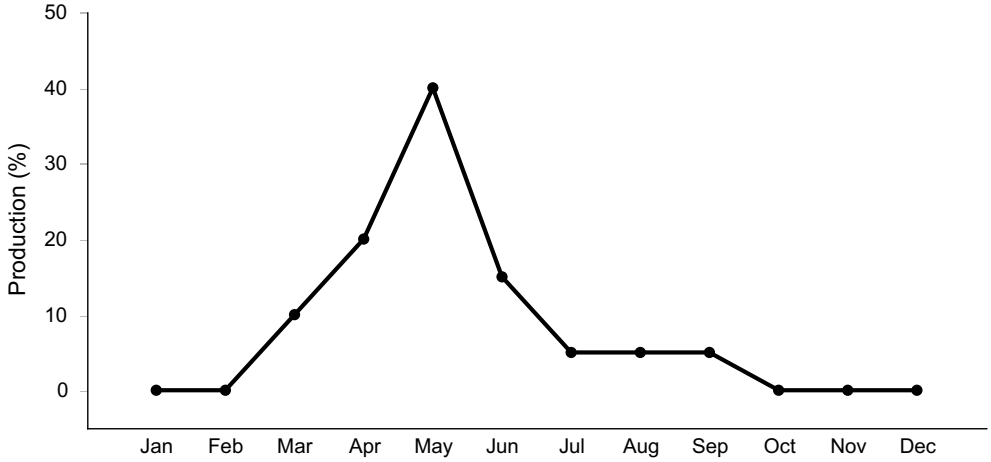


Figure 4. Plant community growth curve (percent production by month). CA3017, Desert Senna. Growth starts in spring, flowering occurs from April to May and after summer/fall rains..

Community 1.2
Plant Community 1.2

This plant community is characteristic of a post-disturbance plant community phase. Initially, it is heavily dominated by herbaceous vegetation and short-lived perennials. Sprouting shrubs quickly recover and provide a favorable environment for establishment of shrub seedlings. Additional run-in moisture from the surrounding landscape increases the ecological resilience and helps this site recover quickly following disturbance. This plant community is ‘at-risk’ of invasion by non-natives. Non-native species are able to take advantage of increased availability of critical resources following disturbances.

Pathway 1.1a
Community 1.1 to 1.2

Drought, wildfire, disease or insect attack or other event which reduces vegetation cover

Pathway 1.2a
Community 1.2 to 1.1

Absence from disturbance and natural regeneration over time.

Additional community tables

Animal community

Mammals occurring on this site include antelope ground squirrels, Great Basin and Merriam's kangaroo rats, pocket mice, coyotes and black-tailed jackrabbits.

Reptiles occurring on this site include lizards such as western whiptail and side-blotched lizard. Desert tortoise have been documented on this site, although the sandy subsurface textures are poorly suited for burrowing.

Birds common to this site include horned larks, common ravens, and black-throated and sage sparrows.

Other Mgt. Considerations - White bursage is fair browse for cattle and horses, and fair to good browse for goats. Sheep also use this shrub, feeding primarily on new growth and seeds. Creosotebush is unpalatable to livestock. Domestic sheep use creosotebush primarily for shade. During favorable years, annual forbs and grasses provide additional forage.

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 medium. Hydrologic soil group A - soils having high infiltration rates even when thoroughly wetted and consisting chiefly of deep, well drained to excessively drained sands or gravels.

Soil Series:Eastrange
Hydrologic Group: A
Hydrologic Conditions and Runoff Curves:
Good 49; Fair 55; Poor 63

Recreational uses

This site is highly valued for open space and those interested in desert ecology. Flowering wildflowers and shrubs may also attract visitors during the spring.

Other information

Military Operations - Management for this site would be to protect it from excessive disturbance and maintain existing plant cover. Land clearing or other disturbances that destroy the vegetation and soil crust and structure can result in soil compaction, reduced infiltration rates, accelerated erosion, soil blowing and barren areas. The frequency of flash flooding may also increase with increased surface runoff and loss of vegetative cover. Rest or protect sites from further disturbances. Slopes can be pitted with equipment or hand tools. Pitting will reduce erosion, increase soil moisture and trap blowing sediment and seed. Gully stabilization methods include straw bale checkdams, rock riprap and sand bags.

Inventory data references

Sampling technique

___ NV-ECS-1
___ SCS-Range 417
_3_ Other

Type locality

Location 1: San Bernardino County, CA	
Township/Range/Section	T12N R3E S5
UTM zone	N
UTM northing	3890555
UTM easting	528257
General legal description	SW1/4 Sec 5, T12N, R3E Approximately 6 miles north of Red Pass Lake Red Pass Lake Quadrangle UTM 11S 0528257e 3890555n (Datum=NAS-C) San Bernardino Co., CA

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

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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)	
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:**

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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:

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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:**
