

Ecological site R030XA029CA Shallow Limy 5-7

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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 create islands of low elevation hot desert surrounded by islands of high elevation cold desert.

The Mojave Desert receives less than 10 inches of mean annual precipitation. Low elevation hot desert 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 nearly no 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.

LRU notes

XA LRU - Arid Western Mojave

The Mojave Desert is currently divided into 5 Land Resource Units (LRUs). This ecological site is within the arid portions of the Mojave where precipitation primarily occurs during the winter months. The Arid Western Mojave LRU is designated by the 'XA' symbol within the ecological site ID. This LRU is found across the western half of California. This LRU is essentially equivalent to Western Mojave Basins and Western 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 (XB) by the lack of summer precipitation which excludes many warm season plant species from occurring in this LRU. The 'XA' LRU is generally west of the Mojave River and the 117 W

meridian (Hereford et. al 2004). Vegetation includes creosote bush, shadscale saltbush, Nevada jointfir, Joshua tree, and burrobush. At the upper portions of the LRU, plant production and diversity are greater and blackbrush is a common dominant shrub. This LRU generally lacks the diversity of yucca, cacti and warm season species found in the Arid Eastern Mojave.

Classification relationships

Creosotebush - Burrobush Shrubland Association

Ecological site concept

This ecological site is found among the hill and mountains landscape below 3000 feet (915 m) on rock pediments between 15 and 50 percent slope . Soils formed in residuum from granodiorite and have a calcareous soil surface.

This is a group concept and provisional STM that also covers R030XA056NV.

Associated sites

R030XA020CA	Arid Fans 5-7 Limy 5-7
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Similar sites

R030XA021CA	Limy Sand 5-7 Limy Sand 5-7
R030XA020CA	Arid Fans 5-7 Limy 5-7

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) <i>Larrea tridentata</i> (2) <i>Eriogonum fasciculatum</i>
Herbaceous	(1) <i>Achnatherum speciosum</i>

Physiographic features

This site occurs on summits and upper sideslopes of hills and rock pediments. Elevations are 2375 to 3425 feet. Slopes range from 0 to 50 percent, but slope gradients from 15 to 50 percent are most typical.

Table 2. Representative physiographic features

Landforms	(1) Hill (2) Pediment
Elevation	2,375–3,425 ft
Slope	2–50%
Aspect	Aspect is not a significant factor

Climatic features

The climate on this site is characterized by cool, relatively dry winters (30 to 60 degrees F) and hot, dry summers (70 to 100 degrees F). The average annual precipitation ranges from 3 to 7 inches with most falling as rain from November to March. Mean annual air temperature is 60 to 64 degrees F.

The average frost free period is 200 to 250 days.

Table 3. Representative climatic features

Frost-free period (average)	250 days
Freeze-free period (average)	
Precipitation total (average)	7 in

Influencing water features

Soil features

The soils that characterize this site are well drained and shallow to moderately deep. They are formed in limy residuum weathered from granodiorite. Surface textures are sandy loams and gravelly sandy loams. Subsoil textures are loams and sandy loams. The Muroc soil has a 12-inch lime silica cemented duripan which has a 2 to 4 mm opalized cap. Soils are slightly to moderately alkaline. Available water capacity is very low to low and the hazard of water erosion is slight to severe. Wind erosion hazard is moderate. Effective rooting depth is 15 to 20 inches.

Soil Map Units

- 120 Helendale-Randsburg complex, 0-5% slopes
- 122 Hi Vista-Machone-Randsburg complex 2-15% slopes
- 123 Hi Vista-Rock outcrop, 30-50% slopes
- 130 Machone-Randsburg complex, 2-9% slopes
- 131 Machone-Randsburg-Hi Vista complex, 2-50% slopes
- 134 Muroc-Randsburg complex, 5-15% slopes
- 140 Randsburg-Machone-Rock outcrop complex, 4-50% slopes
- 141 Randsburg-Rock outcrop, 15-50% slopes

Ecological dynamics

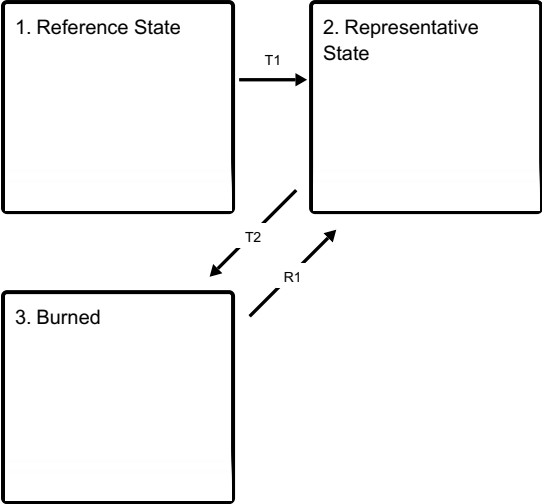
As ecological condition deteriorates, the perennial grasses and many of the shrubs will decrease. Creosotebush, Cooper goldenbush, and needleleaf rabbitbrush will dominate. Species likely to invade this site include non-native annuals such as filaree, red brome and schismus. Burrobush is also an invader of this site.

Desert communities are usually unaffected by fire because of low fuel loads, although a year of exceptionally heavy winter rains can generate fuel by producing abundant annuals. When fires do occur, the effect on the ecosystem may be extreme because of the harsh environment and the slow rate of recovery. Fire is not recommended as a management tool, although the perennial grasses may increase in cover if climatic conditions following fire are favorable.

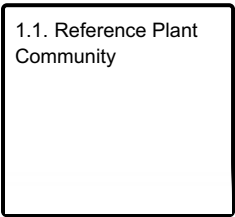
Management for this site would be to protect it from excessive disturbance and maintain existing plant cover. Water is the main limitation on this site. Water developments would increase the species diversity of this site.

State and transition model

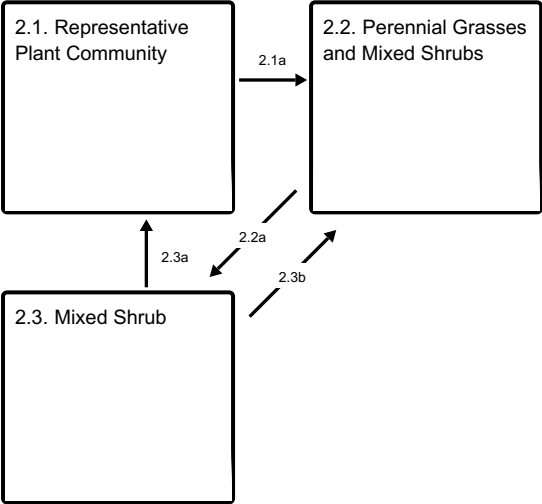
Ecosystem states



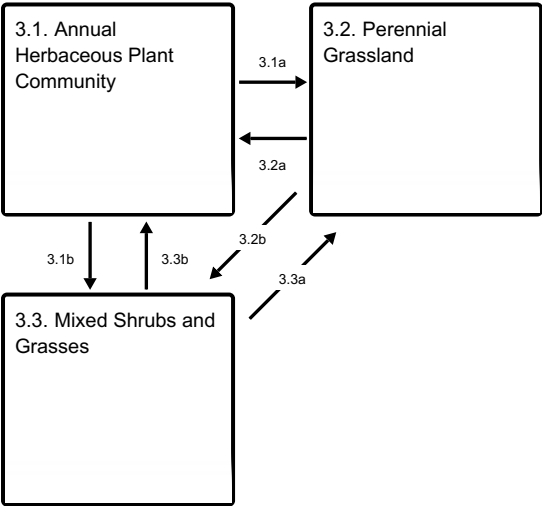
State 1 submodel, plant communities



State 2 submodel, plant communities



State 3 submodel, plant communities



State 1

Reference State

The Reference State is dominated by creosotebush with other shrubs and perennial grasses making a significant contribution to species composition.

Community 1.1

Reference Plant Community

The historic site potential is characterized by widely spaced shrubs, 0.5 to 3.0 meters tall. Creosotebush, California buckwheat and Nevada ephedra dominate. Perennial grasses and forbs are common. Annual forbs and grasses comprise a small percentage of the cover. The composition of the annual vegetation differs from year to year, depending on the time and amount of rainfall. This site is stable in this condition. The representative natural plant community is the Mojave Creosote Bush Scrub or Creosote bush series. This community is dominated by creosotebush, California buckwheat, Nevada ephedra, and desert needlegrass. Potential vegetative composition is about 25% grasses, 10% forbs, and 65% shrubs. Annuals are abundant in wet years. 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 (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Shrub/Vine	97	195	292
Grass/Grasslike	38	75	113
Forb	15	30	45
Total	150	300	450

Table 5. Ground cover

Tree foliar cover	0%
Shrub/vine/liana foliar cover	6-17%
Grass/grasslike foliar cover	2-7%
Forb foliar cover	1-3%
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%

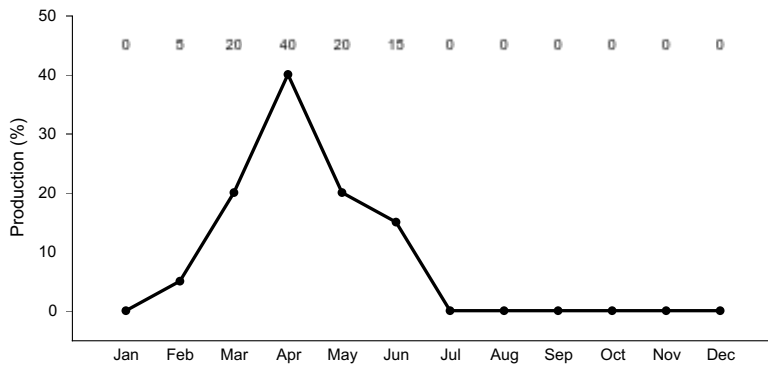


Figure 2. Plant community growth curve (percent production by month). CA3002, Creosote bush XY. Growth starts in early spring, flowering and seed set occur by July. Dormancy occurs during the hot summer months. With sufficient summer/fall precipitation, some vegetation may break dormancy and produce a flush of growth..

State 2

Representative State

Introduced annuals such as red brome, schismus and redstem stork's bill have invaded the reference plant community and have become a dominant component of the herbaceous cover. Factors such as soil surface disturbances, changes in the kinds of animals and grazing patterns, drought, and changes in fire frequency are likely to create conditions which favor non-native annual plant species. Following wet years, dried non-native annuals can provide enough fuel to carry wildfires where large, intense wildfires historically have been infrequent.

Community 2.1

Representative Plant Community

Compositionally this plant community is similar to the Reference State with the presence of non-native species in the understory.

Community 2.2

Perennial Grasses and Mixed Shrubs

This plant community is characterized by increased annual, perennial, native and non-native grasses. Few surviving shrubs will remain on the site. This plant community is identified as "at-risk". Continued heavy disturbance or repeated fire will exclude native vegetation and change the ecological dynamics of the site.

Community 2.3

Mixed Shrub

Shrubs have begun to regenerate. Woody species with high seed production and early establishment will be the first to return. Once large shrubs are established and begin to produce shade it will favor the establishment of additional native perennials.

Pathway 2.1a

Community 2.1 to 2.2

Anthropogenic disturbance removes shrubs and favors an increase of herbaceous vegetation and non-native species or occurs with low intensity, patchy fire especially when flash flooding events cause aggressive sediment deposition.

Pathway 2.2a

Community 2.2 to 2.3

Changes in management remove disturbance and allow woody species to regenerate. Fast growing, short-lived woody species with high reproductive ability such as Copper's goldenbush, rabbitbrush, and Eastern Mojave

buckwheat will increase and become nurse plants for other species.

Pathway 2.3a **Community 2.3 to 2.1**

This pathway occurs over time without fire.

Pathway 2.3b **Community 2.3 to 2.2**

Occurs with low intensity, patchy fire especially when flash flooding events cause aggressive sediment deposition.

State 3 **Burned**

This state is characterized by an increase in herbaceous plant species due to frequent recurring fire which prohibits the establishment of the reference and representative plant communities.

Community 3.1 **Annual Herbaceous Plant Community**

This community phase is characterized by dominance of grasses; annual, perennial, native and non-native. Few surviving shrubs remain on the site. Non-native annuals provide a significant amount of herbaceous biomass.

Community 3.2 **Perennial Grassland**

This plant community is dominated by pioneering woody species tolerant of post fire conditions. Scattered shrubs consist of those with the ability to sprout from the root crown following fire. Perennial bunchgrasses and non-native annuals are common and wide spread.

Community 3.3 **Mixed Shrubs and Grasses**

This plant community is dominated by a variety of shrubs that were present in smaller quantities in the Reference State.

Pathway 3.1a **Community 3.1 to 3.2**

Time without disturbance pioneering shrubs germinate and establish from an offsite seed source and sprouting shrubs begin to reappear.

Pathway 3.1b **Community 3.1 to 3.3**

Shrubs may dominate if the site is not experiencing active overburden or if the site is being used for livestock grazing.

Pathway 3.2a **Community 3.2 to 3.1**

Small scale fire or other localized disturbances remove patches of woody vegetation and encourage growth of perennial bunchgrasses and non-native annuals.

Pathway 3.2b

Community 3.2 to 3.3

Removal of disturbance and the absence of fire favors establishment of long-live native perennial vegetation.

Pathway 3.3b

Community 3.3 to 3.1

A high intensity fire will return this community phase to an annual herbaceous plant community.

Pathway 3.3a

Community 3.3 to 3.2

Rest from livestock grazing may increase perennial grass cover. Drought will limit the ability of this community phase pathway to occur. Shrub control is likely necessary to convert and maintain at least a semi-grassland community (Gibbens et al. 2005).

Transition T1

State 1 to 2

Introduction of non-native species due to a combination of factors including; surface disturbance, changes in the kinds of animals and their grazing patterns, drought, changes in fire history or any other type of vegetation removal. Non-natives can alter disturbance regimes significantly from their natural or historic range and change ecological processes therefore creating an unlikely scenario to restore the site back to reference.

Transition T2

State 2 to 3

Repeated disturbance, including wildfire, removes perennial vegetation and decreases soil stability.

Restoration pathway R1

State 3 to 2

Over time, likely more than 25 years with rest from use, perennial vegetation may resemble pre-disturbance conditions.

Additional community tables

Animal community

This site provides suitable habitat for small mammals such as kangaroo rats and ground squirrels, and game and fur mammals such as coyotes and rabbits. Reptiles, raptors and songbirds also frequent this site. Woodrats are common in the associated rock outcrops. Soil depth may be a limiting factor for desert tortoise habitat. Historically, this site may have been grazed by antelope as the valley had a large population at the turn of the century.

This site is poorly suited for grazing. Low production, lack of water, rock outcrops, and slope are the main limitations. In favorable years, annual forbs and grasses may provide limited spring grazing by sheep.

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

Pounds/acre

airdry AUM/AC AC/AUM

Normal Years 300

Hydrological functions

Runoff is very low to high. Hydrologic soil group C - soils having slow infiltration rates when thoroughly wetted and consisting chiefly of soils with a layer that impedes downward movement of water, or soils with moderately fine to

fine texture. These soils have a slow rate of water transmission. Hydrologic soil 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 watertable, soils with a claypan or clay layer at or near the surface, and shallow soils over nearly impervious material. These soils have a very slow rate of water transmission.
Hydrologic condition: good - >70% ground cover (includes litter, grass and brush overstory); fair - 30 to 70% ground cover; poor - <30% ground cover.

Soil Series: Hi Vista
Hydrologic Group: C
Hydrologic Conditions and Runoff Curves:
Good 79; Fair 81; Poor 85

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

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

Recreational uses

This site is highly valued for open space. Recreation users include mountain bikers, joggers, and off-road enthusiasts. Flowering forbs may also attract visitors during the spring. Off-road vehicle use can easily damage the fragile soils and vegetation and should be restricted to existing roads and trails.

Other information

Military Operations - Clearing or other disturbances that destroys the vegetation and soil structure can result in increased erosion, soil blowing, formation of gullies and barren areas. Off-road vehicles should be limited to existing roads and trails. Native species indigenous to this site are recommended for any revegetation efforts. Water bars are effective in controlling erosion on roadways.

Inventory data references

Sampling technique

19 NV-ECS-1
___ SCS-Range 417
11 Other

Type locality

Location 1: Kern County, CA	
Township/Range/Section	T9N R11W S4
General legal description	NW 1/4 Section 4, T9N R11W Rosamond Hills, Kern Co., CA

Contributors

P. Novak-Echenique

Approval

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	05/12/2025
Approved by	Kendra Moseley
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:**
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17. **Perennial plant reproductive capability:**
-