USDA Natural Resources
Conservation Service

# Ecological site R030XA021CA
# Limy Sand 5-7

Last updated: 10/21/2024
Accessed: 11/24/2024

## 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 Limy Sand ecological site is on soils within the fan piedmont below 3000 feet (915 m) elevation. Soils are very deep and found on sand sheets developed from eolian deposition. Although this ecological site is not on steep landforms, with slopes generally less than 10% slope, sandy textures create conditions for somewhat excessively well drained soils.

The central concept for this ecological site is within the Soil Survey of Edwards Air Force Base, California, Parts of Kern, Los Angeles, and San Bernardino Counties on the Cajon 90% component of the Cajon loamy fine sand, 2 to 9 percent slopes map unit.

## Associated sites

| | |
|---|---|
| R030XA009CA | **Alkali Flat 5-7**<br>Alkali Flat 5-7 |
| R030XA020CA | **Arid Fans 5-7**<br>Limy 5-7 |

## Similar sites

| | |
|---|---|
| R030XA029CA | **Shallow Limy 5-7**<br>Shallow Limy 5-7 |
| R030XA020CA | **Arid Fans 5-7**<br>Limy 5-7 |

**Table 1. Dominant plant species**

| | |
|---|---|
| Tree | Not specified |
| Shrub | (1) *Larrea tridentata*<br>(2) *Ambrosia dumosa* |
| Herbaceous | (1) *Achnatherum hymenoides* |

## Physiographic features

This site occurs on sand sheets. Elevations are 1600 to 3000 feet. Slopes range from 2 to 9 percent.

**Table 2. Representative physiographic features**

| | |
|---|---|
| Landforms | (1) Sand sheet |
| Flooding frequency | Rare |
| Elevation | 488–914 m |
| Slope | 2–9% |
| 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) | 178 mm |

## Influencing water features

This site does not have any influencing water features

## Soil features

The soils that characterize this site are very deep and somewhat excessively drained. They are formed in limy granitic alluvium and wind blown sand. Surface textures are loamy sands, loamy fine sands and fine sands. Subsoils are sandy loams, loamy sands and sands. These soils are slightly to moderately alkaline. Available water capacity is low and the hazard of water erosion is slight. Wind erosion hazard is severe. Effective rooting depth is 60 inches or more. Water tables are greater than 60 inches.

Soil Map Units
104 Cajon loamy fine sand, 2-9% slopes
109 Cajon-Norob complex, 2-9% slopes
107 Cajon-Machone complex, 2-9% slopes
118 Helendale-Cajon complex, 2-9% slopes

## Ecological dynamics

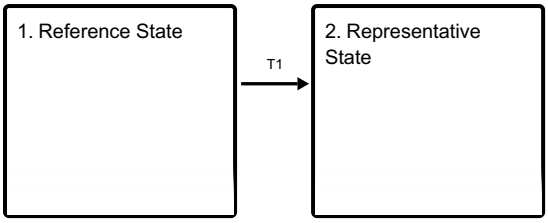
As ecological condition deteriorates, the perennial grasses and shrubs such as winterfat and spiny hopsage decrease. The short-lived perennials such as white bursage and rayless goldenhead will increase. Destructive impacts such as land clearing can also reduce long-lived creosotebush. With a reduction in perennial cover, non-native annual grasses and forbs such as red brome, schismus and filaree will readily invade this site. White burrobush is also an invader on this site.

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 because of the harsh environment and the slow rate of recovery. Thus, fire is not recommended as a management tool to reduce shrub cover.

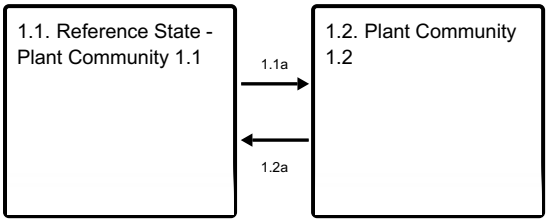
Wildlife Habitat - Management for this site would be to protect it from excessive disturbance and maintain existing plant cover. Habitat-destructive military maneuvers and vehicle activity off designated roads are incompatible with desert tortoise recovery. Close access to non-essential roads and trails and restore to pre-disturbance conditions. Water developments would increase the diversity of this site.

## State and transition model

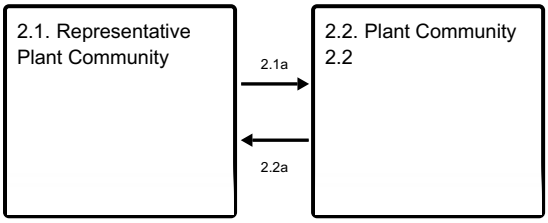
**Ecosystem states**




**State 1 submodel, plant communities**




**State 2 submodel, plant communities**




## State 1
## Reference State

The reference state is representative of the natural range of variability under pristine conditions. Community phase changes are primarily driven by natural disturbances such as long-term drought and insect attack. Wildfire is infrequent and patchy due to low fuel loading and widely spaced shrubs. Timing of disturbance combined with weather events determines plant community dynamics.

## Community 1.1
## Reference State - Plant Community 1.1

The historic site potential, has an open canopy of shrubs less than 3 meters tall. Creosotebush and white bursage form the most characteristic association. 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, white bursage and Indian ricegrass. Potential vegetative composition is about 25% grasses, 10% forbs, and 65% 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 | 146 | 254 | 364 |
| Grass/Grasslike | 56 | 99 | 140 |
| Forb | 22 | 39 | 56 |
| **Total** | **224** | **392** | **560** |

**Table 5. Ground cover**

| | |
|---|---|
| Tree foliar cover | 0% |

| | |
|---|---|
| Shrub/vine/liana foliar cover | 10-16% |
| Grass/grasslike foliar cover | 4-6% |
| Forb foliar cover | 1-2% |
| 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% |

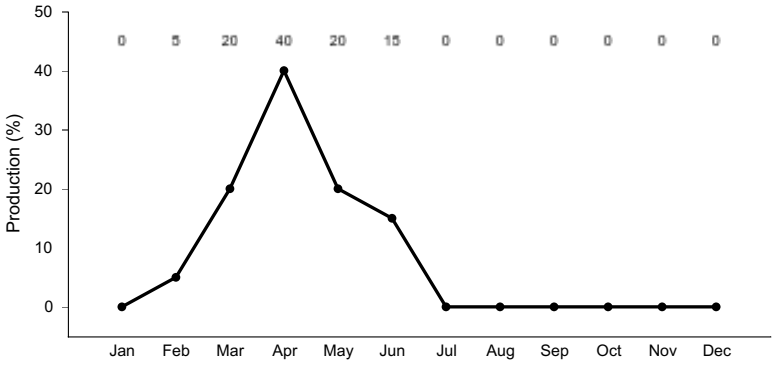



**Figure 2. Plant community growth curve (percent production by month). CA3002, Creosote bush XY. Growth starts in early spring, flowering and seed set occur by July. Dormancy occurs during the hot summer months. With sufficient summer/fall precipitation, some vegetation may break dormancy and produce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

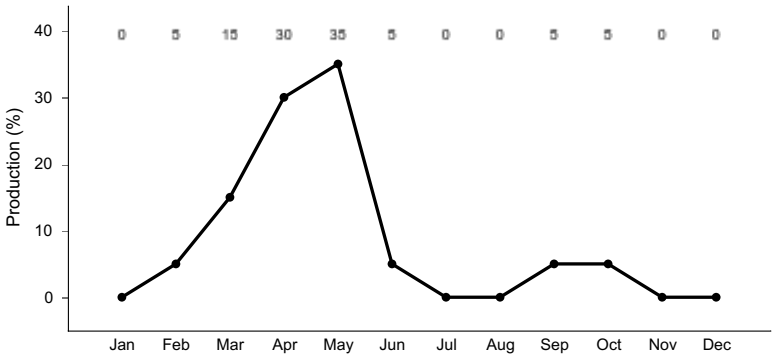



**Figure 3. Plant community growth curve (percent production by month). CA3022, Indian ricegrass. Growth begins in late winter, flowering and fruiting finished by the hot summer months. Early fall rains can trigger a flush of new growth..**

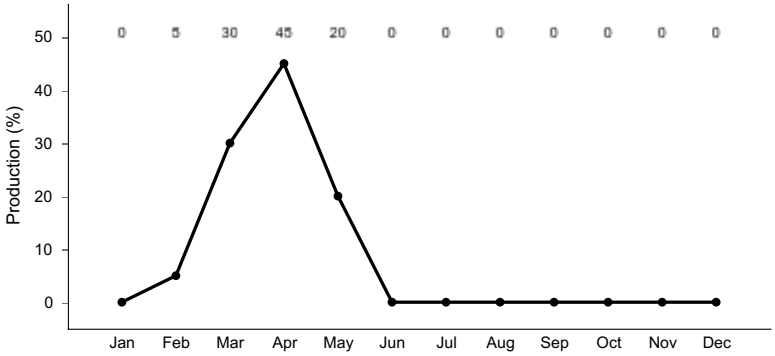



**Figure 4. Plant community growth curve (percent production by month).**

**CA3083, Burrobush XY. Growth begins in mid-winter and by late spring, seed has set..**

### Community 1.2
### Plant Community 1.2

This plant community is characteristic of a post-disturbance plant community. Herbaceous biomass initially increases, sprouting shrubs recover quickly and provide favorable sites for the establishment of shrub seedlings. Post-disturbance plant community composition may vary depending on season of disturbance. This plant community is ‘at-risk’ of invasion by non-native species. Non-natives are able to take advantage of increased availability of critical resources following disturbance.

### Pathway 1.1a
### Community 1.1 to 1.2

Prolonged drought, insect attack, low intensity, patchy wildfire or any other type of vegetation removal.

### Pathway 1.2a
### Community 1.2 to 1.1

Absence from disturbance and natural regeneration over time.

## State 2
## Representative State

The Representative State is characterized by the presence of non-native species. A biotic threshold is crossed with the introduction of non-native annuals that are difficult to remove from the system and have the potential to alter disturbance regimes significantly from their historic range of variability. Theses non-native annuals are highly flammable and promote wildfire where fires historically have been infrequent.

### Community 2.1
### Representative Plant Community

This plant community occurs across the west end of the MLRA. Introduced annuals such as red brome, schismus and filaree have invaded the historic climax plant community and have become a dominant component of the herbaceous cover. It is hypothesized that the change from natives to non-natives is due to a combination of factors such as invasion of alien species, changes in the kinds of animals and grazing pressure, drought, and fire patterns. This site is stable in this condition unless basal cover falls below 5% on slopes greater than 5%.

### Community 2.2
### Plant Community 2.2

This plant community is characteristic of a post-disturbance plant community. Initially herbaceous biomass increases, which may or may not be dominated by non-native annuals. Sprouting shrubs quickly recover and serve as nurse plants for other shrub seedlings. This plant community is ‘at-risk’ of reoccurring wildfire. Increased herbaceous biomass, mainly non-native annuals, promote the spread of and decreases the spatial variability of wildfire.

### Pathway 2.1a
### Community 2.1 to 2.2

Prolonged drought, wildfire, insect/disease attack or other localized disturbance.

### Pathway 2.2a
### Community 2.2 to 2.1

Absence from disturbance and natural regeneration over time.

### 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.

## 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 squirrels. Reptiles, raptors and songbirds also frequent this site. The Joshua trees provide song perches, lookout posts and nest sites for birds. They also provide protective havens for birds and lizards, particularly the desert night lizard. These soils provide suitable habitat for desert tortoise where subsoil textures are sandy loams and loamy sands.

This site is suitable for spring grazing by sheep and cattle where water is available. During favorable years, annual forbs and grasses provide abundant forage.

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

Pounds/acre
air dry

Normal Years 350

## Hydrological functions

Runoff is very low or low. Hydrologic soil group A - soils having high infiltration rates even when thoroughly weeted and consisting chiefly of deep, well-drained to excessively drained sands or gravels. These soils have a high 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: Cajon
Hydrologic Group: A
Hydrologic Conditions and Runoff Curves:
Good 49; Fair 55; Poor 63

## Recreational uses

This site is highly valued for open space. Recreation users include mountain bikers, joggers and other off-road enthusiasts. Flowering wildflowers may also attract visitors during the spring.

## Other information

Military Operations - Land clearing or other disturbances that destroys the vegetation and soil structure can result in increased erosion, soil blowing and barren areas. Off-road vehicles should be limited to existing roads and trails. Revegetation with native species indigenous to this site is recommended for disturbed areas.

## Inventory data references

Sampling technique

_5_ NV-ECS-1
_1_ SCS-Range 417

___ Other

## Type locality

| Location 1: Kern County, CA | |
|---|---|
| Township/Range/Section | T36 R8w S10n |
| General legal description | NW 1/4 Section 36, T10N, R8W Leuhman Ridge area, Kern 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

Kendra Moseley, 10/21/2024

## 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 | 11/24/2024 |
| 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:**

17. **Perennial plant reproductive capability:**