USDA Natural Resources Conservation Service

# Ecological site R030XA054NV
# Limy Hill 5-7 P.Z.

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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 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 Hill 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); Kern County, Northeastern Part, and Southeastern Part of Tulare County, California (CA668); Mojave Desert Area, Northwest Part, California (CA682) on both Jawbone major components in the 3250 - Jawbone association, 30 to 60 percent slopes map unit.

## Associated sites

| | |
|---|---|
| R030XA058NV | **LIMY 5-7 P.Z.** |

## Similar sites

| | |
|---|---|
| R030XA058NV | **LIMY 5-7 P.Z.**<br>More productive site; not on hill landform |
| R030XA059NV | **GRAVELLY HILL 5-7 P.Z.**<br>ATCO codominant shrub |
| R030XB073NV | **VOLCANIC SLOPE 5-7 P.Z.**<br>Not on hill landform; LEFR2 major shrub |
| R030XB067NV | **BOULDERY HILL 5-7 P.Z.**<br>Less productive site |

**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 hills and lower mountain sideslopes on all exposures. Slopes range from 30 to 60 percent. Elevations are between 1600 to 3000 feet.

**Table 2. Representative physiographic features**

| | |
|---|---|
| Landforms | (1) Hill<br>(2) Mountain slope |
| Elevation | 488–914 m |
| Slope | 30–60% |

## Climatic features

The climate is hot and arid, with mild winters and very hot summers. Precipitation is greatest in the winter with a lesser secondary peak in summer, typical of the Mojave Desert. Average annual precipitation is about 5 to 7 inches. Mean annual air temperature is 58 to 68 degrees F. The average growing season is about 160 to 260 days.

**Table 3. Representative climatic features**

| | |
|---|---|
| Frost-free period (average) | 260 days |
| Freeze-free period (average) | |
| Precipitation total (average) | 178 mm |

## Influencing water features

There are no influencing water features associated with this site.

## 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.

**Table 4. Representative soil features**

| | |
|---|---|
| Surface texture | (1) Loamy sand |
| Family particle size | (1) Loamy |
| Drainage class | Somewhat excessively drained |
| Soil depth | 10–102 cm |
| Surface fragment cover <=3" | 5–55% |

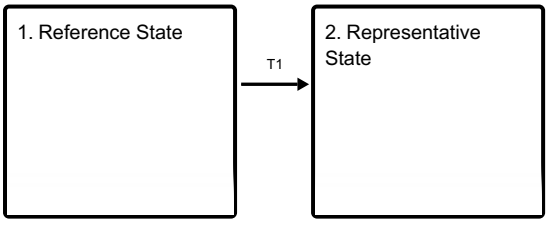
## Ecological dynamics

As ecological condition deteriorates, creosotebush and white bursage increase as perennial grasses decrease. Species likely to invade this site are annual forbs and grasses such filaree and red brome.

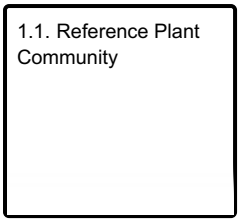
Fire Ecology:
Fires in the Mojave desert are infrequent and of low severity because production of annual and perennial herbs seldom provides a fuel load capable of sustaining fire. Fire generally kills white bursage. However, most white bursage plants burned because their canopies contained numerous small branches in proximity to herbaceous fuels. Fires in creosotebush scrub were an infrequent event in pre-settlement desert habitats, because fine fuels from winter annual plants were probably sparse, only occurring in large amounts during exceptionally wet winters. Fire kills many creosotebush. Creosotebush is poorly adapted to fire because of its limited sprouting ability. Creosotebush survives some fires that burn patchily or are of low severity. Indian ricegrass can be killed by fire, depending on severity and season of burn. Indian ricegrass reestablishes on burned sites through seed dispersed from adjacent unburned areas. Desert needlegrass has persistent dead leaf bases, which make it susceptible to burning. Fire removes the accumulation; a rapid, cool fire will not burn deep into the root crown and surviving tufts will resprout.

## State and transition model

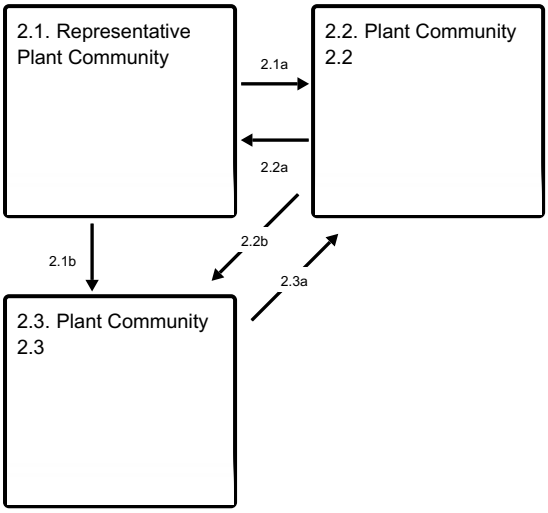
**Ecosystem states**



**State 1 submodel, plant communities**




**State 2 submodel, plant communities**




## State 1
## Reference State

### Community 1.1
### Reference Plant Community

The reference plant community is dominated by creosotebush and white bursage. Potential vegetative composition is about 20% grasses, 10% forbs and 70% shrubs. Approximate ground cover (basal and crown) is 4 to 8 percent.

**Table 5. Annual production by plant type**

| Plant Type | Low (Kg/Hectare) | Representative Value (Kg/Hectare) | High (Kg/Hectare) |
|---|---|---|---|
| Shrub/Vine | 39 | 118 | 196 |
| Grass/Grasslike | 11 | 34 | 56 |
| Forb | 6 | 17 | 28 |
| **Total** | **56** | **169** | **280** |

## 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 is characterized by the presence of non-native species. Species composition and ecological function is similar to the reference plant community. However, ecological resilience is reduced by the presence of non-natives. This plant community responds differently following disturbance, when compared to non-invaded plant

communities.

### 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. Seedlings are dominated by white bursage and Encelia. 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.

### Community 2.3
### Plant Community 2.3

This plant community is characterized by heavy surface disturbance. Total shrub canopy is reduced. Non-natives persist and may increase with increased disturbance. Shrubs experience reduced vigor and reproductive capacity due to soil compaction and competition from non-natives.

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

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

### Pathway 2.1b
### Community 2.1 to 2.3

Reoccurring surface disturbance.

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

Absence from disturbance and natural regeneration over time.

### Pathway 2.2b
### Community 2.2 to 2.3

Reoccurring surface disturbance.

### Pathway 2.3a
### Community 2.3 to 2.2

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 or any other type of vegetation removal.

## Additional community tables

**Table 6. Community 1.1 plant community composition**

| Group | Common Name | Symbol | Scientific Name | Annual Production (Kg/Hectare) | Foliar Cover (%) |
|---|---|---|---|---|---|
| **Grass/Grasslike** | | | | | |
| 1 | **Primary Perennial Grasses** | | | 4–30 | |
| | Indian ricegrass | ACHY | *Achnatherum hymenoides* | 3–17 | – |
| | desert needlegrass | ACSP12 | *Achnatherum speciosum* | 1–13 | – |
| 2 | **Secondary Perennial Grasses** | | | 1–9 | |
| | threeawn | ARIST | *Aristida* | 1–6 | – |
| | low woollygrass | DAPU7 | *Dasyochloa pulchella* | 1–6 | – |
| | squirreltail | ELEL5 | *Elymus elymoides* | 1–6 | – |
| 3 | **Annual Grasses** | | | 1–9 | |
| **Forb** | | | | | |
| 4 | **Perennial forbs** | | | 2–13 | |
| | globemallow | SPHAE | *Sphaeralcea* | 1–6 | – |
| 5 | **Annual forbs** | | | 1–26 | |
| | plantain | PLANT | *Plantago* | 1–6 | – |
| **Shrub/Vine** | | | | | |
| 6 | **Primary shrubs** | | | 68–119 | |
| | creosote bush | LATR2 | *Larrea tridentata* | 43–76 | – |
| | burrobush | AMDU2 | *Ambrosia dumosa* | 26–43 | – |
| 7 | **Secondary shrubs** | | | 17–43 | |
| | fourwing saltbush | ATCA2 | *Atriplex canescens* | 2–9 | – |
| | shadscale saltbush | ATCO | *Atriplex confertifolia* | 2–9 | – |
| | Nevada jointfir | EPNE | *Ephedra nevadensis* | 2–9 | – |
| | desert pepperweed | LEFR2 | *Lepidium fremontii* | 2–9 | – |
| | desert-thorn | LYCIU | *Lycium* | 2–9 | – |
| | Nevada dalea | PSPO | *Psorothamnus polydenius* | 2–9 | – |

## Animal community

Livestock Interpretations:
This site has limited value for livestock grazing, due to the low forage production, steep slopes and stony surfaces. Indian ricegrass is highly palatable to all classes of livestock in both green and cured condition. It supplies a source of green feed before most other native grasses have produced much new growth. Creosotebush is unpalatable to livestock. Consumption of creosotebush may be fatal to sheep. Desert needlegrass produces considerable basal foliage and is good forage while young. Young desert needlegrass is palatable to all classes of livestock. Mature herbage is moderately grazed by horses and cattle but rarely grazed by sheep. Creosotebush is unpalatable to livestock. Consumption of creosotebush may be fatal to sheep. White bursage is of intermediate forage value. It is fair to good forage for horses and fair to poor for cattle and sheep. However, because there is often little other forage where white bursage grows, it is often highly valuable to browsing animals and is sensitive to browsing.

Stocking rates vary over time depending upon season of use, climate variations, site, and previous and current management goals. A safe starting stocking rate is an estimated stocking rate that is fine tuned by the client by adaptive management through the year and from year to year.

Wildlife Interpretations:
Creosotebush is unpalatable to most browsing wildlife. White bursage is an important browse species for wildlife. Indian ricegrass is eaten by pronghorn in "moderate" amounts whenever available. In Nevada it is consumed by desert bighorns. A number of heteromyid rodents inhabiting desert rangelands show preference for seed of Indian ricegrass. Indian ricegrass is an important component of jackrabbit diets in spring and summer. In Nevada, Indian

ricegrass may even dominate jackrabbit diets during the spring through early summer months. Indian ricegrass seed provides food for many species of birds. Doves, for example, eat large amounts of shattered Indian ricegrass seed lying on the ground. Creosotebush is unpalatable to most browsing wildlife. Desert bighorn sheep and feral horses and burros will graze desert needlegrass.

## Hydrological functions

The water intake rate is moderate and available water capacity is low. Runoff is rapid and these soils are well drained.

## Other products

Indian ricegrass was traditionally eaten by some Native Americans. The Paiutes used seed as a reserve food source. Creosotebush has been highly valued for its medicinal properties by Native Americans. It has been used to treat at least 14 illnesses. Twigs and leaves may be boiled as tea, steamed, pounded into a powder, pressed into a poultice, or heated into an infusion. Creosotebush has been highly valued for its medicinal properties by Native Americans. It has been used to treat at least 14 illnesses. Twigs and leaves may be boiled as tea, steamed, pounded into a powder, pressed into a poultice, or heated into an infusion. White bursage is a host for sandfood, a parasitic plant. Sandfood was a valuable food supply for Native Americans.

## Other information

Desert needlegrass may be used for groundcover in areas of light disturbance, but it is susceptible to excessive trampling. Once established, creosotebush may improve sites for annuals that grow under its canopy by trapping fine soil, organic matter, and symbiont propagules. It may also increase water infiltration and storage. White bursage may be used to revegetate disturbed sites in southwestern deserts.

## Other references

Fire Effects Information System (Online; http://www.fs.fed.us/database/feis/plants/).

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).

USDA-NRCS Plants Database (Online; http://www.plants.usda.gov).

## Contributors

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## 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) | P NOVAK-ECHENIQUE |
| Contact for lead author | State Rangeland Management Specialist. |
| Date | 04/02/2014 |
| Approved by | Kendra Moseley |
| Approval date | |
| Composition (Indicators 10 and 12) based on | Annual Production |

## Indicators

1. **Number and extent of rills:** Rills are none. Rock fragments armor the soil surface against erosion.

2. **Presence of water flow patterns:** Water flow patterns are none to rare. A few may occur on steeper slopes (short <1m) after summer convection storms.

3. **Number and height of erosional pedestals or terracettes:** Pedestals and terracettes are none.

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare ground is variable (15-25%), depending on amount of surface rock fragments. Rock fragments up to 70%.

5. **Number of gullies and erosion associated with gullies:** None. Natural drainages may be observed on steeper side slopes.

6. **Extent of wind scoured, blowouts and/or depositional areas:** None

7. **Amount of litter movement (describe size and distance expected to travel):** Litter typically remains in place. Fine litter (foliage from grasses and annual and perennial forbs) may move the distance of slope length (<10 ft) during intense summer convection storms or rapid snowmelt events. Persistent litter (large woody material) will remain in place expect during large rainfall events.

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Soil stability values should be 3 to 6 depending on soil textures and canopy cover. (To be field tested.)

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Soil surface structure is typically weak thin platy. Soil surface colors are pale browns and the soils have an ochric epipedon. Organic matter of the surface 2 to 3 inches is less than 1 percent.

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Sparse shrub canopy (5-10%) and associated litter provide some protection from raindrop impact.

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** None. Subangular blocky structure is not to be interpreted as compacted layers.

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: tall evergreen shrubs (creosote bush) > deciduous shrubs

    Sub-dominant: cool-season perennial grasses > perennial forbs > annual forbs > warm-season perennial grasses > annual grasses

    Other: succulents.

    Additional:

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Dead branches within individual shrubs are common and standing dead shrub canopy material may be as much as 25% of total woody canopy.

14. **Average percent litter cover (%) and depth ( in):** Between plant interspaces 5-15% and depth of litter is ±¼ inch. Litter is concentrated under shrubs and generally stays in place.

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** For normal or average growing season ~150 lbs/ac. Favorable years ±250 lbs/ac and unfavorable years ±50 lbs/ac.

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:** Potential invaders include Red brome, red-stem filaree, annual mustards, and Mediterranean grass.

17. **Perennial plant reproductive capability:** All functional groups should reproduce in average and above-average rainfall years. Little growth and reproduction occurs during extreme drought and extended drought periods.