USDA Natural Resources
Conservation Service

Ecological site R030XA023CA
Loamy Bottom 5-7

Last updated: 10/21/2024
Accessed: 05/12/2025

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 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

This ecological site occurs on lake plains within the Arid Western Mojave Land Resource Region. The lake plain land form is distinguished from the playa landform by the presence of vegetation whereas the playa floor is barren (Peterson 1981). The presence of mesquite at this site suggests a water table is within 30 feet (9m) of the soil surface (Laity 2003). The particle size control section is coarse-loamy or loamy skeletal with a calcic or argillic subsurface horizon.

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 Leuhman component of the 125 - Leuhman loamy sand, 0 to 2 percent slopes map unit.

This is a group concept and provisional STM that also covers R030XY164CA.

Associated sites

R030XA025CA	**Saline Bottom** Saline Bottom
R030XA031CA	**Sodic Dunes 5-7" P.Z.** Sodic Dune 5-7
R030XA032CA	**Sodic Flat** Sodic Flat

Similar sites

R030XA025CA	**Saline Bottom** Saline Bottom [SPAI, ATCO dominant species]

Table 1. Dominant plant species

Tree	(1) *Prosopis glandulosa*
Shrub	(1) *Atriplex*
Herbaceous	(1) *Sporobolus airoides*

Physiographic features

This site occurs on floodplains on basin floors. Elevations are 2270 to 2375 feet. Slopes range from 0 to 2 percent.

Table 2. Representative physiographic features

Landforms	(1) Alluvial flat
Flooding duration	Very brief (4 to 48 hours)
Flooding frequency	Occasional
Ponding duration	Very brief (4 to 48 hours)
Ponding frequency	Occasional

Elevation	692–724 m
Slope	0–2%
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

Soil features

The soils that characterize this site are very deep and moderately well drained. They are formed in lacustrine sediments. Surface textures are loamy sands. Subsoils are moderately fine textured, moderately to strongly alkaline and sodic. The substratum to 60 inches is sandy loam and loamy sand. Available water capacity is moderate and the hazard of water erosion is slight. Wind erosion hazard is severe. Effective rooting depth is 60 inches or more. A perched water table occurs at greater than 60 inches that supplies moisture to deep rooted shrubs and grasses. These soils are frequently flooded for several days after heavy winter rains.

Soil Map Units

125 Leuhman loamy sand, 0-2% slopes

Ecological dynamics

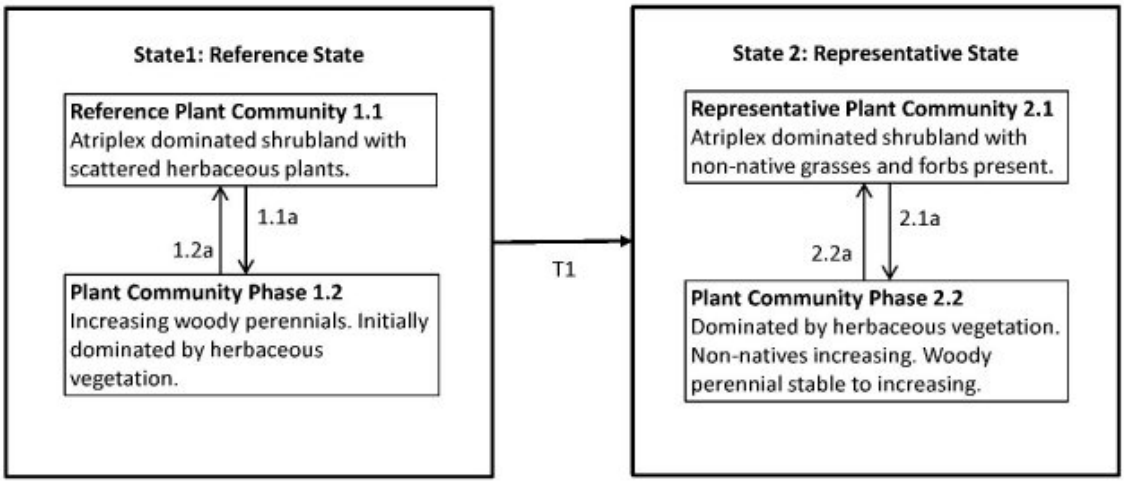
As ecological condition deteriorates, the phreatophytic shrubs and grasses decrease and the xerophytic shrubs such as shadscale and spinescale increase. The mesquite has a patchy distribution and is limited to major drainage channels. Mesquite is typically an increaser, however die-off of mesquite and other phreatophytes would occur with watertable drawdown or changes of surface runoff. This loss of perennial cover would allow for the invasion of non-native annuals including foxtail barley, schismus, red brome, filaree and mustards. Gully and other accelerated erosion would also occur. Threadleaf snakeweed is also an invader of this site.

Water is the main limitation on this site during most of the year. The mesquite trees provide valuable habitat for wildlife species, thus, fuel wood gathering should be limited. Management would be to protect this site from excessive disturbance and maintain existing plant cover.

Littleleaf horsebrush is toxic to sheep.

The foliage of the saltbushes appears to have fire-retarding qualities associated with the salt content of the leaves. A severe fire, however, can kill the top growth and can be used as a range management tool to decrease the brush and tree species and increase the phreatophytic grass cover. This is not recommended where a site is in poor condition due to changes in ground or surface hydrology.

State and transition model



State 1
Reference State

The reference state is representative of the natural range of variability under pristine conditions. Plant communities are dynamic in response to changes in disturbance regimes and weather patterns. Plant community phase changes are primarily driven by long-term drought. Historically, fire had little impact in this system due to low fuel loading and widely spaced vegetation.

Community 1.1
Reference Plant Community

The historic site potential is characterized by an open or continuous canopy of trees and shrubs less than 10 meters tall and is dominated by *Prosopis glandulosa* var. torreyana and Atriplex spp. Understories are productive in favorable rainfall years, and are dominated by perennial and annual grasses. This site is stable in this condition. The representative natural plant community is Mesquite Bosque or Mesquite series. This community is dominated by mesquite and saltbushes. Potential vegetative composition is about 25% grasses, 5% forbs, and 70% shrubs and trees. 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	392	785	1569
Grass/Grasslike	140	280	560
Forb	28	56	112
Total	**560**	**1121**	**2241**

Table 5. Ground cover

Tree foliar cover	0%
Shrub/vine/liana foliar cover	17-28%
Grass/grasslike foliar cover	6-10%
Forb foliar cover	12-20%
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%

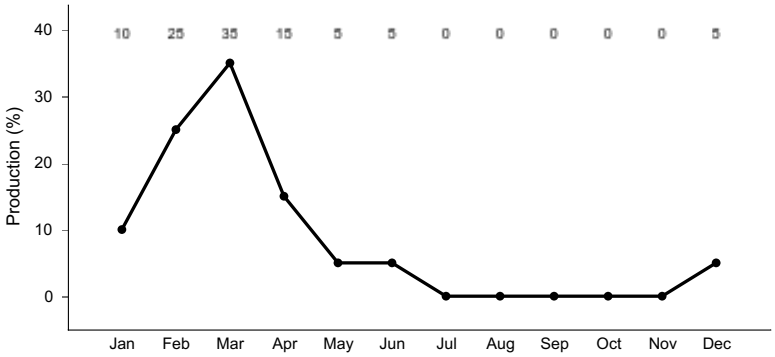


Figure 2. Plant community growth curve (percent production by month). CA3001, Spinescale. Growth starts in late winter. Flowering and seed set occur by June. Seeds remain on the shrubs for several months. Dormancy occurs during the hot summer months..

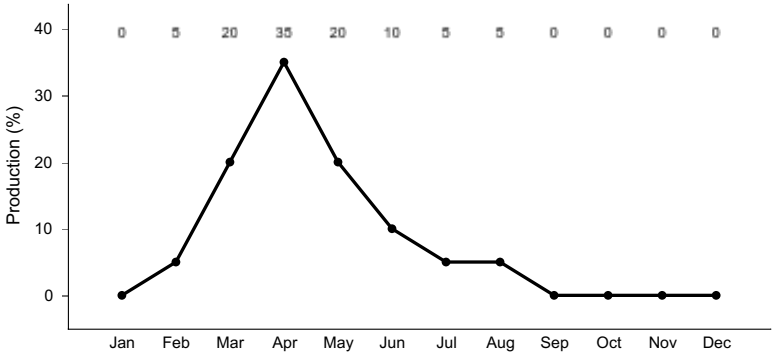


Figure 3. Plant community growth curve (percent production by month). CA3003, Shadscale. Growth starts in early spring. Flowering and seed set occur by July. Seeds stay on the shrub for several months. Dormancy occurs during the hot summer months..

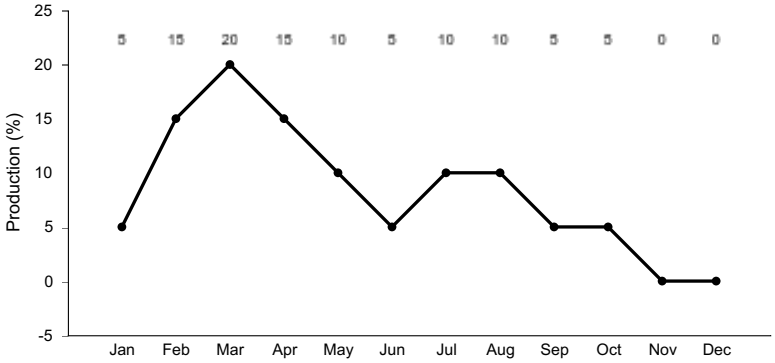


Figure 4. Plant community growth curve (percent production by month). CA3016, Western honey mesquite. Growth begins in early spring; leaves grow in two time periods, January to April and July to September. Flowers develop from February to May. Pods begin maturing in April to May and may continue until August..

Community 1.2
Plant Community 1.2

This plant community is characteristic of an early seral, post- disturbance plant community. Initially, this plant community phase is heavily dominated by herbaceous vegetation. Perennial grasses provide favorable sites for the establishment of shrub seedlings. This plant community is considered at risk of invasion by non-native annuals. Non-natives take advantage of increased availability of critical resources following a fire or other disturbance.

Pathway 1.1a
Community 1.1 to 1.2

Wildfire, prolonged drought, disease, insect attack, or any other type of brush 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 annuals in the understory. Ecological resilience of the site is reduced by the presence of non-natives. 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 natural or historic range of disturbances. Introduced annuals such as red brome and redstem stork's bill have invaded the reference plant community and have become a dominant component of the herbaceous cover. These non-natives annuals are highly flammable and promote wildfires where fires historically have been infrequent.

Community 2.1
Representative Plant Community

Plant community composition is similar to the reference plant community with the trace of non-natives in the understory. Ecological processes have not been compromised at this time, but ecological resilience is reduced by the presence of non-natives. This plant community will respond differently following a disturbance, when compared to the reference plant community. Non-natives likely to invade this site include red brome and Mediterranean grass. Increased fine fuels provided by non-native annuals can drastically change the natural fire return interval.

Community 2.2
Plant Community 2.2

This plant community is characteristic of an early seral, post-disturbance plant community and may or may not be dominated by non-native annuals. Perennial native bunchgrasses recover quickly and provide favorable sites for the establishment of shrub seedlings. Disturbance may result in increased bare ground, increasing the risk of soil erosion. This plant community is considered at-risk, due to the increased fuel loading from herbaceous biomass. Management should be focused on minimizing the threat of wildfire and reducing anthropogenic impacts to protect soil and ecological resources.

Pathway 2.1a
Community 2.1 to 2.2

Surface disturbance or fire removes mature shrubs and favors an increase of herbaceous vegetation, native and non-native.

Pathway 2.2a
Community 2.2 to 2.1

Recovery of woody perennials and absence from disturbance.

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 or changes in fire history.

Additional community tables

Animal community

The seeds of the mesquite are extensively eaten by rabbits, Gambel quail, ravens and various small mammals. Mesquite also provides valuable shade for wildlife and nesting habitat for songbirds. Hawks, owls, mourning dove, coyotes, skunks, and raccoons also occur on this site. Habitat for desert tortoise is limited due to the occurrence of ponding and flooding.

Other Mgt. Considerations: This site is suitable for winter and spring grazing by sheep and also cattle where water is available. The mesquite seeds are readily eaten by domestic livestock. The perennial grasses and annual forbs also provide valuable forage.

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

Pounds/acre Air dry
AC/AUM
Normal Years 1000

Hydrological functions

Runoff is negligible or low. 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: Leuhman
Hydrologic Group: D
Hydrologic Conditions and Runoff Curves:
Good 84; Fair 86; Poor 88

Recreational uses

This site is highly valued for open space and is used by mountain bikers, joggers, off-road enthusiasts and photographers. Off-road vehicle use can easily damage the fragile soil and vegetative cover and should be restricted to existing roads and trails.

Other information

Military Operations - As these soils are subject to moderate wind and water erosion, clearing of vegetation can result in increased soil blowing, channel bank erosion and barren areas. Vehicular traffic should be confined to existing roads. Levees, diversions, and/or culverts may be needed to protect roads from flooding. Improperly designed or installed diversions will create gullies, increase soil erosion and result in sedimentation downstream.

Inventory data references

Sampling technique

_5_ NV-ECS-1
___ SCS-Range 417
___ Other

Type locality

Location 1: Los Angeles County, CA	
Township/Range/Section	T8N R10W S3
General legal description	NW 1/4 Section 3, T8N, R10W Southeast of Buckhorn Lake, Los Angeles, 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.

Laity, J. 2003. Aeolian destabilization along the Mojave River, Mojave Desert, California: linkages among fluvial, groundwater, and aeolian systems. Physical Geography, 24(3), 196-221.

Peterson, F.F. 1981. Landforms of the Basin and Range Province defined for soil survey.

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	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:**

17. **Perennial plant reproductive capability:**