USDA Natural Resources
Conservation Service

Ecological site R030XA001CA
Cool Loamy Fan Remnants 5-7

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

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.

LRU notes

Arid Western Mojave Land Resource Unit

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 Cool Loamy Fan Remnants ecological site is found on fan remnants above 3800 feet (1200 m) on soils which form in alluvium from predominantly igneous sources. Soil surfaces are moderately alkaline which may be due to the relict lacustrine deposits in the area.

The central concept is with the Soil Survey of Benton-Owens Valley Area Parts of Inyo and Mono Counties, California; map unit 207, Helendale-Cajon complex, 0 to 5 percent slopes.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Menodora spinescens* (2) *Picrothamnus desertorum*
Herbaceous	(1) *Achnatherum speciosum*

Physiographic features

This site occurs on fan terraces. Elevations are 3800 to 4500 feet. Slopes range from 0 to 15 percent.

Table 2. Representative physiographic features

Landforms	(1) Alluvial fan
Elevation	3,800–4,500 ft
Slope	0–15%
Aspect	Aspect is not a significant factor

Climatic features

The climate on this site is characterized by mild cool winters (30 to 60 degrees F) and hot dry summers (70 to 100 degrees F). The average annual precipitation ranges from 5 to 7 inches, with most falling as rain from November to March.

The average frost-free period is 200 to 235 days.

Table 3. Representative climatic features

Frost-free period (average)	235 days
Freeze-free period (average)	
Precipitation total (average)	7 in

Influencing water features

Soil features

The soils that characterize this site are moderate to very deep and well-drained. They are formed in mixed alluvium predominantly from igneous sources. Surface textures are sands, loamy sands, and sandy loams. Available water

capacity ranges from very low to moderate and the hazard of water erosion is slight. Wind erosion hazard is slight. Effective rooting depth is 20 to 60 inches or more. Centennial has a fractured lime-cemented hardpan from 20 to 40 inches.

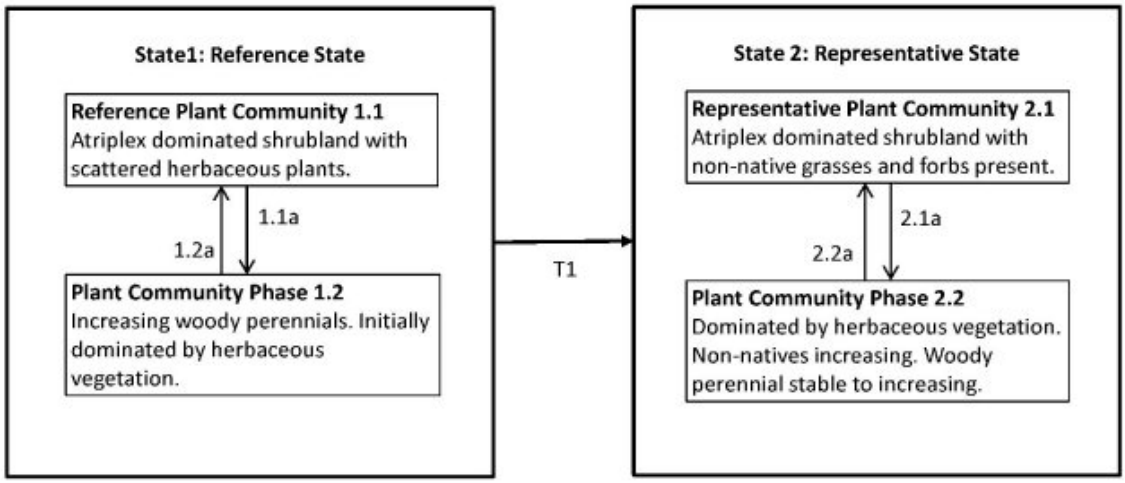
Ecological dynamics

The plant community is dominated by spiny menodora, bud sagebrush, and desert needlegrass. Potential vegetation composition is about 60% shrubs, 30% grasses, and 10% forbs.

Overgrazing this site would cause a decrease in the perennial grass species. The more unpalatable shrubs, such as white bursage, Anderson wolfberry, and creosotebush, would increase. Species likely to invade this site are Russian thistle and white burrobrush. Inclusions of south-facing slopes are dominated by creosotebush and white bursage.

Fire is very infrequent at this site.

State and transition model



State 1
Reference State - Plant Community 1

Community 1.1
Reference Plant Community

The plant community is dominated by spiny menodora, bud sagebrush, and desert needlegrass. Potential

vegetation composition is about 60% shrubs, 30% grasses, and 10% forbs. 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.

Table 4. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Shrub/Vine	180	300	420
Grass/Grasslike	90	150	210
Forb	30	50	70
Total	**300**	**500**	**700**

Table 5. Ground cover

Tree foliar cover	0%
Shrub/vine/liana foliar cover	12-21%
Grass/grasslike foliar cover	6-11%
Forb foliar cover	2-4%
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%

Community 1.2
Plant Community Phase 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 brush removal of any type.

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. Plant communities in this state function very similarly to the reference state, however, ecological resilience may be reduced by the presence of the non-natives. Introduced annuals such as red brome, Mediterranean grass and redstem filaree have invaded the reference plant community and have become a component of the herbaceous

cover. These non-native annuals are highly flammable and promote wildfires where fires historically have been infrequent. Mature shadscale persists after this invasion by non-native annuals, however shrubs seedling and desirable grasses suffer reduced vigor and limited reproductive capability due to increased competition from non-natives.

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 Phase 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. 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.

Additional community tables

Animal community

Occasional winter use by mule deer

Mojave ground squirrel habitat

LIVESTOCK GRAZING:
This site is unleased at present.

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 500

Hydrological functions

Runoff is slow to medium. The erosion hazard is slight.

Soil Series:Cajon
Hydrologic Group:A
Hydrologic Conditions and Runoff Curves:
Good 41; Fair 46; Poor 61

Soil Series:Centennial
Hydrologic Group:C
Hydrologic Conditions and Runoff Curves:
Good 75; Fair 77;Poor 84

Soil Series:Frye
Hydrologic Group:C
Hydrologic Conditions and Runoff Curves:
Good 75; Fair 77;Poor 84

Soil Series:Helendale
Hydrologic Group:B
Hydrologic Conditions and Runoff Curves:
Good 63; Fair 66;Poor 76

Soil Series:Neuralia
Hydrologic Group:B
Hydrologic Conditions and Runoff Curves:
Good 63; Fair 66;Poor 76

Soil Series:Timosea
Hydrologic Group:B
Hydrologic Conditions and Runoff Curves:
Good 63; Fair 66;Poor 76

Recreational uses

This site is located on City of Los Angeles, Department of Water and Power (LADWP) property, and is open to public use.

Type locality

Location 1: Inyo County, CA	
Township/Range/Section	T19S R37E S33
General legal description	NW 1/4 Section 33, T19S, R37E Three miles southeast of Olancha, Inyo 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

P. Novak
Dustin Detweiler

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	05/10/2025
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:**