

## **Ecological site R030XA016CA**

### **Deep Sand 5-7**

Last updated: 10/21/2024  
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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

This ecological site is found on sand dunes and sand sheets burying an alluvial flat, flood-plain step or similar fluvial landform. Soils are within the Torripsamments great group.

This is a group concept and provisional STM that also covers the following ecological sites: R030XA019CA, R030XA027CA, R030XA015CA, R030XY120UT

## Associated sites

R030XA014CA	<b>Clay Plain</b> Clay Plain 5-7
R030XA031CA	<b>Sodic Dunes 5-7" P.Z.</b> Sodic Dune 5-7
R030XA009CA	<b>Alkali Flat 5-7</b> Alkali Flat 5-7

## Similar sites

R030XA022CA	<b>Loamy 5-7</b> Loamy 5-7
R030XA019CA	<b>Dune 5-7" p.z.</b> Dune 5-7. Essentially the same ecological site concept as R030XA016CA.
R030XA027CA	<b>Sandy 5-7" P.Z.</b> Essentially the same ecological site concept as R030XA016CA.

**Table 1. Dominant plant species**

Tree	Not specified
Shrub	(1) <i>Atriplex confertifolia</i> (2) <i>Ambrosia dumosa</i>
Herbaceous	(1) <i>Achnatherum hymenoides</i>

## Physiographic features

This site occurs on stabilized sand dunes. Elevations are 2270 to 2375 feet. Slopes range from 2 to 15 percent.

**Table 2. Representative physiographic features**

Landforms	(1) Dune
Elevation	692–724 m
Slope	2–15%
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**

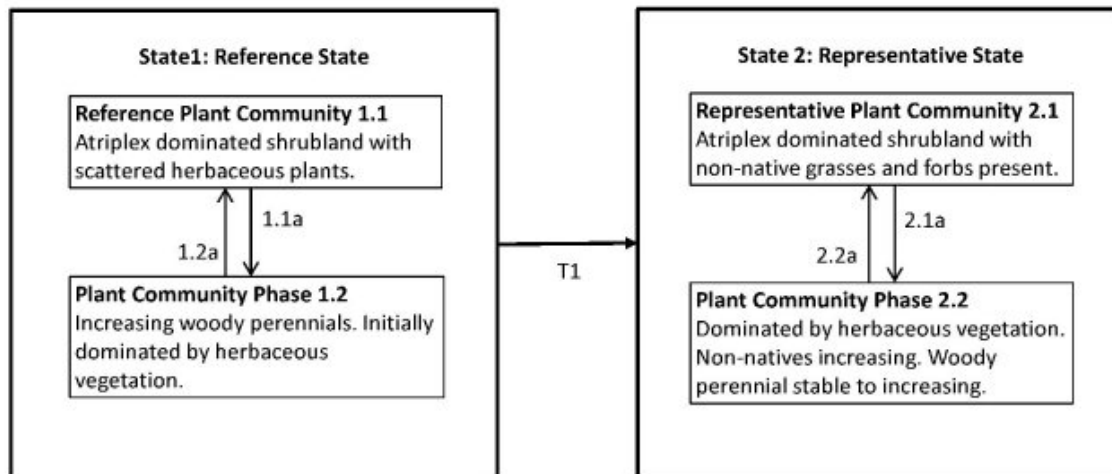
The soils that characterize this site are very deep and somewhat excessively drained. They are formed in wind blown sand-sandy alluvium dominately from granitic rocks. Surface textures are loamy sands. Subsoils are loamy sands and sands. Available water capacity is low and the hazard of water erosion is slight. Wind erosion hazard is severe. Effective rooting depth is 60 inches or more. Water tables are greater than 60 inches.

**Ecological dynamics**

As ecological condition deteriorates, the perennial grasses decrease and shadscale and white bursage become more dominant. Allscale saltbush, Nevada ephedra and horsebrush also increase. Species likely to invade this site include burrobrush, threadleaf snakeweed and non-native annual forbs and grasses such as Russian thistle, bromes and schismus.

Fire is infrequent and is not recommended as a management tool due to the sparse cover, severe hazard of wind erosion and slow recovery rates.

**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

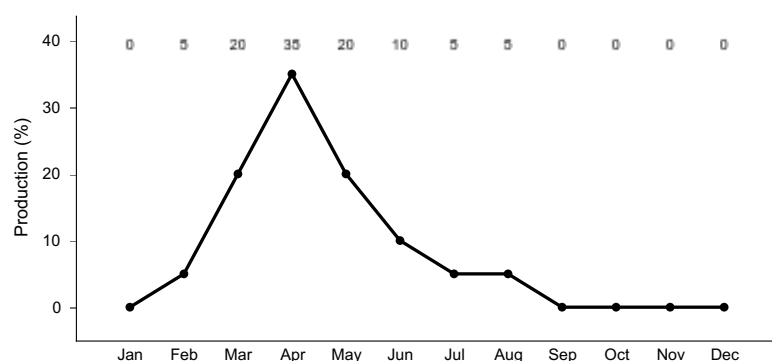
The representative natural plant community is Stabilized Desert Dunes or Shadscale series. This community is dominated by shadscale, white bursage and Indian ricegrass. Potential vegetative composition is about 25% grasses, 10% forbs, and 65% shrubs. Perennial grasses and forbs are common. Annual forbs and grasses are seasonally present. Total cover increases as the dunes are progressively stabilized. Dunes retain water just below the sand surface allowing perennial vegetation to survive long drought periods. This site is stable in this condition. 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**

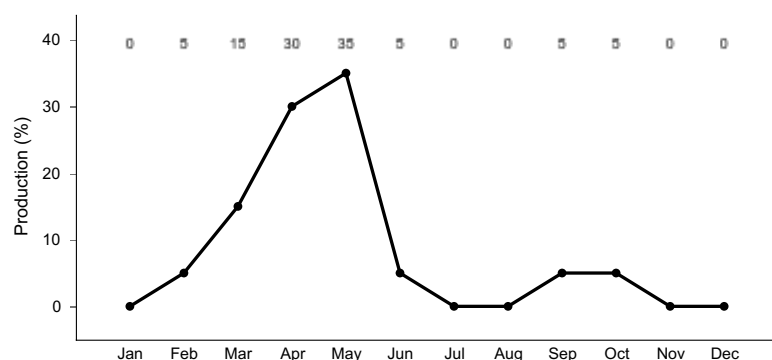
Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Shrub/Vine	182	291	364
Grass/Grasslike	71	112	140
Forb	28	45	56
<b>Total</b>	<b>281</b>	<b>448</b>	<b>560</b>

**Table 5. Ground cover**

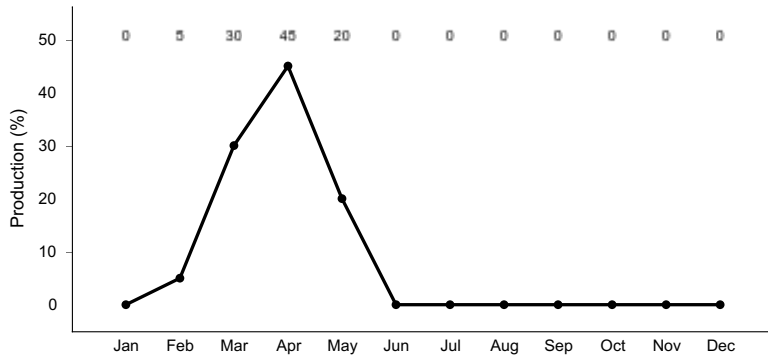
Tree foliar cover	0%
Shrub/vine/liana foliar cover	6-16%
Grass/grasslike foliar cover	2-6%
Forb foliar cover	1-2%
Non-vascular plants	0%
Biological crusts	0%
Litter	0%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	0%



**Figure 2. Plant community growth curve (percent production by month). 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 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 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 and changes in fire history.

### **Restoration pathway NR**

#### **State 2 to 1**

Non-native annuals species have become naturalized in these systems creating an unlikely scenario to restore the site back to reference.

## **Additional community tables**

### **Animal community**

Historically, this site may have provided habitat for antelope. At present, this site provides habitat for small mammals such as kangaroo rats and ground squirrels, and fur and game mammals such as coyotes and rabbits. Other wildlife species occurring on this site include: ravens, raptors, reptiles and various songbirds. This site has limited habitat for desert tortoise due to the sandy subsoils which have reduced burrow stability.

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

### **LIVESTOCK GRAZING:**

Season of Use- Other Mgt. Considerations: This site is suitable for limited spring grazing by sheep and also cattle where water is available. In favorable years, annual forbs and grasses provide additional forage.

General guide to initial stocking rate. Before making specific recommendations, an on-site evaluation must be made. Stocking rate based on proper use factors and proportion of grazeable forage.

Pounds/acre AC/AUM  
air-dry

Normal Years 400 20-25

## **Hydrological functions**

Runoff is very low to low. Permeability is rapid. Hydrologic soil group A - soils having high infiltration rates even when thoroughly wetted and consisting chiefly of deep, well drained to excessively drained sands or gravels.

Hydrologic conditions: 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 has value for open space and is used by off-road enthusiasts. Flowering wildflowers may also attract visitors during the spring. Off-road vehicle use can easily damage the soil structure and vegetative cover, causing increased soil blowing.

## Other information

Military Operations - Clearing or any other disturbance that destroys the soil structure and vegetation can result in increased soil blowing and barren areas. Vehicles should be restricted to existing roads and trails. Native species indigenous to this site are recommended for any revegetation efforts.

## Inventory data references

This ecological site description is based on the following documentation:

Sampling technique

\_4\_ NV-ECS-1

\_1\_ SCS-Range 417

\_\_\_ Other

## Type locality

Location 1: Kern County, CA	
Township/Range/Section	T10N R8W S16
General legal description	NW1/4 Section 16, T10N, R8W Rich Rd., east of Rogers Lake, 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.

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.

## Contributors

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## 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	11/21/2024
Approved by	Kendra Moseley
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. Number and extent of rills:  

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2. Presence of water flow patterns:  

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3. Number and height of erosional pedestals or terracettes:  

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4. Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):  

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5. Number of gullies and erosion associated with gullies:  

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6. Extent of wind scoured, blowouts and/or depositional areas:  

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7. Amount of litter movement (describe size and distance expected to travel):  

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8. Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):  

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9. Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):  

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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:

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):**
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14. **Average percent litter cover (%) and depth ( in):**
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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:**
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