USDA Natural Resources
Conservation Service

Ecological site R030XB257CA
Sodic Flat

Last updated: 3/10/2025
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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 Eastern Mojave Land Resource Unit (XB)

LRU notes

The Mojave Desert is currently divided into 4 Land Resource Units (LRUs). This ecological site is within the Arid Eastern Mojave LRU where precipitation is bi-modal, occurring during the winter months and summer months. The Arid Eastern Mojave LRU is designated by the 'XB' symbol within the ecological site ID. This LRU is found across the eastern half of California, much of the mid-elevations of Nevada, the southernmost portions of western Utah, and the mid-elevations of northwestern Arizona. This LRU is essentially equivalent to the Eastern Mojave Basins and Eastern Mojave Low Ranges and Arid Footslopes of EPA Level IV Ecoregions

Elevations range from 1650 to 4000 feet and precipitation is between 4 to 8 inches per year. This LRU is

distinguished from the Arid Western Mojave (XA) by the summer precipitation, falling between July and September, which tends to support more warm season plant species. The 'XB' LRU is generally east of the Mojave River and the 117 W meridian (Hereford et. al 2004). Vegetation includes creosote bush, burrobush, Nevada jointfir, ratany, Mojave yucca, Joshua tree, cacti, big galleta grass and several other warm season grasses. At the upper portions of the LRU, plant production and diversity are greater and blackbrush is a common dominant shrub.

Classification relationships

California Natural Diversity Database, May 2002. List of California terrestrial natural communities recognized by the California Natural Diversity Database – Desert Bush Seepweed shrub.

Sawyer, J.O. and T. Keeler-Wolf. 1995. Manual of California Vegetation – Bush Seepweed Series.

Ecological site concept

This site occurs on nearly level lake plains. The soils that characterize this site are very deep and well drained. These soils are saline and sodic.

Please refer to group concept R030XY129CA to view the provisional STM.

Associated sites

R030XY156CA	**Sodic Loam 3-5" p.z.** Sodic Loam 3-5” P.Z. Occurs on alluvial flats.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Suaeda moquinii*
Herbaceous	Not specified

Physiographic features

This site occurs on nearly level lake plains.

Table 2. Representative physiographic features

Landforms	(1) Lake plain
Flooding duration	Very brief (4 to 48 hours)
Flooding frequency	Very rare
Ponding duration	Very brief (4 to 48 hours)
Ponding frequency	Rare
Elevation	2,580–2,800 ft
Slope	0–2%
Ponding depth	1–4 in
Water table depth	60 in
Aspect	Aspect is not a significant factor

Climatic features

The primary air masses affecting California are cold maritime polar air from the Gulf of Alaska and warmer, moist maritime subtropical air from lower latitudes. Occasionally there are invasions of cold continental polar air from northern Canada or the Rocky Mountains. Precipitation in the area results primarily from the passage of cyclones with associated fronts during fall, winter and spring; from closed cyclones in late winter and spring; and from the

flow of moist tropical air from the southeast to the southwest quadrant in the summer.

Barstow Fire Station, occurs at a lower elevation and has a long-term record from 1980 to 2002. Twentynine Palms Station, occurs at a lower elevation and has a long-term record from 1948 to 2002. This climate summary is based on data from both locations. Warm, moist winters (35 to 70 degrees F) and hot, dry summers (60 to 105 degrees F) characterize the climate on this site. Mean annual air temperature is 65 to 70 degrees F. The average annual precipitation is 3 to 5 inches, with most falling as rain from December through March. Approximately 20 to 45% of the annual precipitation occurs from July to September as a result of intense, convection storms.

Table 3. Representative climatic features

Frost-free period (average)	340 days
Freeze-free period (average)	
Precipitation total (average)	5 in

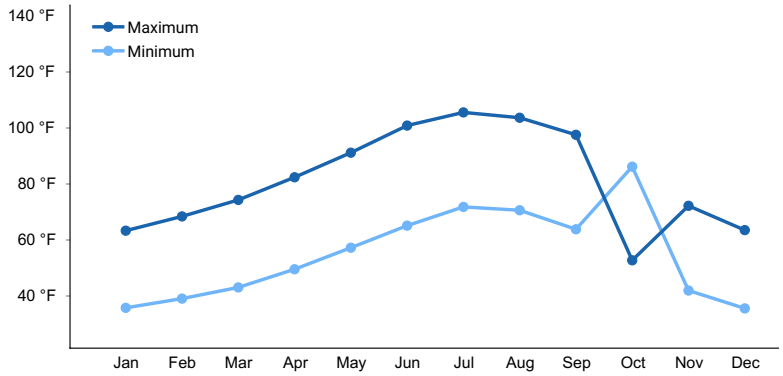

Figure 1. Monthly average minimum and maximum temperature

Influencing water features

There are no influencing water features associated with this site.

Soil features

The soils that characterize this site are very deep and well drained. These soils are saline and sodic. Available water capacity is very low (due to salinity) and permeability is slow. Effective rooting depth is 60 inches ot more. Water tables are greater than 60 inches.

Soils:
6984702 Calcic Haplosalids-Sodic Haplocalcids complex, 2.8%. Calcic Haplosalids. Johnson Valley OHV Area Soil Survey.

6984730 Calcic Haplosalids-Sodic Haplocalcids-Typic Haplosalids complex, 0-2%. Calcic Haplosalids. Johnson Valley OHV Area Soil Survey.

Table 4. Representative soil features

Surface texture	(1) Silty clay loam (2) Sandy loam
Family particle size	(1) Clayey
Drainage class	Well drained
Permeability class	Slow
Soil depth	60 in
Surface fragment cover <=3"	1–5%

Available water capacity (0-40in)	0.3–0.6 in
Calcium carbonate equivalent (0-40in)	5–15%
Electrical conductivity (0-40in)	20–40 mmhos/cm
Sodium adsorption ratio (0-40in)	35–160
Soil reaction (1:1 water) (0-40in)	8.6–9.2
Subsurface fragment volume <=3" (Depth not specified)	1–5%

Ecological dynamics

Please refer to group concept R030XY129CA to view the provisional STM.

The interpretive plant community for this site is the historic climax plant community. This site occurs on dry lake beds which are intermittently flooded. The historic site potential is characterized by a low, open shrubland dominated by Mojave seablite (*Suaeda moquinii*). Few other species occur. Perennial grasses and forbs are scarce. Annuals are seasonally present. Potential vegetative composition is approximately 5% grasses, 5% forbs, and 90% shrubs. This site is stable in this condition.

This site is characterized by low productivity with little plant diversity. Disturbance would allow for the introduction of non-native annuals such as cheatgrass (*Bromus tectorum*) and Russian thistle (*Salsola tragus*).

State and transition model

Ecosystem states

1. Mojave seablite

State 1 submodel, plant communities

1.1. Mojave seablite

State 1
Mojave seablite

Community 1.1
Mojave seablite

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abnormal precipitation or other climatic factors. The historic climax plant community has been determined by study of rangeland relict areas or other protected areas and historical accounts.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Shrub/Vine	67	133	225
Forb	4	9	13
Grass/Grasslike	4	8	12
Total	**75**	**150**	**250**

Table 6. Ground cover

Tree foliar cover	0%
Shrub/vine/liana foliar cover	1-5%
Grass/grasslike foliar cover	1%
Forb foliar cover	1%
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%

Table 7. Soil surface cover

Tree basal cover	0%
Shrub/vine/liana basal cover	0%
Grass/grasslike basal cover	0%
Forb basal cover	0%
Non-vascular plants	0%
Biological crusts	0%
Litter	5-10%
Surface fragments >0.25" and <=3"	1-5%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	70-90%

Table 8. Canopy structure (% cover)

Height Above Ground (Ft)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.5	–	–	–	–
>0.5 <= 1	–	–	1-2%	–
>1 <= 2	–	–	–	1-2%
>2 <= 4.5	–	5-15%	–	–
>4.5 <= 13	–	–	–	–
>13 <= 40	–	–	–	–
>40 <= 80	–	–	–	–
>80 <= 120	–	–	–	–
>120	–	–	–	–

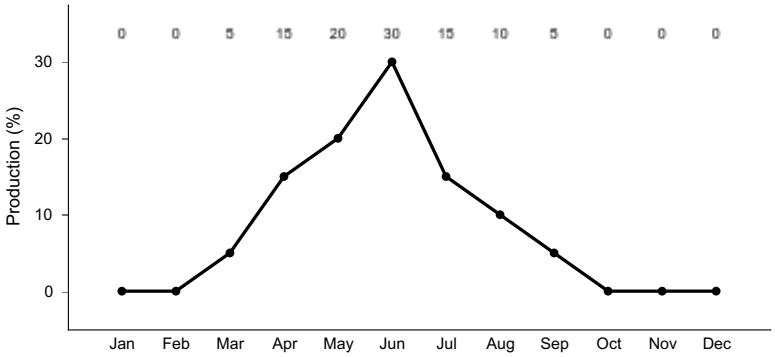

Figure 3. Plant community growth curve (percent production by month). CA3010, Mojave Seablite. Growth begins in early spring; flowering occurs from July to September..

Additional community tables

Table 9. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	**Perennial grasses**			1–4	
	saltgrass	DISP	*Distichlis spicata*	1–4	–
2	**Annual grasses**			1–4	
	Grass, annual	2GA	*Grass, annual*	1–4	–
Forb					
3	**Perennial forbs**			1–10	
	Forb, perennial	2FP	*Forb, perennial*	1–10	–
	desert princesplume	STPI	*Stanleya pinnata*	1–4	–
4	**Annual forbs**			1–4	
	Forb, annual	2FA	*Forb, annual*	1–3	–
Shrub/Vine					
5	**Dominant shrubs**			155–203	
	Mojave seablite	SUMO	*Suaeda moquinii*	155–203	–
6	**Other shrubs**			1–11	
	Shrub, evergreen	2SE	*Shrub, evergreen*	1–11	–
	fourwing saltbush	ATCA2	*Atriplex canescens*	1–5	–
	cattle saltbush	ATPO	*Atriplex polycarpa*	1–5	–

Animal community

Grazing: This site has limited use for livestock grazing due to low productivity, unsuitable forage, and lack of stockwater. Mojave seablite is considered poor forage for livestock.

Wildlife: This site has low species diversity. Small mammals, coyotes, and black-tailed jackrabbits may occur. Common lizards include western whiptails. Common birds include horned larks and common ravens. Mojave seablite is used by Black-tailed jackrabbits, non-game birds and small mammals, but the degree of utilization is unknown. Shadscale is a desirable shrub for Black-tailed jackrabbits, non-game birds and small mammals.

Hydrological functions

Intermittent flooding occurs after convective summer storms.

Recreational uses

High off-road vehicle usage due to proximity to dry lake beds. Dry lake beds are prime locations for off-highway vehicle use and campsites.

Inventory data references

Line transects: 2 from 7/02 to 8/02 in San Bernardino, California.

NV-ECS:1 8/02 in San Bernardino, California.

Other references

Hickman, J.C. (ed).1993. The Jepson Manual: Higher plants of California. University of California Press, Berkeley, CA.

U.S. Department of Agriculture, NRCS. National Range and Pasture Handbook, September 1997.

U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory. 2002. Fire Effects Information System [Online] Available: http://www.fs.fed.us/database/feis/plants)

Western Regional Climate Center, Desert Research Institute, Reno, Nevada (http://www.wrcc.dri.edu/index.html)

Contributors

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Approval

Kendra Moseley, 3/10/2025

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)	
Contact for lead author	
Date	05/11/2025
Approved by	Sarah Quistberg
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:**

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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:**

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11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):**

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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):**

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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:**
