USDA Natural Resources
Conservation Service

Ecological site R030XY165CA
Alluvial Flat

Last updated: 2/24/2025
Accessed: 05/13/2025

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.

Ecological site concept

This site occurs on alluvial flats and dry lake plains. The soils for the site are moderately deep, loamy soils derived from alluvium and lacustrine deposits from limestone and dolomite. The parent material for these soils is high in carbonates and dust deposition of carbonates in the Mesquite Lake basin is high.

Please refer to group concept R030XB045CA to view the provisional STM.

Associated sites

R030XY164CA	**Gravelly Skirt** Soils on this ecosite are of mixed mineralogy and are not saline or sodic. This ecosite has more alluvial influence, leading to more surface gravel. Dominant species are western honey mesquite (Prosopis glandulosa var. torreyana) and alkali goldenbush (Isocoma acradenia).

Similar sites

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Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Prosopis glandulosa var. torreyana* (2) *Atriplex confertifolia*
Herbaceous	Not specified

Physiographic features

This site occurs on alluvial flats and dry lake plains.

Table 2. Representative physiographic features

Landforms	(1) Alluvial flat (2) Lake plain
Flooding duration	Very brief (4 to 48 hours) to brief (2 to 7 days)
Flooding frequency	Very rare to rare
Ponding duration	Very brief (4 to 48 hours) to brief (2 to 7 days)

Ponding frequency	Rare to occasional
Elevation	1,500–3,000 ft
Slope	0–2%
Ponding depth	0–1 in
Aspect	Aspect is not a significant factor

Climatic features

The Mojave Desert experiences clear, dry conditions for a majority of the year. Winter temperatures are mild, summer temperatures are hot, and seasonal and diurnal temperature fluctuations are large. Monthly minimum temperature averages range from 30 to 80 degrees F (-1 to 27 degrees C). Monthly maximum temperature averages range from 60 to 110 degrees F (16 to 43 degrees C) (CSU 2002).

Average annual rainfall is between 2 and 8 inches (50 to 205 millimeters) (USDA 2006). Snowfall is more common at elevations above 4000 feet (1220 meters), but it may not occur every year (WRCC 2002b). The Mojave Desert receives precipitation from two sources. Precipitation falls primarily in the winter as a result of storms originating in the northern Pacific Ocean. The Sierra Nevada and Transverse Ranges create a rain shadow effect, causing little precipitation to reach the Mojave Desert. Sporadic rainfall occurs during the summer as a result of convection storms formed when moisture from the Gulf of Mexico or Gulf of California moves into the region. Summer rainfall is more common and has a greater influence on soil moisture in the eastern Mojave Desert.

Windy conditions are also common in the Mojave Desert, particularly in the west and central Mojave Desert. Spring is typically the windiest season, with winds averaging 10-15 miles per hour (WRCC 2002a). Winds in excess of 25 miles per hour and gusts in excess of 50 miles per hour are not uncommon (CSU 2002).

In the BLM Grazing Allotments Soil Survey (Northeast Part of Mojave Desert Area, CA (CA805)), most areas receive approximately 5 to 7 inches of precipitation annually (WRCC 2002b). At elevations above 4000 feet (1370 meters), average annual precipitation in the form of rain may reach 8 inches or more, and average annual snowfall may reach up to 10 inches (WRCC 2002b).

The data from the following climate stations were used to describe the climate in the BLM Grazing Allotments Soil Survey (station number in parentheses):
Pahrump, NV (265890)
Mountain Pass, CA (045890)
Searchlight, NV (267369)
Red Rock Canyon State Park, NV (266691)

"Maximum monthly precipitation" represents average monthly precipitation.

Table 3. Representative climatic features

Frost-free period (average)	240 days
Freeze-free period (average)	282 days
Precipitation total (average)	7 in

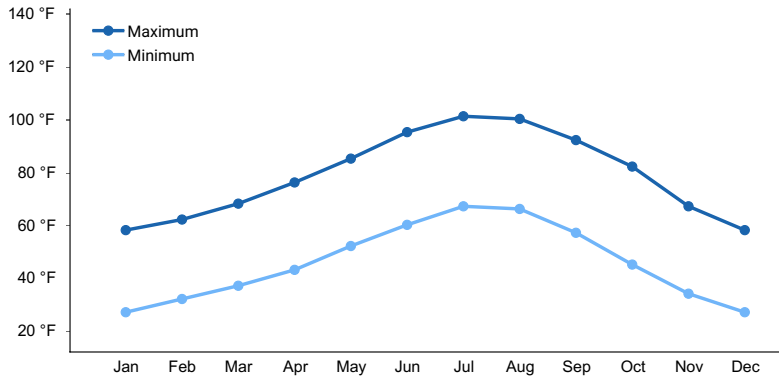

Figure 1. Monthly average minimum and maximum temperature

Influencing water features

Soil features

The soils for the site are moderately deep, loamy soils derived from alluvium and lacustrine deposits from limestone and dolomite. The parent material for these soils is high in carbonates and dust deposition of carbonates in the Mesquite Lake basin is high. The soils classify as coarse-loamy, carbonatic Calcic Petrocalcids. Permeability is moderately rapid to rapid and soils are moderately well to well drained. Soils are moderately to strongly alkaline.

There is a large influence on soil development from surrounding limestone mountains and hills. These processes lead to development of calcic and petrocalcic horizons in these soils. The landform on which these soils develop is also stable, allowing time for cemented petrocalcic horizons to develop in lower part of the subsoil. These soils are saline and sodic below the surface soil, a common feature of soils on the bolson floor in arid regions.

Soil survey area - Map unit symbol - Component
CA805 - 4775 - Calcic Petrocalcids

Table 4. Representative soil features

Surface texture	(1) Fine sandy loam (2) Loam
Family particle size	(1) Loamy
Drainage class	Moderately well drained to well drained
Permeability class	Moderate to moderately rapid
Soil depth	20–40 in
Surface fragment cover <=3"	2–10%
Surface fragment cover >3"	0–3%
Available water capacity (0-40in)	3–5 in
Calcium carbonate equivalent (0-40in)	20–45%
Electrical conductivity (0-40in)	0–12 mmhos/cm
Sodium adsorption ratio (0-40in)	0–40
Soil reaction (1:1 water) (0-40in)	8.2–8.8
Subsurface fragment volume <=3" (Depth not specified)	1–15%

Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

Please refer to group concept R030XB045CA to view the provisional STM.

This ecosite occurs on alluvial flats and outer lake plains. Vegetation is adapted to saline soils present on this ecosite. The dominant species are western honey mesquite (*Prosopis glandulosa* var. torreyana) and shadscale (*Atriplex confertifolia*). Another common species is Mojave seablite (*Suaeda moquinii*). Grasses are a minor component of the ecosite.

In the Mojave Desert, western honey mesquite often establishes along dry lakes and low-lying areas into which water drains (Hickman 1993). It grows extensive lateral roots to extract water from a large volume of soil, particularly if restrictive layers limit the growth of the taproot, and can also grow in response to burial such that shoots remain above the sand (Steinberg 2001). It can tolerate a range of salinity (Steinberg 2001).

Mojave seablite grows on saline and alkaline soils, and is often found on dry lakes (Dole and Rose 1996). Shadscale tolerates more moderate conditions of soil salinity and sodicity (Hodgkinson 1987). On a dry lake soil high in sodium, species such as Mojave seablite preceded those less tolerant of high salinity, such as shadscale. The shift was associated in part with a decline in sodium concentrations (Vasek and Lund 1980). The presence of Mojave seablite may help to facilitate the establishment of shadscale on this ecosite.

Invasive species red brome (*Bromus rubens*) and Mediterranean grass (*Schismus arabicus*) are present in small amounts on this ecosite. Expansion of these species contributes to higher ground cover, potentially increasing the risk of fire. Fire in desert ecosystems has historically been rare due to discontinuous fuels. Spread of these invasive species would create a more continuous, easily ignitable fuel source.

Biological soil crusts—slow-growing complexes of fungi, lichen, moss, and cyanobacteria— cover small areas of this ecosite. They indicate site stability and recover slowly following disturbance (Belnap and Lange 2001). They moderate several processes that occur in the desert (Belnap and others 2001). These processes include reducing water and wind erosion. They act like a living mulch and slow evaporative water loss. They also affect soil fertility by increasing the available nitrogen in the soil. By occupying spaces between shrubs, biological soil crusts limit the establishment of invasive species that change disturbance regimes. The presence of biological soil crusts on this ecosite suggest that disturbance on this ecosite historically was not severe.

State and transition model

Ecosystem states

1. Western Honey Mesquite - Shadscale

State 1 submodel, plant communities

1.1. Western Honey Mesquite - Shadscale

State 1
Western Honey Mesquite - Shadscale

Community 1.1
Western Honey Mesquite - Shadscale

The interpretive plant community is the reference plant community prior to European colonization. This plant community is composed of western honey mesquite (*Prosopis glandulosa* var. torreyana), in its more tree-like stature, with shrub components of shadscale (*Atriplex confertifolia*) and Mojave seablite (*Suaeda moquinii*). Shrub and herbaceous vegetation accounts for approximately 20% of total ground cover. Biological soil crusts account for approximately 1% of total ground cover. Species observed in trace amounts include big galleta (*Pleuraphis rigida*), water jacket (*Lycium andersonii*), desert princesplume (*Stanleya pinnata*), and cattle saltbush (*Atriplex polycarpa*). “Percent Composition by Frequency of Overstory Species” represents only low, RV, and high canopy cover. Production values are not listed.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Tree	600	1000	1200
Shrub/Vine	71	142	285
Grass/Grasslike	4	8	15
Total	**675**	**1150**	**1500**

Table 6. Ground cover

Tree foliar cover	0%
Shrub/vine/liana foliar cover	15-25%
Grass/grasslike foliar cover	0-2%
Forb foliar cover	0-2%
Non-vascular plants	0%
Biological crusts	0-2%
Litter	30-40%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	25-30%

Table 7. Soil surface cover

Tree basal cover	0%
Shrub/vine/liana basal cover	3-5%
Grass/grasslike basal cover	0-2%
Forb basal cover	0-2%
Non-vascular plants	0%
Biological crusts	0-2%
Litter	45-55%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%
Bedrock	0%
Water	0%

Bare ground	25-35%

Table 8. Canopy structure (% cover)

Height Above Ground (Ft)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.5	–	2-3%	–	–
>0.5 <= 1	–	20-35%	–	–
>1 <= 2	–	20-35%	0-1%	–
>2 <= 4.5	–	2-3%	0-1%	–
>4.5 <= 13	5-10%	–	–	–
>13 <= 40	20-35%	–	–	–
>40 <= 80	–	–	–	–
>80 <= 120	–	–	–	–
>120	–	–	–	–

Additional community tables

Table 9. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Tree					
1	**Trees**			600–1200	
	western honey mesquite	PRGLT	*Prosopis glandulosa var. torreyana*	600–1200	–
Shrub/Vine					
2	**perennial shrubs**			71–285	
	shadscale saltbush	ATCO	*Atriplex confertifolia*	43–171	–
	Mojave seablite	SUMO	*Suaeda moquinii*	20–81	–
	alkali goldenbush	ISAC2	*Isocoma acradenia*	5–18	–
	water jacket	LYAN	*Lycium andersonii*	1–3	–
	desert princesplume	STPI	*Stanleya pinnata*	1–3	–
	cattle saltbush	ATPO	*Atriplex polycarpa*	1–3	–
	burrobush	AMDU2	*Ambrosia dumosa*	1–3	–
	fourwing saltbush	ATCA2	*Atriplex canescens*	1–3	–
Grass/Grasslike					
3	**grasses**			4–15	
	alkali sacaton	SPAI	*Sporobolus airoides*	2–9	–
	big galleta	PLRI3	*Pleuraphis rigida*	2–6	–

Animal community

Western honey mesquite and shadscale are valuable food and habitat resources for wildlife. The fruit of western honey mesquite is considered nutritious and is eaten in large quantities by many animals, including birds, rodents, jackrabbits, coyotes, and deer (Steinberg 2001). Flowers are eaten by many bird species. Foliage is generally eaten only in small amounts. The fruit and the foliage of shadscale are both important food sources (Simonin 2001).

This ecosite is used for livestock grazing. Livestock consume western honey mesquite fruit and flowers, but rarely consume foliage unless other food sources are scarce (Simonin 2001). Livestock consume both leaves and fruit of shadscale (Sampson and Jespersen 1963). Grasses are valuable forage but a minor component of this ecosite.

Uncontrolled grazing may affect different aspects of this ecosite. Western honey mesquite and shadscale are grazed by livestock. Uncontrolled grazing may damage or kill plants. Smaller shrubs and grasses may be more easily damaged by trampling. Biological crusts are fragile, easily damaged, and very slow to recover following a disturbance. Disturbance may also facilitate establishment of invasive species by creating areas of bare soil or dispersing seeds.

Hydrological functions

This ecological site occurs in low positions in the landscape, and water from adjacent areas will drain toward this area.

Recreational uses

Off-highway vehicle use occurs on the lake plain, and effects may be similar to the effects of uncontrolled grazing. Trampling of plants and disturbance of the soil surface may damage or kill shrubs, destroy fragile biological soil crusts, and facilitate establishment of invasive species.

Wood products

Western honey mesquite is mainly used as firewood and in the barbeque industry. It is also used as lumber for furniture and flooring.

Other information

Nitrogen-fixing bacteria in the roots of western honey mesquite provide a source of nitrogen for the mesquite. They also enrich the soil locally, possibly facilitating the establishment of other species.

Inventory data references

Production was sampled at the type locality on 29 June 2005. Shrub and herbaceous production was sampled with one double weight sampling transect. Tree production was sampled using a one acre plot and production estimates from USDA NRCS Range Note #52-Arizona: Annual herbage yield for some woody plants in Arizona.

Vegetation cover was sampled 20 March 2006 at the type locality.

Type locality

Location 1: San Bernardino County, CA	
UTM zone	N
UTM northing	3951214
UTM easting	626714
Latitude	35° 41′ 48″
Longitude	115° 35′ 58″
General legal description	The type site is located on the eastern edge of Mesquite Lake.

Other references

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Contributors

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Approval

Sarah Quistberg, 2/24/2025

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	05/13/2025
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:**

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:**