USDA Natural Resources
Conservation Service

Ecological site R030XY163CA
Loamy Lakeplain 5-7" p.z.

Last updated: 2/24/2025
Accessed: 05/21/2025

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 hummocky lake plains and toeslopes of stabilized dunes. This site occurs on hummocky lake plains and toeslopes of stabilized dunes.

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

Associated sites

R030XY045NV	**DUNES 3-7 P.Z.** Occurs on adjacent dune areas.

Similar sites

R030XY045NV	**DUNES 3-7 P.Z.** This site lacks big saltbush and rubber rabbitbrush. Additionally it occurs mostly on sand dunes.

Table 1. Dominant plant species

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

Physiographic features

This site occurs on hummocky lake plains and toeslopes of stabilized dunes.

Table 2. Representative physiographic features

Landforms	(1) Lake plain (2) Dune
Flooding duration	Extremely brief (0.1 to 4 hours) to very brief (4 to 48 hours)
Flooding frequency	None to very rare
Ponding duration	Very brief (4 to 48 hours) to brief (2 to 7 days)
Ponding frequency	None
Elevation	457–914 m
Slope	0–2%
Ponding depth	0–3 cm
Water table depth	152 cm
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 at Pahrump, NV.

Table 3. Representative climatic features

Frost-free period (average)	240 days
Freeze-free period (average)	282 days
Precipitation total (average)	178 mm

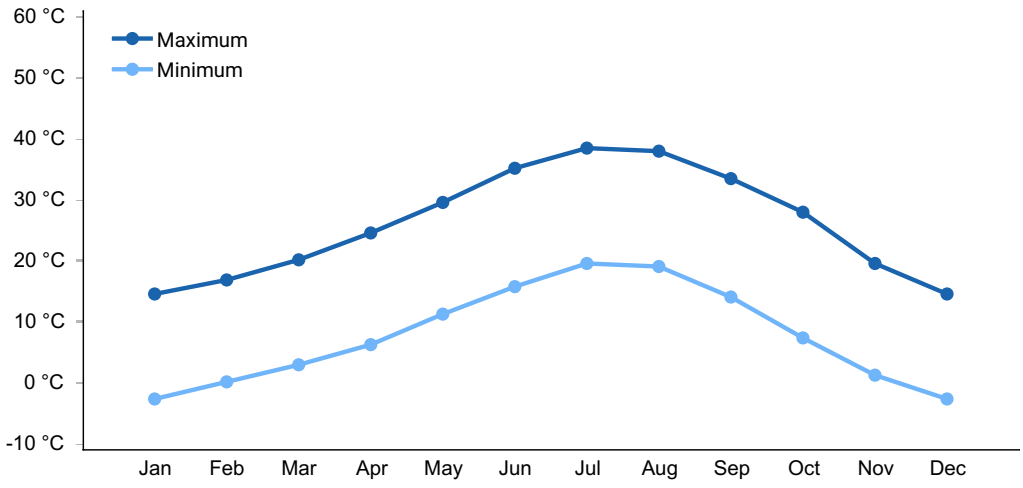

Figure 1. Monthly average minimum and maximum temperature

Influencing water features

Soil features

This site occurs on hummocky lake plains and toeslopes of stabilized dunes. The soils classify as fine-silty Typic Torriorthents. Soils are moderately well to well drained, and permeability is moderate to moderately rapid. The texture and permeability allow the soil to hold moisture for extended periods following a rain. Ponding occurs rarely and for very brief periods (4-48 hours) after a storm, and the soils have low to moderate available water-holding capacity. This contributes to high productivity on this ecosite.

Soil survey area - Map unit symbol - Component
CA805 - 4711 - Typic Torriorthents (minor component)

Table 4. Representative soil features

Surface texture	(1) Very fine sandy loam (2) Fine sandy loam
Family particle size	(1) Loamy
Drainage class	Moderately well drained to well drained
Permeability class	Moderate to moderately rapid
Soil depth	152–203 cm
Surface fragment cover <=3"	0–10%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	5.08–15.24 cm
Calcium carbonate equivalent (0-101.6cm)	1–5%
Electrical conductivity (0-101.6cm)	0–4 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–8
Soil reaction (1:1 water) (0-101.6cm)	7.8–8.4
Subsurface fragment volume <=3" (Depth not specified)	0–5%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

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

This ecological site is hummocky and occurs on dry lake margins. Wind blows across Mesquite Lake and deposits lake sediments on the northeast side of the lake where this ecosite is found. Soil gets trapped at the base of plants, forming coppice dunes. This site also has common alluvial activity due to close proximity to the playa. The soil has relatively high water-holding capacity due to the soil texture. This helps support relatively high plant production on this ecosite.

The dominant species are western honey mesquite (*Prosopis glandulosa* var. torreyana),

big saltbush (*Atriplex lentiformis*), and rubber rabbitbrush (*Ericameria nauseosa*). These species are tolerant of saline soils.

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).

Big saltbush is found on dry lakes and in alkaline and saline washes (Hickman 1993). Its presence in washes indicates tolerance to disturbance, but can occur in both early and late seral stages (Meyer 2005). Rubber rabbitbrush is common in early seral stages and in disturbed areas (Tirmenstein 1999). Rubber rabbitbrush quickly colonizes disturbed sites, and also survives partial burial by growing larger shoots (Brown 1997).

Another important species on this ecological site is alkali sacaton (*Sporobolus airoides*). Alkali sacaton grows in low spots of hummocky areas. Germination of alkali sacaton seedlings is more sensitive to moisture stress compared with other desert grasses (Knipe 1968). The low positions and the finer textured soils on this ecosite create moister areas in which alkali sacaton can establish. Alkali sacaton tolerates a wide range of salinity, but higher salinities reduce germination success (Johnson 2000). This may contribute to its higher abundance on this ecosite relative to adjacent, more saline ecosites. Because water flows to low spots, adjacent areas may also have less water available. Anthropogenic lowering of groundwater levels in the Owens Valley reduced alkali sacaton while saltbush (Atriplex spp.) and rubber rabbitbrush (*Ericameria nauseosa*) increased (Johnson 2000).

Biological soil crusts—slow-growing complexes of fungi, lichen, moss, and cyanobacteria—cover large 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 - Big Saltbush

State 1 submodel, plant communities

1.1. Western Honey Mesquite - Big Saltbush

State 1
Western Honey Mesquite - Big Saltbush

Community 1.1
Western Honey Mesquite - Big Saltbush

The interpretive plant community is the reference plant community prior to European colonization. The plant community is dominated by western honey mesquite (*Prosopis glandulosa* var. torreyana). In some areas a dense overhead canopy shades out the understory. Big saltbush (*Atriplex lentiformis*) and rubber rabbitbrush (*Ericameria nauseosa*) occur mostly in canopy gaps. Alkali sacaton (*Sporobolus airoides*) is patchily distributed between hummocks. “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 (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Tree	1905	2410	2690
Shrub/Vine	309	464	619
Grass/Grasslike	27	40	54
Total	**2241**	**2914**	**3363**

Table 6. Ground cover

Tree foliar cover	0%
Shrub/vine/liana foliar cover	5-15%

Grass/grasslike foliar cover	0-2%
Forb foliar cover	0-1%
Non-vascular plants	0%
Biological crusts	20-40%
Litter	40-60%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	2-6%

Table 7. Soil surface cover

Tree basal cover	20-35%
Shrub/vine/liana basal cover	10-40%
Grass/grasslike basal cover	0-2%
Forb basal cover	0-1%
Non-vascular plants	0%
Biological crusts	5-15%
Litter	15-30%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	2-5%

Table 8. Canopy structure (% cover)

Height Above Ground (M)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.15	–	–	–	0-1%
>0.15 <= 0.3	–	–	–	–
>0.3 <= 0.6	–	–	0-3%	–
>0.6 <= 1.4	–	20-40%	–	–
>1.4 <= 4	1-5%	5-10%	–	–
>4 <= 12	30-50%	–	–	–
>12 <= 24	–	–	–	–
>24 <= 37	–	–	–	–
>37	–	–	–	–

Additional community tables

Table 9. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Tree					
1	**Trees**			1905–2690	
	western honey mesquite	PRGLT	*Prosopis glandulosa var. torreyana*	1905–2690	–
Shrub/Vine					
2	**Perennial Shrubs**			309–619	
	big saltbush	ATLE	*Atriplex lentiformis*	195–390	–
	rubber rabbitbrush	ERNA10	*Ericameria nauseosa*	114–229	–
Grass/Grasslike					
3	**Perennial Grasses**			27–54	
	alkali sacaton	SPAI	*Sporobolus airoides*	27–54	–

Animal community

Western honey mesquite fruit, big saltbush, and alkali sacaton are valuable food and habitat resources for wildlife and livestock. The fruit of western honey mesquite is considered nutritious and is eaten in large quantities by many animals, including birds, rodents, jackrabbits, coyotes, deer, and livestock (Steinberg 2001). Flowers are eaten by many bird species. Foliage is rarely consumed unless other food sources are scarce (Steinberg 2001).

Big saltbush is eaten by mule deer, rabbits, rodents, and pronghorn antelope, and pheasants and quail eat the seeds. Big saltbush is considered valuable forage for livestock but may be nutritionally insufficient or potentially toxic if used as the dominant forage species (Meyer 2005).

Alkali sacaton is also a valuable forage species for livestock and wildlife. It is moderately tolerant of grazing. It can grow to over a meter in height (Hickman 1993), providing good cover for small mammals and birds.

Uncontrolled grazing may have severe impacts on this ecosite. Cover of big saltbush and small shrubs in the understory may be reduced. Alteration of the microtopography may limit sites suitable for alkali sacaton growth, and trampling and uncontrolled grazing will damage or kill plants. 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 traffic occurs on this ecosite and may have severe impacts on this ecosite. These impacts are similar to those that may occur due to uncontrolled grazing, such as reduced shrub cover, alteration of microtopography, and destruction of biological soil crusts, and facilitating establishment of invasive species.

Wood products

The wood of 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

Vegetation cover was sampled in lieu of production due to a poor growing season. Ten 100-foot point-intercept transects were sampled. The top two tiers of vegetation or other cover class (e.g. bare soil, gravel, rock, litter, biological soil crust) were recorded at every

foot. Western honey mesquite production was sampled using one one-acre plot and USDA NRCS Range Note #52-Arizona: Annual herbage yield for some woody plants in Arizona. Cover and vegetation sampling were conducted at the type locality on 22-27 March 2006.

Annual production for other species was estimated based on similar ecological sites.

Type locality

Location 1: San Bernardino County, CA	
UTM zone	N
UTM northing	3956258
UTM easting	628637
Latitude	35° 44′ 30″
Longitude	115° 34′ 38″
General legal description	The type site is located on the eastern bank of Mequite Lake near the town of Sandy Valley. Accessible from Stateline Pass Rd.

Other references

Belnap, J., J.H. Kaltenecker, R. Rosentreter, J. Williams, S. Leonard, D. Eldridge. 2001. Biological Soil Crusts: Ecology and Management. Technical Reference 1730-2. U.S. Department of the Interior, Bureau of Land Management and U.S. Geological Survey. Available: http://www.blm.gov/nstc/library/pdf/CrustManual.pdf. Accessed 5 October 2006.

Belnap, J. and O.L. Lange. 2001. Structure and functioning of biological soil crusts: a synthesis. In: Ecological Studies, Vol. 150. Belnap, J. and O.L. Lange (eds.). 2001. Biological Soil Crusts: Structure, Function, and Management. Springer-Verlag Berlin Heidelberg. pp. 471-479.

Brown, J.F. 1997. Effects of experimental burial on survival, growth, and resource allocation of three species of dune plants. Journal of Ecology 85: 151-158.

California State University (CSU) Desert Studies Center. 2002. Desert Climate. CSU Desert Studies Center, Soda Springs, CA. Online. http://biology.fullerton.edu/facilities/dsc/zz_climate.html. Accessed 28 November 2006.

Fisher, C. E.; Meadors, C. H.; Behrens, R., [and others]. 1959. Control of mesquite on grazing lands. Bull. 935. College Station, TX: Texas A&M University, Texas Agricultural Experiment Station. 24 p. In cooperation with: U.S. Department of Agriculture. [10078]

Hickman, James C. (Ed.). 1993. The Jepson manual: higher plants of California. Berkeley, CA: University of California Press.

Johnson, K.A. 2000. *Sporobolus airoides*. In: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/ [2006, October 18].

Knipe, O.D. 1968. Effects of moisture stress on germination of alkali sacaton, galleta, and blue grama. Journal of Range Management 21(1): 3-4.

Meyer, Rachelle. 2005. *Atriplex lentiformis*. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/ [2006, October 11].

Rundel, P.W. and A.C. Gibson. 1996. Ecological communities and processes in a Mojave Desert ecosystem: Rock Valley, Nevada. Cambridge University Press, New York. 369pp.

Sampson, A.W. and B.S. Jesperson. 1963. California range brushlands and browse plants. Publication 4010. Division of Agriculture and Natural Resources, University of California.

Steinberg, Peter. 2001. *Prosopis glandulosa*. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/ [2006, October 5].

Tirmenstein, D. 1999. Chrysothamnus nauseosus. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/ [2006, October 11].

United States Department of Agriculture (USDA), Natural Resources Conservation Service. 2006. Land Resource Regions and Major Land Resource Areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296.

Western Regional Climate Center (WRCC). 2002a. Average wind speeds by state (1992-2002). Desert Research Institute, Reno, NV. Online. http://www.wrcc.dri.edu/htmlfiles/westwind.final.html. Accessed 28 November 2006.

Western Regional Climate Center (WRCC). 2002b. Western U.S. Climate Historical Summaries [Online]. Desert Research Institute, Reno, NV. Online. http://www.wrcc.dri.edu/Climsum.html. Accessed 28 November 2006.

Contributors

Heath M. Mcallister, Steven R. Perkins, Allison Tokunaga

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	05/21/2025
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:**
