USDA Natural Resources
Conservation Service

Ecological site R040XD025CA
Sandsheet [2-4" p.z.]

Last updated: 3/04/2025
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.

MLRA notes

Major Land Resource Area (MLRA): 040X–Sonoran Basin and Range

Major land resource area (MLRA) 31 is the Lower Colorado Desert. This area is in the extreme southeastern part of California, in areas along the Colorado River, and in Western Arizona. The area is comprised of rough, barren, steep, and strongly dissected mountain ranges, generally northwest to southwest trending that are separated by intermontane basins. Elevation ranges from approximately 275 feet below sea level at the lowest point in the Salton Trough to 2700 feet along low northwest to southeast trending mountain ranges. The average annual precipitation is 2 to 6 inches with high temporal and spatial variability. Winter temperatures are mild, summer temperatures are hot, and seasonal and diurnal temperature fluctuations are large. Monthly minimum temperature averages range from 40 to 80 degrees F (4 to 27 degrees C). Monthly maximum temperature averages range from 65 to 110 degrees F (18 to 43 degrees C) (WRCC 2002). Temperatures are rarely below 28 degrees F, and extremely rarely fall below 24 degrees F. Precipitation is bimodal, with approximately 20 to 40 percent of annual precipitation falling between July and September. This summer rainfall, in combination with very hot temperatures and very few to no days of hard freeze are what characterize this MLRA and distinguish it from the Mojave Desert (MLRA 30).

Classification relationships

Mojave Creosote Bush (Holland, 1986).
Larrea tridentata Shrubland Alliance (Sawyer et al. 2009).

Ecological site concept

This site is above the playa landscape but often adjacent to the playa where dunes often fade into sandsheets. These very deep sands allow moisture to percolate deep and quickly and often limit shallow rooted plants from surviving at this site. Deep rooted plants like creosote can take advantage of this site and are often larger than ones on surrounding landforms but remain spaced far from each other. Although the deep sands mean water infiltrates deeper than sites with a finer textured surface, the sand does allow more moisture to infiltrate with very little run off, allowing annual plant species to take advantage of this site and thrive when ideal growing conditions exist. This site is far enough from the playa that periodic ponding does not happen, excluding plant species commonly associated with the playa landscape and its dune landforms.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Larrea tridentata*
Herbaceous	(1) *Pleuraphis rigida*

Physiographic features

This ecological site is found on sand sheets, coppice dunes, and semi-stabilized dunes.

Table 2. Representative physiographic features

Landforms	(1) Sand sheet (2) Dune
Flooding frequency	None
Ponding frequency	None
Elevation	300–600 m
Slope	2–8%
Water table depth	152 cm
Aspect	Aspect is not a significant factor

Climatic features

Mean annual precipitation is about 3.5 inches and the mean annual air temperature is about 74 degrees F.

Table 3. Representative climatic features

Frost-free period (characteristic range)	315-365 days
Freeze-free period (characteristic range)	365 days

Precipitation total (characteristic range)	76-102 mm
Frost-free period (actual range)	290-365 days
Freeze-free period (actual range)	365 days
Precipitation total (actual range)	76-102 mm
Frost-free period (average)	337 days
Freeze-free period (average)	365 days
Precipitation total (average)	76 mm

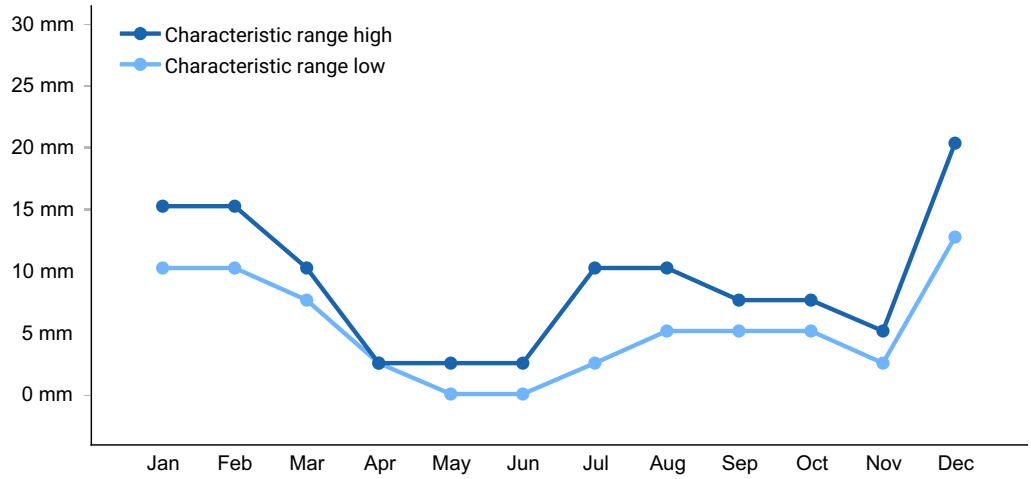


Figure 1. Monthly precipitation range

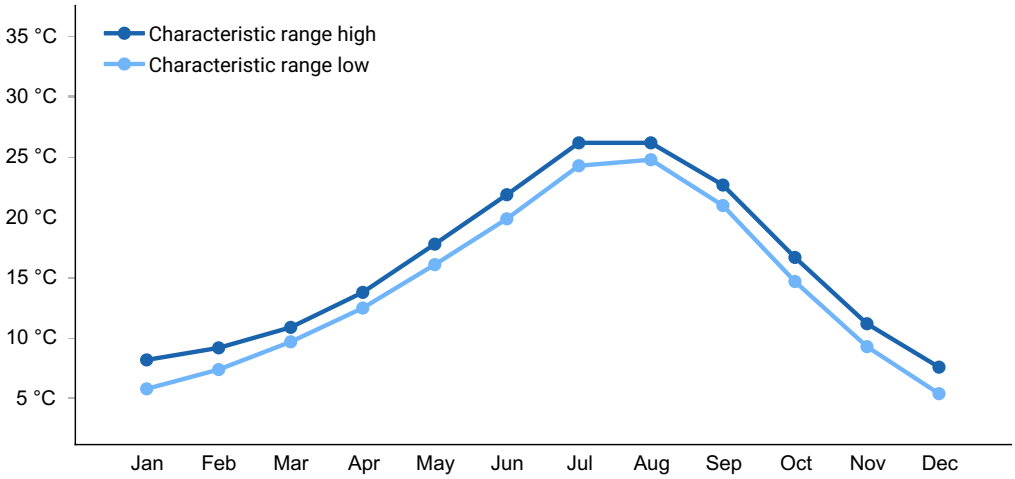


Figure 2. Monthly minimum temperature range

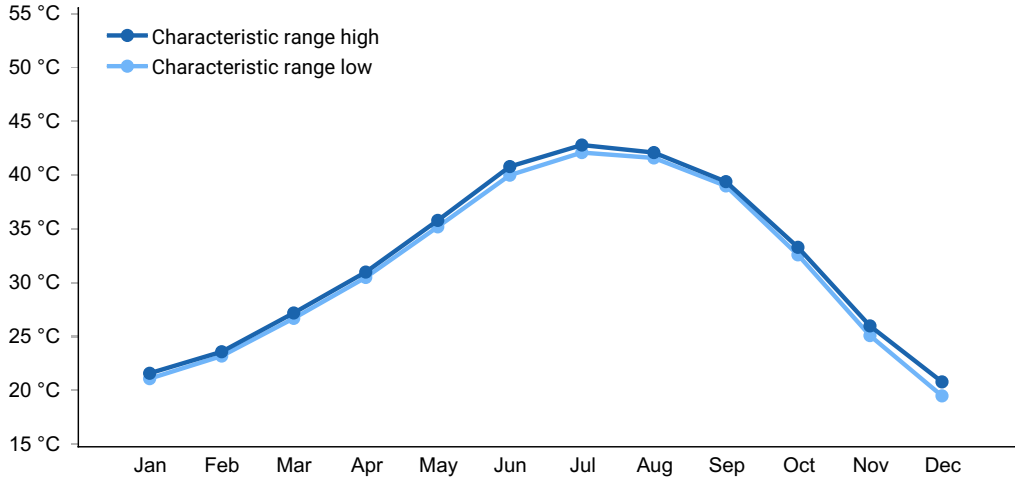


Figure 3. Monthly maximum temperature range

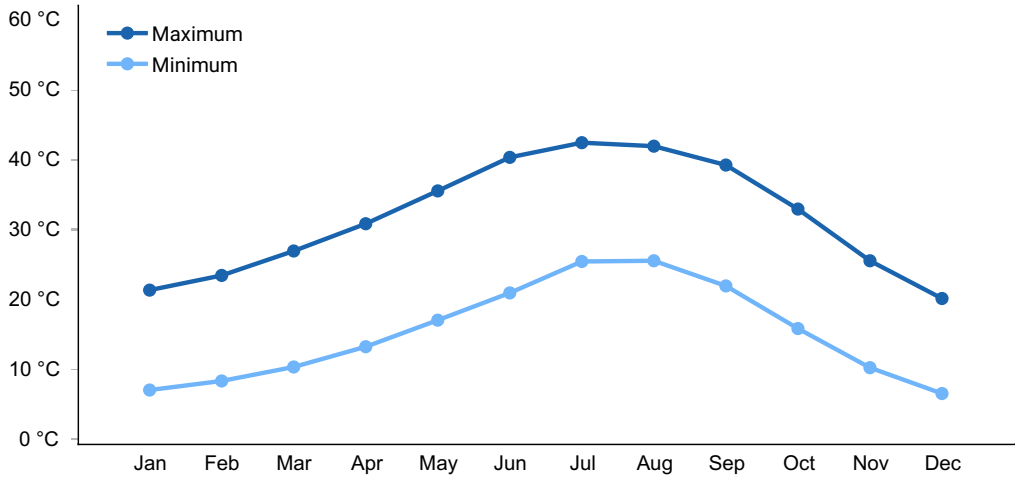


Figure 4. Monthly average minimum and maximum temperature

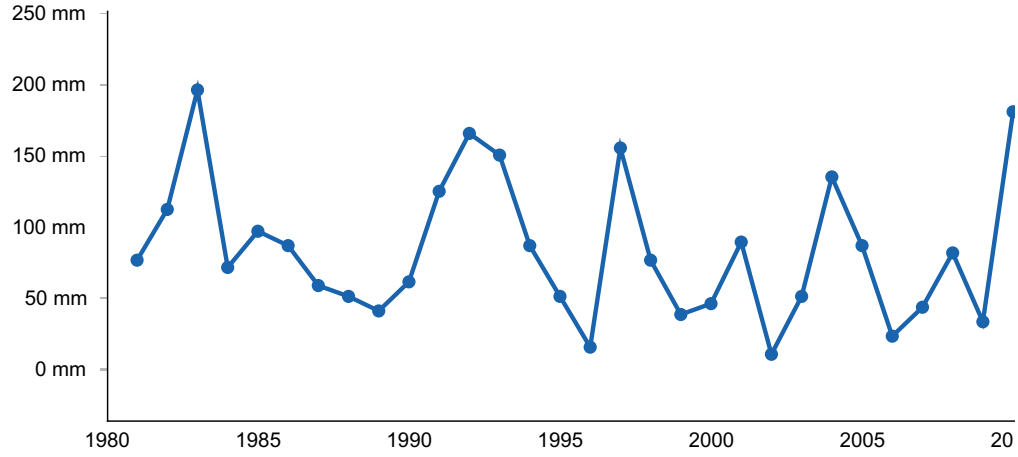


Figure 5. Annual precipitation pattern

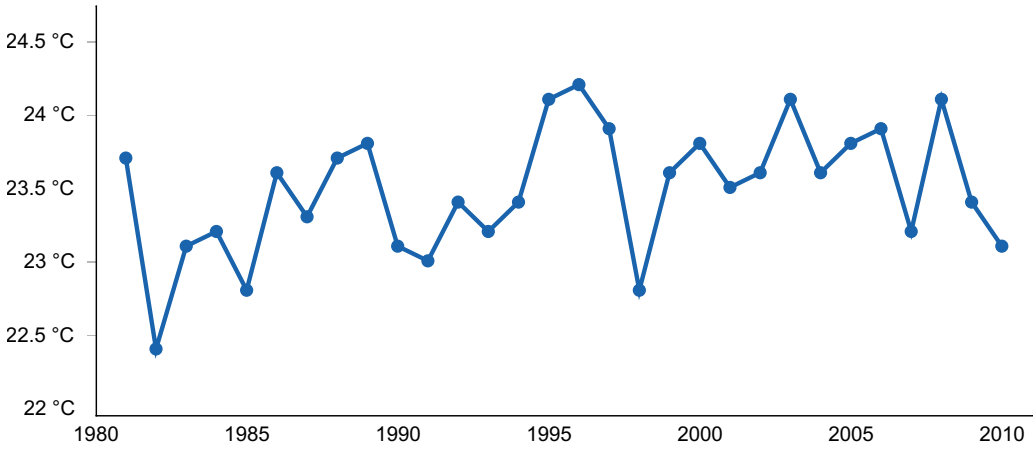


Figure 6. Annual average temperature pattern

Climate stations used

- (1) BRAWLEY 2 SW [USC00041048], Brawley, CA
- (2) GOLD ROCK RCH [USC00043489], Winterhaven, CA
- (3) YUMA QUARTERMASTER DEPOT [USC00029656], Winterhaven, AZ

Influencing water features

This is a dry desert upland site without additional water features.

Soil features

This ecological site is found on eolian soils, some of which have also been influenced by alluvial activity.

Dalelake--mixed, hyperthermic Typic Torripsamments
Sheephole--sandy, mixed, hyperthermic Typic Torriorthents

Table 4. Representative soil features

Parent material	(1) Eolian sands
Surface texture	(1) Fine sand (2) Gravelly fine sand
Family particle size	(1) Sandy
Drainage class	Well drained to excessively drained
Permeability class	Rapid
Soil depth	152–203 cm
Surface fragment cover <=3"	0–65%
Surface fragment cover >3"	0–5%

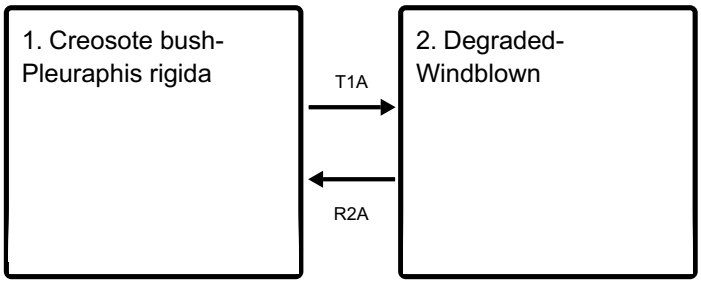
Calcium carbonate equivalent (0-101.6cm)	0–3%
Electrical conductivity (0-101.6cm)	0–4 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–5
Soil reaction (1:1 water) (0-101.6cm)	7–8.4
Subsurface fragment volume <=3" (Depth not specified)	0–70%
Subsurface fragment volume >3" (Depth not specified)	0–35%

Ecological dynamics

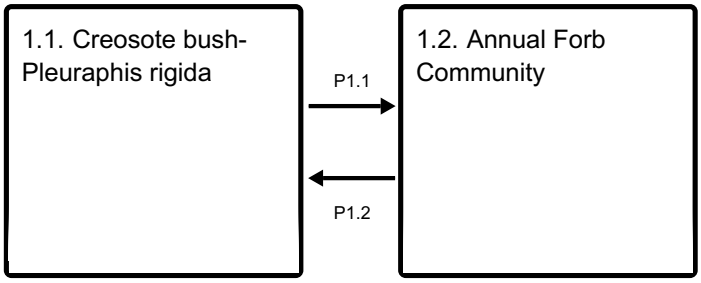
The major factor affecting this ecological site is the climate. Creosote bush (*Larrea tridentata*) and big galleta (*Pleuraphis rigida*) are common thoughout the Mojave and Colorado Deserts as they have relatively non-specific habitat requirements and are tolerant of extreme heat and drought. The higher water holding capacity of the soils is likely important in supporting high productivity, particularly of grasses. Interspecific competition is not a significant factor in the dynamics of this ecological site because species diversity is relatively low.

State and transition model

Ecosystem states



State 1 submodel, plant communities



State 1
Creosote bush-Pleuraphis rigida

Community 1.1
Creosote bush-Pleuraphis rigida

Figure 7. Sandhill 2-4" p.z.

The reference state of this ecological site includes invasive species. An example of its non-invaded state has not been seen. This plant community is dominated by creosote bush (*Larrea tridentata*). Big galleta (*Pleuraphis rigida*) is irregularly clustered throughout this plant community. Asian mustard (*Brassica tournefortii*) is a major invasive forb in this plant community. Dehiscing of the fruit as well as a plant structure that is easily detached from the ground and moved by wind has enabled this plant to spread widely throughout this plant community.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Forb	–	112	448
Shrub/Vine	11	22	34
Grass/Grasslike	6	11	17
Total	**17**	**145**	**499**

Table 6. Ground cover

Tree foliar cover	0%
Shrub/vine/liana foliar cover	1-5%
Grass/grasslike foliar cover	10-15%
Forb foliar cover	1-20%
Non-vascular plants	0%
Biological crusts	0%
Litter	5-15%
Surface fragments >0.25" and <=3"	5-10%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	40-45%

Community 1.2
Annual Forb Community

Above average precipitation through winter will bring a flush of annual forbs.

Pathway P1.1
Community 1.1 to 1.2

Above average winter moisture will bring a flush of annual forbs.

Pathway P1.2
Community 1.2 to 1.1

Hot dry spring and summer dries up the annual forbs.

State 2

Degraded-Windblown

This site has been impacted to where there is little to no vegetation severe erosion and deposition.

Transition T1A
State 1 to 2

Loss of vegetation due to multi-year drought, recreation impacts, or repetitive, excessive browsing and grazing.

Restoration pathway R2A
State 2 to 1

A relief from recreational activity or grazing pressure along with two successive years of above average precipitation.

Additional community tables

Table 7. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Shrub/Vine					
1	**Shrubs**			11–34	
	creosote bush	LATR2	*Larrea tridentata*	11–34	–
	dyebush	PSEM	*Psorothamnus emoryi*	1–3	–
Grass/Grasslike					
2	**Perennial grasses**			6–17	
	big galleta	PLRI3	*Pleuraphis rigida*	6–17	–
Forb					
3	**Annual forbs**			0–448	
	Forb, annual	2FA	*Forb, annual*	0–448	–

Other references

Holland, R. F. 1986. Preliminary descriptions of the terrestrial natural communities of California. State of California Department of Fish and Game, Sacramento, CA.

Sawyer, J. O., T. Keeler-Woolf, and J. M. Evans. 2009. A manual of California vegetation. 2nd edition. California Native Plant Society, Sacramento, California.

Approval

Kendra Moseley, 3/04/2025

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	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:**

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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):**

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:**