

Ecological site R030XD045CA

Hyperthermic Stable Sand Dunes And Sandsheets

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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. Hyper-Arid Mojave Land Resource Unit (XD)

LRU notes

The Mojave Desert is currently divided into 4 Land Resource Units (LRUs). This ecological site is within the Hyper-Arid Mojave LRU, extremely hot and dry low elevation troughs within the Mojave Desert. The Hyper-Arid Mojave LRU is designated by the 'XD' symbol within the ecological site ID. This LRU is found within the Death Valley/Mojave Central Trough, as well as portions of the Mojave exposed to the Salton Sea Trough and the Colorado River Valley. This LRU is essentially equivalent to the Death Valley/Mojave Central Trough, Arid Valleys and Canyonlands, and associated Mojave Sand Dunes and Mojave Playas of EPA Level IV Ecoregions Elevations range from -280 to 1650 feet and precipitation is less than 4 inches per year. This LRU is distinguished by its extreme aridity where a nearly barren landscape is occupied by widely spaced shrubs. Vegetation includes creosote bush, burrobush, big galleta grass with many annual species able to quickly take advantage of the few precipitation events which occur in this LRU. Playa species such as Mojave seablite and saltbush species are also common in this LRU.

Ecological site concept

This ecological site is found on dunes and sand sheets within the fan piedmont, hills, and mountains which are too active to support shrubs. Sand accumulation and removal rates bury sprouting plants or remove seeds and seedlings. Only rhizomatous and stoloniferous perennial grasses are able to tolerate conditions at this site.

Associated sites

R030XD006CA	Abandoned Fan This ecological site occurs on adjacent fan aprons.
R030XD014CA	Hyperthermic Sandy Plains This ecological site occurs on adjacent sandsheets.
R030XD015CA	Hyper-Arid Fans This ecological site occurs on adjacent fan remnants or fan aprons over fan remnants.

Similar sites

R030XD014CA	Hyperthermic Sandy Plains Occurs on more stable sandsheets. More productive site. Creosote bush is present.
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Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) <i>Pleuraphis rigida</i>

Physiographic features

This ecological site occurs on semi-active dunes and sand sheets at elevations of 1200 to 1800 feet. Slopes range from 2 to 5 percent.

Table 2. Representative physiographic features

Landforms	(1) Sand sheet (2) Dune
Flooding frequency	None
Elevation	370 – 550 m
Slope	0 – 10 %
Aspect	Aspect is not a significant factor

Climatic features

Influencing water features

Soil features

This soils associated with this ecological site are very deep fine sands. Surface textures are very fine sands. The soil temperature regime is hyperthermic and the soil moisture regime is typic aridic. Soils are classified as Typic Torripsamments.

Table 3. Representative soil features

Parent material	(1) Eolian deposits – granite
Surface texture	(1) Very fine sand

Ecological dynamics

This ecological site is found on semi-active dunes and sandsheets. The semi-active nature of the site limits shrub colonization, and the somewhat stable nature of the site prevents dune stabilizers like desert panicgrass from success. The native perennial C4 grass big galleta (*Pleuraphis rigida*) is the sole dominant species on this site. Annual species may be abundant on this site, and important species include small wirelettuce (*Stephanomeria exigua*), birdcage evening primrose (*Oenothera deltoides*), pincushion flower (*Chaenactis fremontii*), smooth desertdandelion (*Malacothrix glabrata*), and *Cryptantha* species. The non-native annual grass Mediterranean grass (*Schismus barbatus*) is often present.

This site is highly susceptible to invasion by Asian mustard (*Brassica tournefortii*) and Russian thistle (*Salsola tragus*).

State and transition model

Additional community tables

Table 4. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 5. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
Grass/Grasslike					
1	Native perennial grasses			314-583	
	big galleta	PLRI3	<i>Pleuraphis rigida</i>	314-583	15-20
3	Non-native annual grasses			8-15	
	common Mediterranean grass	SCBA	<i>Schismus barbatus</i>	8-15	5-15
Forb					
2	Native forbs			34-67	
	small wirelettuce	STEX	<i>Stephanomeria exigua</i>	28-56	4-8
	birdcage evening primrose	OEDE2	<i>Oenothera deltoides</i>	3-8	0-3
	smooth desertdandelion	MAGL3	<i>Malacothrix glabrata</i>	0-4	0-3
	pincushion flower	CHFR	<i>Chaenactis fremontii</i>	0-3	0-2

Table 6. Community 2.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
Grass/Grasslike					
1	Native perennial grasses			129-241	
	big galleta	PLRI3	<i>Pleuraphis rigida</i>	129-241	6-12
3	Non-native annual grasses			9-16	
	common Mediterranean grass	SCBA	<i>Schismus barbatus</i>	9-16	10-30

Forb					
2	Native forbs			45-90	
	small wirelettuce	STEX	<i>Stephanomeria exigua</i>	28-53	4-8
	cryptantha	CRYPT	<i>Cryptantha</i>	12-24	5-9
	smooth desertdandelion	MAGL3	<i>Malacothrix glabrata</i>	7-11	0-3
	pincushion flower	CHFR	<i>Chaenactis fremontii</i>	0-3	0-2

Inventory data references

The following NRCS vegetation plots were used to describe this ecological site: 2011CA071031 2011CA071033 2011CA071133 2011CA071228

Other references

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.

Muhs, D.R. and P.B. Maat. 1993. The potential response of aeolian sands to greenhouse warming and precipitation reduction on the Great Plains of the USA. Journal of Arid Environments 25, 351–61.

Muhs, D.R. and Holliday, V.T. 2001. Origin of late Quaternary dune fields on the Southern High Plains of Texas and New Mexico. Geological Society of America Bulletin 113, 75–87.

Salem, B. B. (1989). Arid zone forestry: a guide for field technicians (No. 20). Food and Agriculture Organization (FAO).

Contributors

Alice Miller

Dustin Detweiler

Approval

Sarah Quistberg, 2/25/2025

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	08/19/2026
Approved by	
Approval date	

Composition (Indicators 10 and 12) based on	Annual Production
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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:
