

Ecological site R040XD005CA Hyper-Arid Active Alluvial Fans 2-4" p.z.

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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): 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).

XD LRU concept:

The XD LRU is an extremely hot and dry portion of the MLRA. Mean annual precipitation is about 4 inches or less where the majority of the precipitation can arrive in only a couple storm events during any given year. The very few hard freezing days allows this region to have Plant Hardiness Zones of 9b or warmer. This LRU covers most of the Lower Colorado Desert except elevations above 500 m where Plant Hardiness Zones are less than 9b.

Classification relationships

Mojave Creosote Bush (Holland, 1986).

Larrea tridentata Shrubland Alliance (Sawyer et al. 2009).

Ecological site concept

Buried fan remnants, non-buried fan remnants, fan aprons, or other alluvial fan landforms which are not an erosional fan remnant and where washes do not deeply dissect the landscape. Sheet flow creates water flow patterns where plants tend to grow. Plant species tend to die as these flow patterns migrate.

For streamflow fans see: <https://www.nap.edu/read/5364/chapter/4#33>

National Research Council ~NRC!. ~1997!. "Alluvial fan flooding."

Water Science and Technology Board, National Academy, Washington

D.C.

This description was copied from and is equivalent to R031XY005CA. There is ongoing LRU concept development and designation where a request was made by the Region 8 Ecological Site Specialist to avoid using the default XY LRU.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) <i>Larrea tridentata</i> (2) <i>Ambrosia dumosa</i>
Herbaceous	(1) <i>Plantago ovata</i> (2) <i>Cryptantha</i>

Physiographic features

This site occurs on channelized alluvial fans.

Table 2. Representative physiographic features

Landforms	(1) Alluvial fan
Flooding duration	Extremely brief (0.1 to 4 hours) to very brief (4 to 48 hours)
Flooding frequency	Rare to occasional
Elevation	152–792 m
Slope	4–30%
Aspect	Aspect is not a significant factor

Climatic features

The Colorado Desert of California represents the northwesternmost portion of the Sonoran Desert. The subtropical Colorado Desert results from the descent of cold air which is heated by compression and arrives hot and dry at the earth's surface. Precipitation is frontal in nature during the winter and convectional in the summer. Reduced summer rainfall and high potential evapotranspiration make the Colorado Desert one of the most arid regions in North America. Summer temperatures frequently exceed 105 degrees F. The average annual precipitation ranges from 2 to 6 inches with most falling as rain. Snowfall is rare. Approximately 35% of annual precipitation occurs from July to September as a result of intense convection storms. Spring months are the windiest.

Table 3. Representative climatic features

Frost-free period (average)	360 days
Freeze-free period (average)	360 days
Precipitation total (average)	152 mm

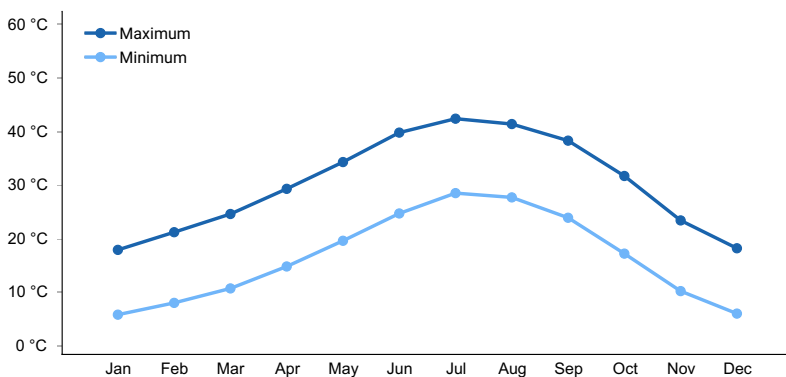


Figure 1. Monthly average minimum and maximum temperature

Influencing water features

Soil features

This site occurs on alluvial fan. The soils consist of very deep, excessively drained soils formed in stratified alluvium from mixed sources. Soil series for this site include Carrizo.

Table 4. Representative soil features

Surface texture	(1) Extremely gravelly sandy loam (2) Sand
Family particle size	(1) Sandy
Drainage class	Well drained to excessively drained
Permeability class	Moderate to moderately rapid
Soil depth	102–183 cm
Surface fragment cover <=3"	29–70%
Surface fragment cover >3"	0–10%
Available water capacity (0-101.6cm)	4.5–7.49 cm
Calcium carbonate equivalent (0-101.6cm)	7–25%
Electrical conductivity (0-101.6cm)	0–2 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–5
Soil reaction (1:1 water) (0-101.6cm)	7.4–8.6
Subsurface fragment volume <=3" (Depth not specified)	9–10%
Subsurface fragment volume >3" (Depth not specified)	2–3%

Ecological dynamics

This creosotebush (*Larrea tridentata*) site is widespread throughout the Sonoran Desert and consists of both long-lived and short-lived perennial species. In stable, old communities, creosotebushes or clones may attain ages of several thousand years. Defoliation and death of branches of creosotebush may occur as a result of long periods of intense moisture stress. Surface disturbance may reduce plant cover, density and diversity of this site. These changes can be very subtle or extremely obvious depending on the intensity of use, rate of use, and an assortment of environmental factors (topography, rainfall, soil type). After surface disturbance, white bursage (*Ambrosia dumosa*) may initially increase and an invasion of non-native annual grasses and forbs such as schismus (*Schismus arabicus*) and red-stem filaree (*Erodium cicutarium*) may occur.

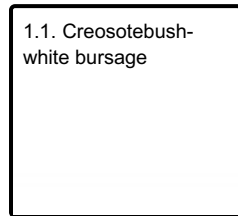
White burrobush (*Hymenoclea salsola*) is the primary perennial pioneer species. Fire effects: Creosotebush is very flammable and is poorly adapted to fire, due to its limited sprouting ability. Factors such as season of burning, fuel quantity, fire intensity and age of existing shrubs will affect the ability of creosotebush to resprout. White bursage can also be killed by fire, however, it can rapidly reestablish from off-site seed.

State and transition model

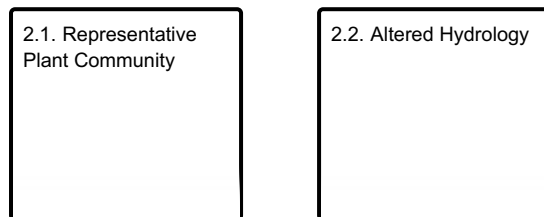
Ecosystem states



State 1 submodel, plant communities



State 2 submodel, plant communities



State 1 Creosotebush-white bursage

Community 1.1 Creosotebush-white bursage



Figure 2. Limy Fan 2-4

The interpretative plant community is the historic climax community prior to European colonization. This community is dominated by creosotebush and white bursage in almost equal numbers. The site appears like a Limy 2-4 with a more developed bursage component and slightly higher production. The site is shallowly dissected by channels which bring increased run-off and are responsible for the higher production in comparison to a Limy 2-4 site. These channels, while bringing in more moisture to the site, are not developed enough to sustain trees. California barrel cactus (*Ferocactus cylindraceus*) and buckhorn cholla (*Cylindropuntia acanthocarpa*) are present in small quantities. Wolfberry (*Lycium andersonii*) is also a minor component which is restricted to the channel areas. Annual forbs and grasses are seasonally present. The potential plant community is 90% shrubs, 5% forbs, and 5% grasses. The total vegetation cover of the site is 25%. Biological crusts compose up to 20% of the ground cover of the site.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Shrub/Vine	83	109	135
Forb	1	2	3
Grass/Grasslike	–	1	2
Total	84	112	140

Table 6. Ground cover

Tree foliar cover	0%
Shrub/vine/liana foliar cover	15-20%
Grass/grasslike foliar cover	1-3%
Forb foliar cover	3-5%
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	13-15%
Grass/grasslike basal cover	0-1%
Forb basal cover	1-5%
Non-vascular plants	0%
Biological crusts	15-20%
Litter	5-7%
Surface fragments >0.25" and <=3"	55-60%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	5-7%

Table 8. Canopy structure (% cover)

Height Above Ground (M)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.15	–	–	0-1%	1-2%
>0.15 <= 0.3	–	15-20%	–	–
>0.3 <= 0.6	–	20-25%	–	–
>0.6 <= 1.4	–	40-45%	–	–
>1.4 <= 4	–	1-3%	–	–
>4 <= 12	–	–	–	–
>12 <= 24	–	–	–	–
>24 <= 37	–	–	–	–
>37	–	–	–	–

State 2 Representative State

Community 2.1 Representative Plant Community

Community 2.2 Altered Hydrology

Additional community tables

Table 9. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Shrub/Vine					
1	Native Shrubs			83–135	
	creosote bush	LATR2	<i>Larrea tridentata</i>	39–64	–
	burrobush	AMDU2	<i>Ambrosia dumosa</i>	37–61	–
	water jacket	LYAN	<i>Lycium andersonii</i>	1–3	–
	white ratany	KRGR	<i>Krameria grayi</i>	1–2	–
	California barrel cactus	FECY	<i>Ferocactus cylindraceus</i>	0–1	–
Grass/Grasslike					
2	Perennial grass			0–1	
	big galleta	PLRI3	<i>Pleuraphis rigida</i>	0–1	–
4	Annual Grass			0–1	
	sixweeks grama	BOBA2	<i>Bouteloua barbata</i>	0–1	–
Forb					
3	Native Forbs			1–3	
	desert Indianwheat	PLOV	<i>Plantago ovata</i>	1–3	–

Animal community

This site is dominated by two shrubs highly valued by burrowing animals, creosotebush and white bursage. Desert tortoise (*Gopherus agassizii*), lizards, ground squirrels and other rodents all burrow into the root-mounds of the creosotebush. The medium stature of creosote also allows for some perching by both birds and rodents. The partially shaded apron around the creosotebush is more nutrient rich than surrounding areas and gives rise to abundant annual plants when rainfall allows. This then provides a food source for the above-mentioned wildlife.

White bursage, although not as well suited as creosote, also provides good burrowing among its roots and provides good cover from predators.

Recreational uses

This site is highly valued for open space and those interested in desert ecology. Uses include mountain biking, hiking, bird watching and botanizing. Desert tortoise and wildflowers may also attract visitors during the spring.

Other information

Non-native plants on this site include mediterranean grass. This grass is rarely eaten by the native animals and increases fire potential by providing a fuel load in between shrubs.

Type locality

Location 1: San Bernardino County, CA	
UTM zone	N
UTM northing	3814211
UTM easting	724520
Latitude	34° 26' 42"
Longitude	114° 33' 22"
General legal description	This site occurs within the Chemehuevi Wash OHV area. The type locality is about 3 miles south of the Lake Havasu rd. on the Heritage Trail (dirt).

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.

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	
Approved by	
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:**
