Ecological site R040XD029CA
Frequently Flooded, Confined Ephemeral Stream

Accessed: 05/05/2024

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

MLRA Statement:
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.

Ecological site concept

This ecological site is associated with first-order ephemeral streams, which occur in confined drainageways that dissect stable fan remnants and ballenas with desert pavement surfaces. These drainageways have frequent, low-intensity flash flood events. The soils are very deep, very gravelly sandy loams. Most of the surface is covered by course gravel and cobbles, but patches of sand deposits exist. These patches are colonized and maintained by vegetation. Production Reference Value (RV) is 365 pounds per acre and ranges from 133 to 525 pounds per acre depending on annual precipitation. The site is dominated by ironwood (Olneya tesota), creosote bush (Larrea tridentata), and brittlebush (Encelia farinosa) and big galleta (Pleuraphis rigida) are important species. Elevations range from 460 to 2230 feet, with slopes between 0 to 15 percent.

Data ranges in the physiographic data, climate data, water features, and soil data sections of this Ecological Site Description are based on major and minor components, since it is often only associated with minor components.

This description was copied from and is equivalent to R031XY029CA. 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.

Associated sites

R030XD002CA	**Desert Pavement** This ecological site is a MLRA 30 hyperthermic desert pavement site on adjacent fan remnants, above the R031XY029CA ESD, with desert ironwood dominated drainageways. A distinct boundary between MLRA 30 (Mojave desert) and MLRA 31 (Sonora desert) is hard to define.
R030XD004CA	**Low-Production Hyperthermic Hills** This ecological site is a MLRA 30 ESD, on steep sideslopes of fan remnants (ballenas). It is situated above the R031XY029CA drainageways.
R040XD034CA	**Gravelly, Braided, Ephemeral Stream** This ecological site is on rarely flooded fan aprons with brittlebush and creosote bush.

Similar sites

R040XD021CA	**Very Gravelly Wash** This ecological site is also on drainageways among desert pavement, but the drainageways are smaller and desert ironwood is not present.
R040XD010CA	**Valley Wash** This frequently flooded ephemeral stream is in large drainageways near the valley bottoms, with blue paloverde, catclaw acacia, and some desert willow.

Table 1. Dominant plant species

Tree	(1) *Olneya tesota*
Shrub	(1) *Larrea tridentata* (2) *Encelia farinosa*
Herbaceous	(1) *Pleuraphis rigida* (2) *Chaenactis fremontii*

Physiographic features

This ecological site occurs on channels and drainageways. Slopes range from 0 to 15 percent, and elevations range from 490 to 2230 feet.

Table 2. Representative physiographic features

Landforms	(1) Channel (2) Drainageway
Flooding duration	Extremely brief (0.1 to 4 hours)
Flooding frequency	None to frequent
Ponding frequency	None
Elevation	149–680 m
Slope	0–15%
Aspect	Aspect is not a significant factor

Climatic features

The climate of this ecological site is characterized by hot temperatures, aridity, and a bimodal precipitation pattern. Precipitation falls as rain, with 30 percent falling in summer between July and October, and 60 percent falling in winter between November and March. The mean annual precipitation is 2 to 4 inches and mean annual air temperature is 73 to 79 degrees F. The frost free period is 360 to 365 days and the freeze free period is 363 to 365 days.

Maximum and minimum monthly climate data for this ESD were generated by the Climate Summarizer (http://www.nm.nrcs.usda.gov/technical/handbooks/nrph/Climate_Summarizer.xls) using data from the following climate stations (results are weighted averages; numbers in square brackets represent relative weights):

42598, Eagle Mountain, CA (Period of record = 1933 to 2011) [2]

43855, Hayfield Reservoir, CA (Period of record = 1933 to 2011) [1]

The data from multiple weather were combined to most accurately reflect the climatic conditions of this ecological site.

Table 3. Representative climatic features

Frost-free period (average)	365 days
Freeze-free period (average)	365 days
Precipitation total (average)	102 mm

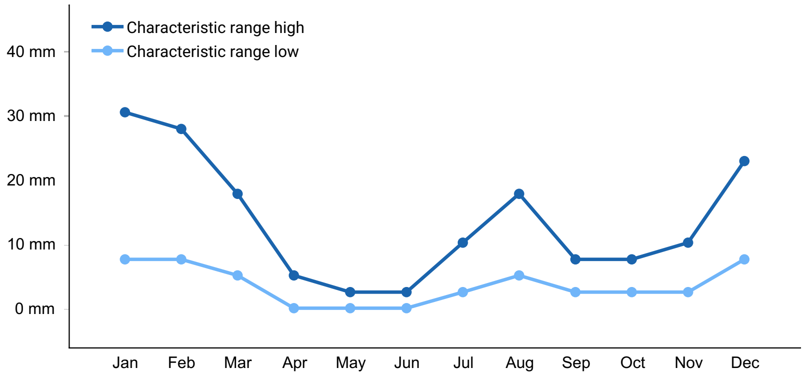

Figure 1. Monthly precipitation range

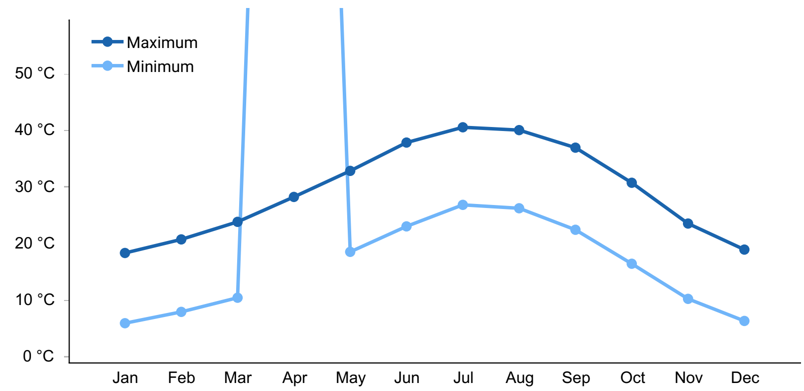

Figure 2. Monthly average minimum and maximum temperature

Influencing water features

This ephemeral stream is subject to extremely brief, frequent to rare flash flood events.

Soil features

The soils associated with this site are very deep and formed in alluvium from igneous or granitic parent material. Surface textures are typically gravelly coarse sand, with very or extremely gravelly coarse sand subsurface textures. Surface rock fragments greater than 3 inches range from 40 to 80 percent, and subsurface rock fragment less than 3 inches ranges from 2 to 46 percent by volume. Surface rock fragments greater than 3 inches ranges from 0 to 22 percent, and subsurface rock fragments greater than 3 inches ranges from 0 to 14 percent.

This ecological site is correlated with the Rizzo soil series. The Rizzo soils are excessively drained, with rapid permeability and are sandy-skeletal, mixed, hyperthermic Typic Torriorthents. A higher order of Typic Torriorthents is also associated with this ecological site. The higher order Typic Torriorthents component has a loam textured horizon beginning at 24 inches. Because of this finer texture, these soils are well drained, with slow to moderately rapid permeability, with higher water holding capacity than the Rizzo soils. This component has younger alluvium deposited over older soils.

This ecological site has been correlated to the following map units and soil components in the Joshua Tree National Park Soil Survey Area (CA794):

Map unit ID; Map unit name; Component; Percent
2120; Rizzo-Deprave complex, 2 to 8 percent slopes; Rizzo; frequently flooded; 20
2130; Goldenbell-Descent association, 2 to 15 percent slopes; Rizzo; frequently flooded; 4
2440; Rizzo complex, 8 to 15 percent slopes;Rizzo; frequently flooded; 10
2091; Deprave-Roostertail association, 0 to 4 percent slopes; Typic Torriorthents; 10

This ecological site is also correlated with the same map units above in the Colorado Desert Area Soil Survey (CA803), where it joins map units with CA794.

Table 4. Representative soil features

Surface texture	(1) Gravelly coarse sand (2) Extremely cobbly sandy loam
Family particle size	(1) Sandy
Drainage class	Well drained to excessively drained
Permeability class	Moderately rapid to rapid
Soil depth	152 cm
Surface fragment cover <=3"	40–80%
Surface fragment cover >3"	0–22%
Available water capacity (0-101.6cm)	2.03–9.65 cm
Calcium carbonate equivalent (0-101.6cm)	0%
Electrical conductivity (0-101.6cm)	0 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0
Soil reaction (1:1 water) (0-101.6cm)	7.4–8.4
Subsurface fragment volume <=3" (Depth not specified)	2–46%
Subsurface fragment volume >3" (Depth not specified)	0–14%

Ecological dynamics

This small ephemeral stream ecological site is in small, confined channels and drainageways that dissect very stable fan remnants and ballenas that often have desert pavement surfaces. The stability of the adjacent fan remnants has allowed a relatively stable network of small drainageways to develop. Flash floods of low intensity occur frequently, with larger events rarely flooding the higher positions within the drainageway. This ecological site is distinguished by small drainage systems with high cover and dominance of desert ironwood, with creosote bush, brittlebush and big galleta as important secondary species.

These drainageways form a dendritic (branched) drainage pattern as they collect runoff from adjacent fan remnants. Desert pavement is characterized by almost barren, flat surfaces covered with tightly interlocked surface rock fragments, which are often darkly colored by desert varnish. Drainageways among desert pavement surfaces appear as wavy lines of vegetation among these dark barren surfaces. Desert pavement has near surface soil features that reduce the rate of infiltration, thus excess flow drains across flat pavement surfaces to the multiple small drainageways that have developed on the fan remnants. Recent theories on the development of desert pavement suggest that eolian dust from nearby dry lake beds have been deposited on the soil surface for thousands of years, and accumulated (through a variety of processes) under the surface rock fragments (McFadden et al. 1987, Meadows et al. 2008). During this process rock fragments are lifted leveling out the surface. Refer to the Desert Patina (R031XY002CA) ecological site for more information on the desert pavement.

Drainageways among desert pavement surfaces receive continuous soil disturbance from runoff events that prevents formation of desert pavement features, such as an interlocking rock fragments on the surface, or an underlying eolian-deposited horizon dominated by vesicular pores. Instead, they are typically composed of very deep coarse sands with very gravelly or extremely gravelly modifiers. Regular flooding of the drainageways flushes and mixes the fine eolian dust deposits from the surface and inhibits the development of the vesicular horizon and the associated uplift of gravels. Deep sands allow for rapid water infiltration to deep soil horizons, providing an important reserve of water for vegetation.

A high density of desert ironwood is a prominent feature of this ecological site. The range of desert ironwood is almost entirely within the Sonoran Desert. Desert ironwood is frost intolerant, which restricts its distribution to frost-free zones. Desert ironwood is dependent upon sufficient winter precipitation for seed production, and summer precipitation for seed germination. This ecological site occurs at the northern edge of the Sonoran Desert, with lower mean annual precipitation and less summer precipitation than is typical for the Sonoran Desert. Because of lower precipitation in the region where this ecological site occurs, ironwood is often associated with ephemeral drainageways in this region. However, it may also occur on alluvial fans, mountain slopes, and over bedrock. Desert ironwood is a long lived, slow growing tree with very dense wood, and dead ironwood trees and stumps take centuries to decompose because of toxic, non-biodegradable chemicals in the wood (Phillips, et al. 2000). Desert ironwood is an important nurse tree for a variety of shrubs and cacti in parts of its range.

The stable gravel surface and the flat topography of the desert pavement are resistant to erosion, and provide little sediment to drainageways during flood events. Occasional floods have low volume and intensity, and are contained within the drainageway. These draingeways are in stable positions, and are not inclined to braid or migrate, unless disturbed. If the desert pavement surface is disturbed, and the protective gravels are removed, surface erosion and gullying may increase sediment and run off to the adjacent drainageways. Road development and associated ditches alter drainage patterns, which may cause drainageways to become wider, deeper, and braided.

This ecological site is very unlikely to burn, or to burn extensively, due to the large expanses of barren desert pavement between the vegetated channels. The non-native forb Asian mustard (*Brassica tournefortii*) is consistently present within this ecological site, and Mediterranean grass (Schismus sp.) is sporadically present, but they both have low cover. These non-native species are unlikely form a continuous cover to carry fire, or increase the fire frequency. However, very wet (El Nino) years followed by severe drought produces conditions where large areas of creosote scrub may burn (Brown and Minnich 1986), and fire has a low potential to spread up the drainageway in some areas.

State and transition model

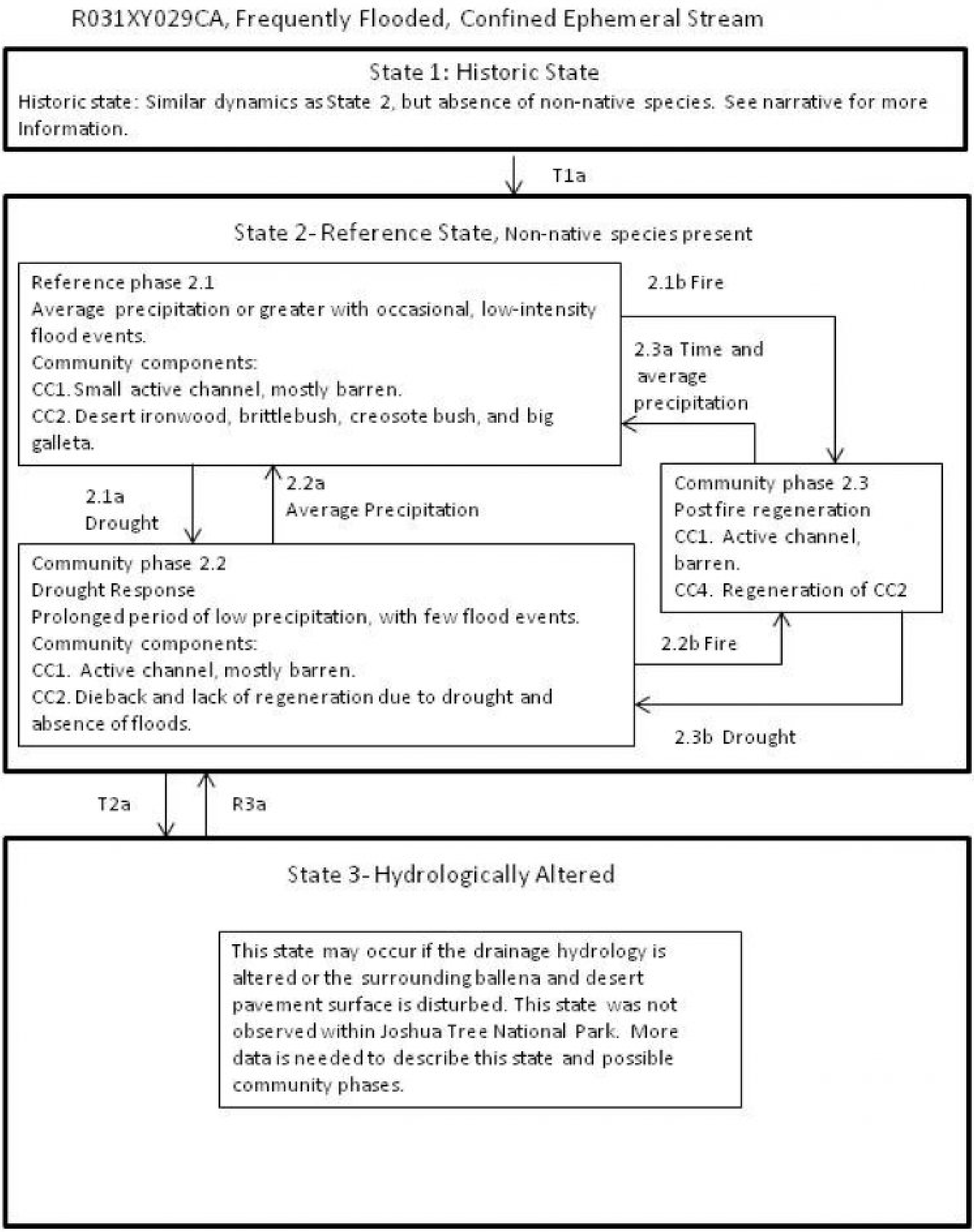

Figure 3. R031XY029CA Model

State 1
Historic State

State 1 represents the historic-natural condition for this ecological site. It is similar to State 2, but has only native species. If we were to include dynamics for this state it would be the same as displayed in State 2. The presence of non-native species is minimal in State 2, and has not altered the hydrology or fire frequency.

State 2
Reference State

This state represents the most common and most ecologically intact condition for this ecological site at the present time.

Community 2.1
Reference Phase

Figure 4. Community Phase 2.1 Ironwood - Big galleta

Figure 5. Community Phase 2.1 Ironwood - Big galleta

This community phase is dependent upon unimpaired hydrologic function and average to above average precipitation. These drainageways are relatively stable and confined. There are two community components associated with this community phase. Community component one (CC1): This community component is in the most actively flooded region of the drainageway, and is composed of barren sands and gravels with sporadic annual cover. Community component two (CC2): This community component is adjacent to the active zone in the drainageway, and may extend up the lower sideslopes of the drainageway. A mixed age of desert ironwood trees is present at 15 to 25 percent cover. Creosote bush is the dominant shrub, with brittlebush co-dominant. Desert lavender (*Hyptis emoryi*), white ratany (*Krameria grayi*), and burrobush (*Ambrosia dumosa*) are secondary shrubs. This site supports several perennial forbs (or subshrubs) including Parry's false prairie-clover (*Marina parryi*), hairy milkweed (*Funastrum hirtellum*), paleface (*Hibiscus denudatus*), and New Mexico silverbush [annual to perennial] (*Argythamnia neomexicana*). Big galleta, a native perennial bunchgrass, is present with 1 to 5 percent cover. The presence, abundance, and diversity of annuals is dependent upon the precipitation cycle. Common annuals are lacy phacelia (*Phacelia tanacetifolia*), desert Indianwheat (Plantago ovate), cryptantha (Cryptantha sp.), Abrams' sandmat (*Chamaesyce abramsiana*), and pincushion flower (*Chaenactis fremontii*). Sediments deposits dominated by sand are regularly distributed along the drainageway, and big galleta has higher cover within these patches. These sandier deposits are also more prone to invasion by the non-native Asian mustard. Creosote bush, desert ironwood and brittlebush are not flood dependent species; they do not require seed scarification for seed germination, and they do not resprout after flood damage. This indicates low flood intensity within these drainageways, but higher water availability than the surrounding fan remnants. The non-native forb, Asian mustard is consistently present and Mediterranean grass (Schismus sp.) is sporadically present within this community component. They both have low cover.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Shrub/Vine	112	157	224
Forb	–	140	185
Grass/Grasslike	9	62	90
Tree	28	50	90
Total	**149**	**409**	**589**

Table 6. Ground cover

Tree foliar cover	10-16%
Shrub/vine/liana foliar cover	9-23%
Grass/grasslike foliar cover	1-5%
Forb foliar cover	7-17%
Non-vascular plants	0%
Biological crusts	0%
Litter	6-21%
Surface fragments >0.25" and <=3"	17-42%
Surface fragments >3"	0-2%
Bedrock	0%
Water	0%
Bare ground	5-13%

Community 2.2
Drought Response

This community develops with prolonged or severe drought, and is characterized by an overall decline in vegetation cover and biomass. Drought is an important shaping force in Sonoran Desert plant communities (Webb et al. 2003, Bowers 2005, Hereford et al. 2006, Miriti et al. 2007). Short-lived perennials, such as brittlebush and burrobush, demonstrate the highest rates of mortality (Webb et al. 2003, Bowers 2005, Hereford et al. 2006, Miriti et al. 2007), and annual species remain dormant in the soil seedbank. Long-lived shrubs (such as creosote bush, white ratany, and desert lavender) are more likely to exhibit branch-pruning, and or limited recruitment during drought (e.g. Hereford et al. 2006, Miriti et al. 2007), leading to reduced cover and biomass in drought-afflicted communities. Desert ironwood is very drought tolerant, but it may slough off large branches to conserve water. Desert ironwood may be top-killed by severe drought, and resprout from the lower trunk after each occurrence (Phillips and Wentworth 2000). Creosote bush is a long-lived, deep-rooted evergreen shrub dominant across vast areas of the North American warm deserts. Once established, it has very low levels of drought-induced mortality. Brittlebush, when dominant on lower landscape positions, such as alluvial fans, is generally associated with a disturbance community (Sawyer et al. 2009). Brittlebush is an extremely drought-tolerant, drought-deciduous shrub. It has leaf and shoot-adaptations that allow it to withstand hot temperatures and extreme aridity, however freezing temperatures restrict brittlebush. Frosts cause branch die-back and mortality in adult brittlebush (Sandquist and Ehleringer 1996), and reduce seedling establishment (Bowers 1994). Desert lavender is a deep rooted species so it can assess the deeper water. It adjusts its leaf pubescence and size similar to brittlebush to reduce water loss, and is also frost intolerant. White ratany is a long-lived, drought-deciduous shrub that co-occurs as a secondary species with creosote bush over much of its range. It is a root parasite that obtains nutrients from the roots of host plants, which may help to sustain it during of drought. If drought persists or the channel becomes less active due to flow diversion, creosote bush may become the main species in the drainageway.

Community 2.3
Post-Fire Regeneration

Fire is very unlikely in this ecological site due to the lack of vegetation cover on adjacent fan remnants, but fire may spread from lower creosote shrub communities following very wet years. The fire regeneration community is characterized by an increase in brittlebush, loss of ironwood cover, and mortality of creosote bush. Desert lavender and catclaw acacia may resprout after fire. There is little information about the effects of fire on desert ironwood but there is some evidence that it can resprout, with survival dependent on burn severity. Desert ironwood establishment from seed requires normal to above normal winter precipitation for seed production and summer rains for seed germination. Tree growth is very slow, and may take 100 years to regain the large tree stature, and previous cover. Creosote bush rarely resprouts after fire, and it will take time to re-establish from seed due to specific recruitment requirements. Brittlebrush will increase in dominance after fire, because it quickly reestablishes from seed (Brown and Minnich 1986, Brooks et al. 2007, Steers and Allen 2011).

Pathway 2.1a
Community 2.1 to 2.2

This pathway is caused by a prolonged or severe drought.

Pathway 2.1b
Community 2.1 to 2.3

This pathway is caused by an unlikely event of a moderate to severe fire.

Pathway 2.2a
Community 2.2 to 2.1

This pathway occurs in response to the passing of time with average to above average precipitation and associated flooding.

Pathway 2.2b
Community 2.2 to 2.3

This pathway occurs as a result of fire. Given low cover of annuals during drought, this pathway is unlikely except in periods immediately following heavy precipitation years.

Pathway 2.3a
Community 2.3 to 2.1

This pathway occurs in response to the passing of time with average to above average precipitation and associated flooding.

Pathway 2.3b
Community 2.3 to 2.2

This pathway occurs in response to the passing of time with drought conditions and absence of flooding.

State 3
Hydrologically Altered State

This state may occur if the drainage hydrology is altered or the surrounding desert pavement surface is disturbed. This state was not observed within the Joshua Tree National Park. More data is needed to describe this state and possible community phases.

Community 3.1
Hydrologically Altered

Altered surface flow was observed due to road crossings. Flow can either be diverted away from or to an area. The diversion of flow from an area will cause a decline of xeroriparian vegetation and subsequent increase of creosote dominated plant communities. Increased flow to an area can cause erosion with channel widening or incision. Ground water drawdown from household wells (Nishikawa et. al. 2004) or the diversion of surface flow in the upper watershed can deplete the water source for deep rooted species such as desert lavender and blue paloverde

Transition 2
State 2 to 3

Triggers that can cause a transition to State 3 include surface flow alterations and disturbance of the adjacent desert pavement surface.

Restoration pathway R3a
State 3 to 2

Restoration from State 3 back to State 2 would be an intensive task. Individual site assessments would be required to determine proper restoration methods. Some hydrological modifications are not feasible restored, such as ground water depletion. However, road diversions can be redesigned to allow proper stream alignment and flow. Since these channels are relatively confined and do not braid or migrate, proper locations for culverts or breaks are easier to identify. Seeds or plants of appropriate species may need to be reintroduced to the restored channels.

Additional community tables

Table 7. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Tree					
1	**Trees**			28–90	
	desert ironwood	OLTE	*Olneya tesota*	28–90	10–16
Shrub/Vine					
2	**Native shrubs**			112–224	
	creosote bush	LATR2	*Larrea tridentata*	90–224	6–9
	brittlebush	ENFA	*Encelia farinosa*	22–90	1–6
	desert lavender	HYEM	*Hyptis emoryi*	0–56	0–4
	white ratany	KRGR	*Krameria grayi*	11–22	1–3
	burrobush	AMDU2	*Ambrosia dumosa*	0–11	0–1
Forb					
3	**Native forbs**			0–185	
	cryptantha	CRYPT	*Cryptantha*	0–90	0–5
	Abrams' sandmat	CHAB2	*Chamaesyce abramsiana*	0–90	0–2
	pincushion flower	CHFR	*Chaenactis fremontii*	22–45	0–6
	desert Indianwheat	PLOV	*Plantago ovata*	0–34	0–6
	hairy milkweed	FUHI	*Funastrum hirtellum*	0–1	0–1
	paleface	HIDE	*Hibiscus denudatus*	0–1	0–1
	Parry's false prairie-clover	MAPA7	*Marina parryi*	0–1	0–1
	lacy phacelia	PHTA	*Phacelia tanacetifolia*	0–1	0–1
	New Mexico silverbush	ARNE2	*Argythamnia neomexicana*	0–1	0–1
6	**Non-native annual forbs**			0–45	
	Asian mustard	BRTO	*Brassica tournefortii*	0–45	0–1
Grass/Grasslike					
4	**Native perennial grasses**			9–90	
	big galleta	PLRI3	*Pleuraphis rigida*	9–90	1–5
5	**Non-native annual grasses**			0–6	
	Mediterranean grass	SCHIS	*Schismus*	0–6	0–1

Animal community

Desert ironwood provides seeds, forage, and shelter for a variety of animals. Creosote bush shrublands provide a home for an abundance of specialist insect species, for example, creosote bush flowers provide nutrition for over twenty species of bees, and the creosote bush grasshopper (Bootettix argentatus) feeds solely on creosote leaves (Pavlik 2008). The sparse vegetation of this ecological site does not provide good cover or food for animals. Brittlebush is used as forage by desert bighorn sheep and mule deer.

Hydrological functions

Ephemeral drainages maintain water quality by allowing energy dissipation from flow events. These systems transport nutrients and sediments, and store sediments and nutrients in deposition zones. Ephemeral drainages provide temporary storage of surface water, and longer duration storage of subsurface water (Levick et al. 2008).

Recreational uses

This site may be used for hiking and aesthetic enjoyment

Wood products

Desert ironwood wood is very dense, and has been used for firewood and wood carvings, but due to its slow growth rate and low recruitment it is unsustainable and illegal to collect in some areas (Phillips and Wentworth 2000).

Other products

Brittlebush has medicinal uses for Native Americans, including as a poultice for pain and for toothaches. Brittlebush resin is used as chewing gum, to fasten arrow points to twigs, to waterproof water bottles, and is melted to make a varnish. Brittlebush twigs were used as kindling for quick fires. http://herb.umd.umich.edu/herb/search.pl?searchstring=Encelia+farinosa.

Brittlebush resin is burned as incense in churches in Mexico (Tesky 1993).

Creosote bush is an important medicinal plant for Native Americans. It has a very wide range of uses from treatment for consumption, bowl complaints, and menstrual cramps, to induce vomiting, relief for arthritis, rheumatism, aching bones and sprains, congestion and cold, as an antiseptic and disinfectant, dandruff, antispasmodic, to induce urination, gonorrhea, and to cancer treatment. (This list is not exhaustive). http://herb.umd.umich.edu/herb/search.pl?searchstring=Larrea+tridentata.

Creosote bush stems are used to make weapons, digging tools, and basket handles, and creosote gum is used for knife and awl handles. Creosote bush branches are used as thatch in dwelling construction. http://herb.umd.umich.edu/herb/search.pl?searchstring=Larrea+tridentata.

Desert ironwood seeds are edible after being prepared and cooked properly (Phillips and Wentworth 2000). Desert lavender is used in landscaping, because it has a pleasant aroma and it attracts bees and hummingbirds.

Inventory data references

The following NRCS vegetation plots were used to describe this ecological site.

1248014702V
EOVP-03 break
EOVP-02 (Type location)

Type locality

Location 1: Riverside County, CA	
UTM zone	N
UTM northing	3741368
UTM easting	657224
General legal description	The type location is just north of MWD Aqueduct Road, about 1 mile from the HW 177 junction, and about 13 miles north of Desert Center, CA.

Other references

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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:

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):**

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14. **Average percent litter cover (%) and depth (in):**

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):**

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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:**

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17. **Perennial plant reproductive capability:**
