Natural Resources
Conservation Service

Ecological site R030XD041CA
Channeled Warm Alluvial Fans

Accessed: 05/03/2024

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.

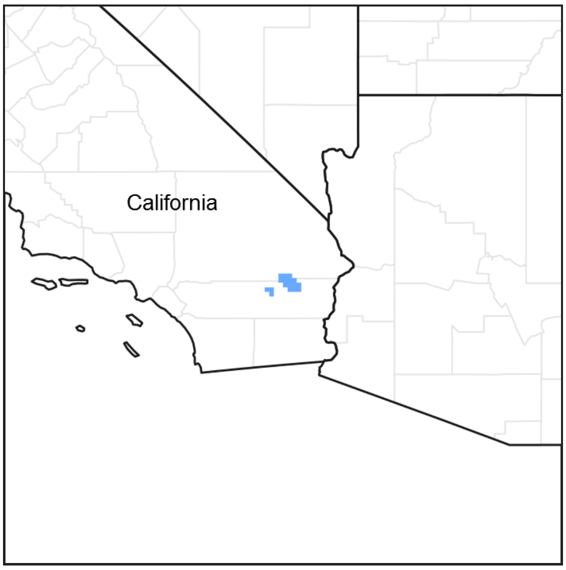

Figure 1. Mapped extent

Areas shown in blue indicate the maximum mapped extent of this ecological site. Other ecological sites likely occur within the highlighted areas. It is also possible for this ecological site to occur outside of highlighted areas if detailed soil survey has not been completed or recently updated.

MLRA notes

Major Land Resource Area (MLRA): 030X–Mojave Basin and Range

MLRA Description:

Major Land Resource Area (MLRA) 30, Mojave Desert, 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 climate of the area is hot (primarily hyperthermic and thermic; however at higher elevations, generally above 5000 feet, mesic, cryic and frigid) and dry (aridic). Elevations range from below sea level to over 12,000 feet in the higher mountain areas found within the MLRA. Due to the extreme elevational range found within this MLRA, Land Resource Units (LRUs) were designated to group the MLRA into similar land units.

LRU Description:

This Land Resource Unit (designated by 'XD') is found on the eastern side of California. Elevations range from 400 to 2200 feet on average, but may be found up to 3600 feet on southern exposures. Precipitation ranges from 1 to 6 inches per year, but averages between 2-4 inches. This LRU is characterized primarily by the extreme aridity, hot temperatures, hyperthermic soil temperatures and low stature of widely spaced vegetation. Temperatures can reach over 110 degrees Fahrenheit for several weeks in July and August. Summer precipitation falls between July and September, ranging from 20-33% in the form of rain, and winter precipitation falls starting in November and ends between February and March, ranging from 56-70%, also mostly in the form of rain. Vegetation is primarily small, widely-spaced, low-producing creosote bush (Larrea tridentata), burrobush (Ambrosia dumosa), and brittlebush (Encelia farinosa).

Ecological Site Concept –

This ecological site occurs on gently sloping channeled fan aprons and fan remnants, typically on the upper portion of the fan piedmont, at elevations of 950 to 2390 feet. Soils are typically very deep with sandy textures. This site typically has a rare surface flooding regime, but may have none to occasional flooding.

Production reference value (RV) is 242 pounds per acre, and ranges from 160 to 390 pounds per acre depending on annual precipitation and annual forb production. The site is dominated by creosote bush (Larrea tridentata), and burrobush (Ambrosia dumosa) and brittlebush (Encelia farinosa) are important secondary species. A hyperthermic climate, landform positions near the base of mountains, a channeled alluvial topography with additional run-on from the adjacent mountains, and a rare to occasional surface flooding regime drives the vegetation community of this ecological site. This site is more productive and diverse than landforms at the same elevation with less additional moisture.

Data in the following sections is based on Pintobasin components (all minor) associated with this ecological site.

Classification relationships

Mojave Creosote Bush (Holland 1986).

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

Associated sites

R030XD004CA	**Low-Production Hyperthermic Hills** This ecological site occurs on steep sideslopes of fan remnants. Sparse vegetation is dominated by creosote bush (Larrea tridentata).
R030XD015CA	**Hyper-Arid Fans** This ecological site occurs on adjacent fan aprons receiving less additional moisture. Creosote bush (Larrea tridentata) and burrobush (Ambrosia dumosa) dominate.
R030XD025CA	**Hyperthermic Sandsheets** This ecological site is found on adjacent sandsheets. Creosote bush (Larrea tridentata) and big galleta (Pleuraphis rigida) dominate.
R030XD042CA	**Hyperthermic Shallow To Moderately Deep Fan Remnants** This ecological site is found on adjacent stable fan remnants. Sparse vegetation is dominated by creosote bush (Larrea tridentata).

Similar sites

R030XD039CA	**Coarse Gravelly Fans** This ecological site occurs on soils with a higher percentage of rock fragments on the surface and in the soil profile. Brittlebush (Encelia farinosa) and creosote bush (Larrea tridentata) dominate.
R030XD006CA	**Abandoned Fan** This ecological site occurs on fan aprons receiving much less additional moisture. The plant community is much less productive and diverse. Creosote bush (Larrea tridenta) is the only dominant shrub.
R030XD015CA	**Hyper-Arid Fans** This ecological site occurs on fan aprons receiving less additional moisture. Channeling is not as prevalent. The plant community is less productive and less diverse, and brittlebush (Encelia farinosa) is not an important species.

Table 1. Dominant plant species

Tree	Not specified

Shrub	(1) *Larrea tridentata* (2) *Ambrosia dumosa*
Herbaceous	Not specified

Physiographic features

This ecological site occurs on channeled fan aprons and fan remnants, typically on the upper portion of the fan piedmont, at elevations of 950 to 2390 feet. Slopes may range from 2 to 15 percent, but slopes of 2 to 4 percent are typical. This site typically has a rare surface flooding regime, but may have none to occasional flooding. Runoff class is very low to high.

Table 2. Representative physiographic features

Landforms	(1) Fan apron (2) Fan remnant
Flooding duration	Extremely brief (0.1 to 4 hours) to very brief (4 to 48 hours)
Flooding frequency	None to occasional
Ponding frequency	None
Elevation	290–728 m
Slope	2–15%

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 65 percent falling in winter between November and March. The mean annual precipitation is 3 to 5 inches and mean annual air temperature is 68 to 73 degrees F. The frost free period is 300 to 340 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 unweighted averages):

42598, Eagle Mountain, CA (Period of record = 1933 to 2011) [1]

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

049099, Twentynine Palms, California (Period of record = 1935 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)	340 days
Freeze-free period (average)	0 days
Precipitation total (average)	127 mm

Influencing water features

Soil features

The dominant soils associated with this ecological site are very deep, somewhat excessively drained soils that formed in alluvium from granitoid and/or gneissic rocks. These soils are sandy in the particle size control section, and permeability is rapid. The surface texture is gravelly sand, and subsurface horizons (1 to 59 inches) are composed of layers of gravelly sand. Surface gravels (< 3 mm in diameter) are 25 percent, with no larger fragments present on the soil surface. Subsurface gravels by volume (for a depth of 0 to 59 inches) range from 15 to 20 percent, with no larger fragments present.

This ecological site is associated with Pintobasin soils (mixed, hyperthermic Typic Torripsamments); and Carpetflat soils (loamy, mixed, superactive, hyperthermic, shallow Cambidic Haplodurids). The Carpetflat soils are shallow to a duripan, have sandy loam textures with higher clay contents than the Pintobasin soils, and are not typical for this ecological site.

This ecological site is correlated with the following map units and soil components in the Joshua Tree National Park Soil Survey:

2100;Perurose-Coxpin-Pintobasin association, 2 to 15 percent slopes;Pintobasin;rarely flooded, channeled;5; Carpetflat;sandy substratum;1
1520;Pintobasin loamy sand, 2 to 4 percent slopes;Pintobasin;rarely flooded, channeled;5
1526;Pintobasin-Joetree-Joetree complex, 2 to 8 percent slopes;Pintobasin;rarely flooded, channeled;5

Table 4. Representative soil features

Parent material	(1) Alluvium–granite
Surface texture	(1) Gravelly sand
Family particle size	(1) Sandy
Drainage class	Somewhat excessively drained
Permeability class	Rapid
Soil depth	150 cm
Surface fragment cover <=3"	25%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	4.06–7.11 cm
Calcium carbonate equivalent (0-101.6cm)	0–10%
Electrical conductivity (0-101.6cm)	0 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0
Soil reaction (1:1 water) (0-101.6cm)	6–8
Subsurface fragment volume <=3" (Depth not specified)	15–20%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

Abiotic Factors

The abiotic factors driving this site are a hyperthermic climate, landform positions near the base of mountains, a channeled alluvial topography with additional run-on from the adjacent mountains, and a rare to occasional surface flooding regime. This ecological site occurs on gently sloping, channeled, fan aprons and fan remnants. It is typically on the upper portion of the fan piedmont, at elevations of 950 to 2390 feet. Soils are typically very deep, but may be shallow to a duripan when on more stable older landforms. Hyperthermic soil temperatures, channeled alluvialtopography, and additional run-on from sheet flooding drives the vegetation community of this ecological site. The reference plant community is a relatively productive, diverse shrub community dominated by creosote bush with burrobush and brittlebush as important secondary species, and several minor shrub species.

Creosote bush – burrobush shrublands dominate fan piedmont landscapes at elevations below 4000 feet in the Mojave Desert (Rundel and Gibson 1996). In arid regions, the availability of moisture is the key resource driving the productivity and composition of vegetation (Noy-Meir 1973, McAuliffe 1994, Hamerlynk et al. 2000, Martre et al. 2002, Austin et al. 2004). Where soil temperature regimes are thermic (above approximately 2800 feet) and soil moisture availability is higher, shrub production, cover, density and diversity are higher (Bedford et al. 2009). Where the soil temperature regime is hyperthermic and moisture becomes more limiting such as this ecological site, shrub production, cover, density and diversity decline. However, within the hyperthermic soil temperature regime, additional moisture such as received from mountain run-off and sheet-flooding, can increase diversity and production.

The soils associated with this ecological site typically are very deep, have layers of sands with gravelly to extremely gravelly sand, or sandy loam textures when on more stable, developed landforms. In the hyperthermic environment of this ecological site, water availability is highest on coarse soils with little horizon development. This is because water drains rapidly through coarse textured, sandy soils, with minimal loss due to run-off and evaporation (Noy-Meir 1973, Austin et al. 2004). Deep, free-draining soils promote dominance by the deep-rooted, long-lived evergreen creosote bush (McAuliffe 1994, Hamerlynk et al. 2002, Hamerlynk and McAuliffe 2008). Sheet flow provides additional moisture that increases water availability, and provides soil disturbance, which provides opportunities for establishment of secondary, shorter-lived shrub species such as burrobush and brittlebush. The channeled topography of the alluvial landforms acts to increase the heterogeneity of resources, which also promotes diversity. Species that are more typical of wash or disturbed habitats, such as sweetbush (*Bebbia juncea*), desertsenna (*Senna armata*), California jointfir (*Ephedra californica*), and burrobrush (*Hymenoclea salsola*) tend to occur in the ephemeral channels of this site.

Disturbance dynamics

The primary disturbances influencing this ecological site are drought, invasion by non-native annual plants, and fire, all of which interact. Drought is an important shaping force in Mojave Desert plant communities (Webb et al. 2003, Bowers 2005, Hereford et al. 2006, Miriti et al. 2007). Short-lived perennial shrubs and perennial grasses 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 (Beatley 1969, 1974, 1976). Long-lived shrubs and trees 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.

Non-native annual species such as red brome (*Bromus rubens*), common Mediterranean grass (*Schismus barbatus*), redstem stork's bill (*Erodium cicutarium*) and Asian mustard (*Brassica tournefortii*) have become naturalized throughout the Mojave Desert over the past century (Rickard and Beatley 1965, D'Antonio and Vitousek 1992, Brooks 1999, Reid et al. 2006, Norton et al. 2007). At lower elevations, where soil temperature regimes are hyperthermic and soil moisture is more limiting, common Mediterranean grass is the dominant non-native grass (Brooks and Berry 2006). Like native annuals, nonnative annual cover and production is directly related to winter precipitation (Beatley 1969, Brooks and Berry 2006, Barrows et al. 2009).

Invasion by non-native annual grasses has increased the flammability of Mojave Desert vegetation communities by providing a continuous fine fuel layer between widely spaced shrubs (Brown and Minnich 1986, Brooks 1999, Brooks et al. 2004, Rao and Allen 2010, Rao et al. 2010). After fire, these communities appear to be more susceptible to invasion by exotic grasses, leading to a grass-fire cycle (D'Antonio and Vitousek 1992). The low potential for high productivity of annual species in this ecological site means that it is relatively resilient to fire. However, after years of extremely high winter precipitation, this site may burn (Brown and Minnich 1986, Brooks et al. 2007).

State and transition model

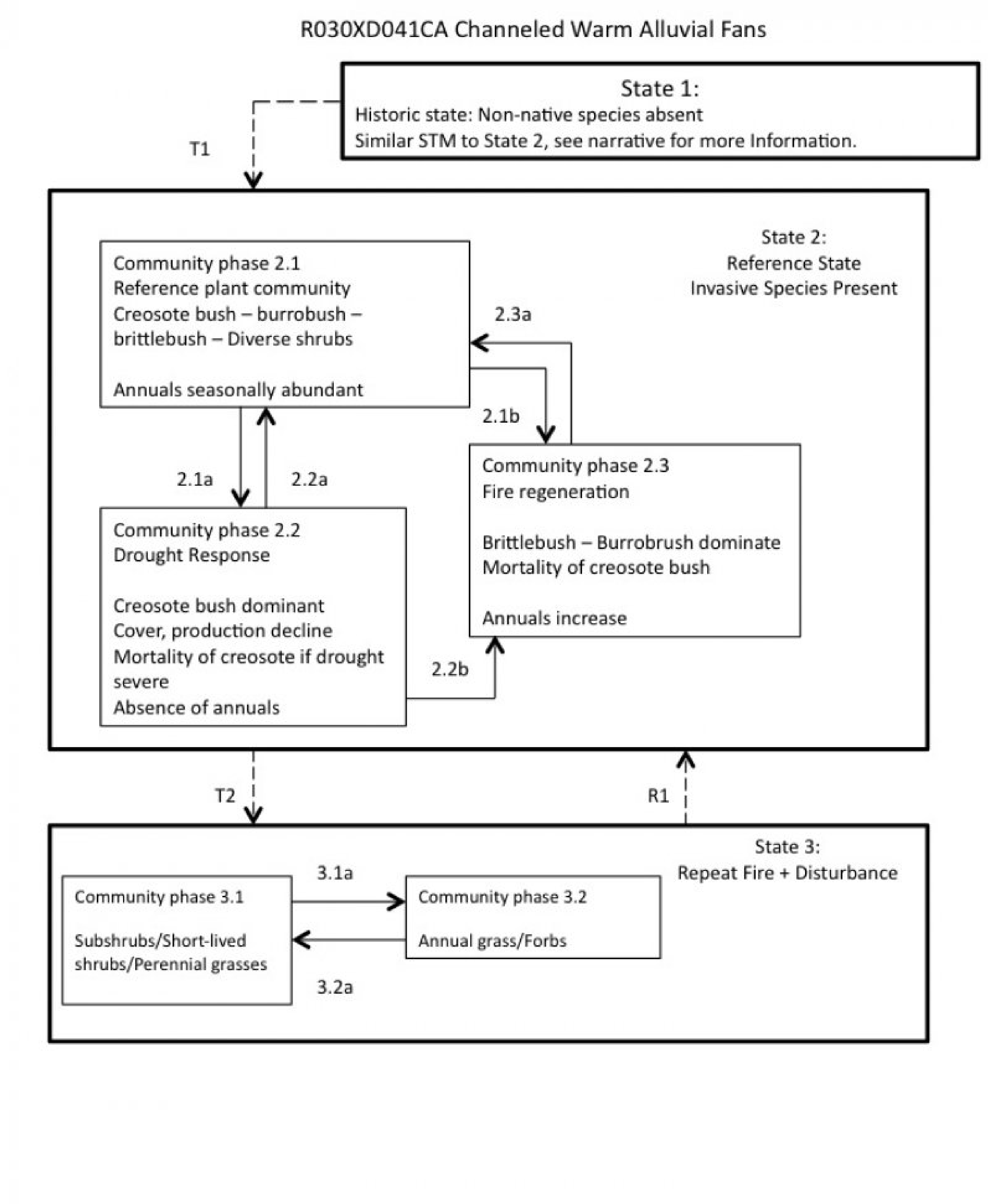

Figure 4. R030XD041CA

State 1
Historic State

State 1 represents the historic range of variability for this ecological site. This state no longer exists due to the ubiquitous naturalization of non-native species in the Mojave Desert. Periodic drought and rare fire were the natural disturbances influencing this ecological site. Fire would have been a very rare occurrence due to the lack of a continuous fine fuel layer between shrubs. Data for this State does not exist, but dynamics and composition would have been similar to State 2, except with only native species present. See State 2 narrative for more detailed information.

State 2
Reference State

State 2 represents the current range of variability for this site. Non-native annuals, including Mediterranean grass, are naturalized in this plant community. Their abundance varies with precipitation, but they are at least sparsely present (as current year's growth or present in the soil seedbank).

Community 2.1
Reference plant community

Figure 5. Community Phase 2.1

Figure 6. Community Phase 2.1

The reference plant community is maintained by periods of average climatic conditions and the absence of fire. It is dominated by creosote bush, and burrobush and brittlebush are important secondary species. Minor shrubs may include California ephedra, burrobrush, sweetbush, desertsenna, branched pencil cholla (*Cylindropuntia ramosissima*), and golden cholla (*Cylindropuntia echinocarpa*). The parasitic vine desert dodder (*Cuscuta denticulata*) is often growing on shrubs in this site. The subshrubs brownplumed wire lettuce (*Stephanomeria pauciflora*) and hairy milkweed (*Funastrum hirtellum*) are also common. Native annual forbs are seasonally abundant, and common species include smooth desert dandelion (*Malacothrix glabrata*), whitemargin sandmat (*Chamaesyce albomarginata*), Cryptantha (Cryptantha spp.), pincushion flower (*Chaenactis fremontii*), desert Indianwheat (*Plantago ovata*), and small wirelettuce (*Stephanomeria exigua* ssp exigua). Mediterranean grass and redstem stork's bill are typically present at low levels.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Forb	78	157	297
Shrub/Vine	101	112	135
Grass/Grasslike	–	2	6
Total	**179**	**271**	**438**

Community 2.2
Drought Response

This community phase is characterized by an overall decline in cover due to branch-pruning and lack of recruitment of longer-lived species, mortality of shorter-lived species, and lack of emergence of annual forbs and grasses. Burrobush, brittlebush, desertsenna, and sweetbush are likely to decline due to drought-induced mortality, while creosote bush, and California ephedra remain stable. Creosote bush is an evergreen species capable of utilizing moisture at any time of the year. This ability buffers populations from the effects of drought that occur due to the absence of the winter rains (the primary source of moisture for this ecological site). Further, creosote bush germinates in response to moisture during the warm season, so may still recruit if warm season rains occur during winter drought (Hereford et al. 2006). Creosote bush exhibits branch-pruning during severe drought, but mortality during drought in the Mojave Desert is very low (Webb et al. 2003, Hereford et al. 2006). Nevertheless, during severe drought, creosote bush mortality may occur. Burrobush may suffer up to 68% mortality during drought (Miriti et al. 2007). Brittlebush suffers very little mortality during modest drought, but up to 25% during more severe drought (Bowers, 2005). In this site, the effects of drought may be more pronounced since the increased availability of water is driving the high diversity of the plant community. This community is at reduced risk of burning, and if it is ignited, will experience lower severity, smaller fires because of reductions in annual and perennial biomass (Minnich 2003). However, drought immediately after a period of heavy moisture, results in standing biomass of native fuels that may carry a fire one year post-production (Minnich 2003), and standing dead biomass of non-native annuals that may provide fuel for 2 -3 years post-fire (Minnich 2003; Rao et al. 2010).

Community 2.3
Fire regeneration community

This community phase is characterized by severe declines in creosote bush, and an increase in shrub diversity. Creosote bush is generally killed by fire, and is slow to re-colonize burned areas due to specific recruitment requirements (Brown and Minnich 1986, Brooks et al. 2007, Steers and Allen 2011). Creosote bush communities in the Mojave Desert may resemble the natural range of variation found in pre-fire conditions in terms of species composition in as little as nineteen years (Engel and Abella 2011), but creosote communities in the Colorado Desert may show little recovery after 30 years (Steers and Allen 2011). The timing and severity of fire, as well as post-fire climate conditions determines trajectories of recovery (Brown and Minnich 1986, Steers and Allen 2011). Initially, the post-burn community is dominated by non-native and native annual grasses and forbs, and native subshrubs. Native annuals likely to be present include smooth desertdandelion, pincushion flower, and cryptantha, but many different species could be at a particular site. Subshrubs that often become dominant after fire include desert globemallow (*Sphaeralcea ambigua*), desert trumpet (*Eriogonum inflatum*), brownplume wirelettuce (*Stephanomeria pauciflora*), and desert marigold (*Baileya multiradiata*). With time, shrub cover increases with colonization by short-lived shrubs from off-site dispersal (including brittlebush, burrobrush, burrobush, sweetbush, desertsenna). Brittlebush and burrobrush in particular quickly become dominate in post-fire creosote bush communities (Brown and Minnich 1986, Steers and Allen 2011). California ephedra can re-sprout after fire, and may increase in importance in the post-fire community. With a long period of time without fire, creosote bush begins to regain dominance as shorter-lived species die out (Vasek 1983, Abella 2009, Vamstad 2009). This community is an at-risk phase, as the increased cover and biomass of fine fuels increases the likelihood of repeat burning. If the fire return interval is less than 20 years, this community is very likely to transition to State 3.

Pathway 2.1a
Community 2.1 to 2.2

This pathway occurs with prolonged or severe drought.

Pathway 2.1b
Community 2.1 to 2.3

This pathway occurs with moderate to severe fire.

Pathway 2.2a
Community 2.2 to 2.1

This pathway occurs with a return to average or above average precipitation.

Pathway 2.2b
Community 2.2 to 2.3

This pathway occurs with moderate to severe fire, and takes place within three years of a very wet period. At longer than three years of drought, the community is at low risk of burning.

Pathway 2.3a
Community 2.3 to 2.1

This pathway occurs with time without fire.

State 3
Repeated fire

This state develops when the fire return interval is less than 20 years. This state has been significantly altered from the natural range of variability found in States 1 and 2. Creosote bush is lost, and non-native annual grasses, native sub-shrubs, and short-lived shrubs dominate the community. Annual grasses and forbs are abundant immediately post-fire, with dominance by perennial grasses, subshrubs and short-lived perennials several years post-fire.

Community 3.1
Subshrubs/Short-lived shrubs

This community phase develops with time without fire (5-20 years), and is dominated by short-lived shrubs (brittlebush, burrobrush, burrobush, desertsenna, and sweetbush), and subshrubs (desert globemallow, desert trumpet, brownplume wirelettuce and desert marigold). There is high cover of non-native and native annuals during wet years. This community is at high risk of repeat burning due to high cover of fine fuels.

Community 3.2
Annual grass/forbs

This community phase occurs one to five years post-fire. The community is dominated by non-native annual species including Mediterranean grass and red-stem stork’s bill, and native forbs. Native subshrubs including globemallow, desert trumpet, brownplume wirelettuce and desert marigold may be abundant. Seedlings of short-lived shrubs may be present, and may include brittlebush, burrobrush, burrobush, desertsenna, and sweetbush. Brittlebush and burrobrush are likely to be dominant. This community is at high-risk of repeat burning due to high fine fuel cover. This community is also susceptible to wind and water erosion, due to the loss of stabilizing shrub cover (Bull 1997). This can lead to arroyo development near ephemeral drainage channels. Furthermore, the loss of vegetation structure present in the historic and reference state decreases the suitability of this habitat for wildlife (Brooks et al. 2007, Vamstad 2009). Since rodent seed caching is important for the dispersal and establishment of many desert species this can further inhibit recovery.

Pathway 3.1a
Community 3.1 to 3.2

This pathway occurs with fire.

Pathway 3.2a
Community 3.2 to 3.1

This pathway occurs with time without fire (> 5 years).

Transition 1
State 1 to 2

This transition occurred with the naturalization of non-native species in this ecological site. Non-native species were introduced with settlement of the Mojave Desert region in the 1860s. Post-settlement cattle and sheep grazing, as well as dryland farming, helped to spread and facilitate their establishment (Brooks and Pyke 2000, Brooks et al. 2007).

Transition 2
State 2 to 3

This transition occurs when the fire return interval is less than 20 years.

Restoration pathway 1
State 3 to 2

Restoration of communities severely altered by repeat fire at the landscape scale is difficult. Methods may include aerial seeding of early native colonizers such as desert globemallow, burrobrush, threeawns (Aristida spp.), and desert marigold. Increased native cover may help to reduce non-native plant invasion, helps to stabilize soils, provides a source of food and cover for wildlife, including desert tortoise (Gopherus agassizii), and provides microsites that facilitate creosote bush establishment. However, the amount of seed required for success is often prohibitive. Large-scale planting of both early colonizers and community dominants tends to be more successful in terms of plant survival, especially if outplants receive supplemental watering during the first two years. Creosote bush and burrobush can be successfully propagated and outplanted. Pre-emergent herbicides (Plateau) have been used in the year immediately post-fire to attempt to inhibit or reduce brome invasion. How successful this is on a landscape scale, and the non-target effects have not yet been determined.

Additional community tables

Table 6. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Shrub/Vine					
1	**Shrubs**			101–135	
	creosote bush	LATR2	*Larrea tridentata*	17–95	1–7
	burrobush	AMDU2	*Ambrosia dumosa*	7–28	1–5
	brittlebush	ENFA	*Encelia farinosa*	1–28	0–3
	burrobrush	HYSA	*Hymenoclea salsola*	0–17	0–2
	sweetbush	BEJU	*Bebbia juncea*	0–11	0–1
	California jointfir	EPCA2	*Ephedra californica*	0–8	0–1
	Wiggins' cholla	CYEC3	*Cylindropuntia echinocarpa*	0–2	0–1
	branched pencil cholla	CYRA9	*Cylindropuntia ramosissima*	0–1	0–1
	desertsenna	SEAR8	*Senna armata*	0–1	0–1
Forb					
2	**Forbs**			78–297	
	smooth desertdandelion	MAGL3	*Malacothrix glabrata*	6–170	1–6
	whitemargin sandmat	CHAL11	*Chamaesyce albomarginata*	1–106	1–7
	pincushion flower	CHFR	*Chaenactis fremontii*	1–45	1–9
	desert dodder	CUDE2	*Cuscuta denticulata*	0–34	0–1
	cryptantha	CRYPT	*Cryptantha*	0–18	0–3
	hairy milkweed	FUHI	*Funastrum hirtellum*	0–17	0–3
	desert Indianwheat	PLOV	*Plantago ovata*	0–2	0–2
	small wirelettuce	STEXE	*Stephanomeria exigua ssp. exigua*	0–1	0–1
	brownplume wirelettuce	STPA4	*Stephanomeria pauciflora*	0–1	0–1
Grass/Grasslike					
3	**Native Perennial Grasses**			0–6	
	big galleta	PLRI3	*Pleuraphis rigida*	0–2	0–1
4	**Non-native annual grasses**			0–1	
	Mediterranean grass	SCHIS	*Schismus*	0–1	0–1

Animal community

This ecological site is preferred habitat for the threatened desert tortoise (Gopherus agassizii agassizii). Creosote bush shrublands provides 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).

Recreational uses

This site may be used for hiking, wildflower viewing, and aesthetic enjoyment.

Other products

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.

Inventory data references

The following NRCS plots were used to describe this ecological site:

Community Phase 2.1:
G1-V (Type location)
H1-A
H1-I
J3-1
J4-B

Type locality

Location 1: San Bernardino County, CA	
UTM zone	N
UTM northing	3773965
UTM easting	644378
General legal description	The type location is approximately 0.15 mile south of Highway 62 in Joshua Tree National Park.

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:

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:**