Ecological site R040XD030CA
Extremely Stony Fan Remnants

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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.

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): 040X–Sonoran Basin and Range

MLRA Description:

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).

Ecological site concept

This ecological site occurs on extremely cobbly and stony alluvial fans and fan remnants that are located near the base of mountain slopes at elevations of 1230 to 2620 feet. Soils are typically very deep gravelly sand, with a high cover of surface gravels and cobbles, and a high subsurface rock fragment volume.

Production reference value (RV) is 290 pounds per acre and depending on precipitation and annual forb production, ranges from 150 to 455 pounds per are. Dense teddybear cholla (Cylindropuntia bigelovii) colonies are characteristic of this ecological site, and brittlebush (Encelia farinosa) and creosote bush (Larrea tridentata) are the dominant species. Shrub cover and diversity are relatively high. Run-on from nearby mountain slopes and from the large rock fragments that dominate the soil surface disperse teddybear cholla propagules, which maintains cholla colonies. Additional run-on and a heterogeneous soil surface also provide microsites that support high shrub diversity and cover relative to adjacent landforms. Deep, coarse soils and hyperthermic soil temperatures favor dominance by the deep-rooted creosote bush, while additional run-on and a very arid climate supports dominance by brittlebush.

Data ranges in the physiographic data, climate data, water features, and soil data sections of this Ecological Site Description are based on major components only (15 percent of map unit or greater).

Associated sites

R040XD034CA	**Gravelly, Braided, Ephemeral Stream** R031XY034CA is found on adjacent third order or larger ephemeral drainageways. A complex of plant communities is present, and desert lavender (Hyptis emoryi), burrobush (Hymenoclea salsola), smoketree (Psorothamnus spinosus), and desert ironwood (Olneya tesota) are important species.
R040XD001CA	**Limy Hill 4-6" p.z.** R031XY009CA is found on adjacent steep alluvial fans. Burrobush (Ambrosia dumosa) and creosote bush (Larrea tridentata) are dominant.
R040XD009CA	**Gravelly Fan Remnants And Fan Aprons** R031XY009CA is found on adjacent terraces. Creosote bush (Larrea tridentata) and Schott's dalea (Psorothamnus schottii) are dominant.
R040XD200CA	**Rarely Flooded Fans** R031XY200CA is found on adjacent alluvial fans and fan aprons. Brittlebush (Encelia farinosa) and creosote bush (Larrea tridentata) are co-dominant.

Similar sites

R040XD200CA	**Rarely Flooded Fans** R031XY200CA occurs on rarely flooded fans and fan aprons, and is not necessarily located near to mountain bases. Teddybear cholla (Cylindropuntia bigelovii) colonies are not present.
R040XD009CA	**Gravelly Fan Remnants And Fan Aprons** R031XY009CA occurs on similar soils, but is found on broader, flatter remnants located further from mountain bases and receiving less additional run-on. Teddybear cholla (Cylindropuntia bigelovii) colonies are not present, and creosote bush (Larrea tridentata) and Schott's dalea (Psorothamnus schottii) are co-dominant. Vegetation is much less productive and less diverse.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Cylindropuntia bigelovii* (2) *Encelia farinosa*
Herbaceous	Not specified

Physiographic features

This ecological site occurs on alluvial fans and fan remnants at elevations of 1230 to 2620 feet on slopes of 4 to 15 percent. The site experiences no flooding or ponding, and runoff class is low.

Table 2. Representative physiographic features

Landforms	(1) Alluvial fan (2) Fan remnant
Flooding frequency	None
Ponding frequency	None
Elevation	1,230–2,620 ft
Slope	4–15%
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. Freeze free period was not entered, and defaults to zero.

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)	
Precipitation total (average)	4 in

Influencing water features

Soil features

The soils associated with this ecological site are very deep, excessively drained soils that formed in alluvium from granite and igneous rock. These soils are sandy-skeletal in the particle size control section, and permeability is moderately rapid to rapid. Surface textures are very cobbly coarse sandy loam and extremely cobbly sandy loam, with very gravelly loamy coarse sand subsurface textures. Surface gravels (< 3 mm in diameter) range from 50 to 52 percent, and larger fragments range from 25 to 35 percent. Subsurface gravels by volume (for a depth of 0 to 59 inches) range from 25 to 46 percent and larger fragments by volume range from 10 to 35 percent.

This soils series associated with this ecological site that are greater than 15 percent in any one mapunit are the Rizzo soils (sandy-skeletal, mixed, hyperthermic Typic Torriorthents). Other soils associated with this ecological site are less than 5 percent in any one mapunit and include the Rockhound soils (loamy-skeletal, mixed, superactive, hyperthermic Typic Haplargids); and Deprave soils (loamy-skeletal, mixed, hyperthermic Argidic Argidurids). The Rockhound soils have extremely gravelly surface textures and an argillic horizon beginning at 7.5 inches, and the Deprave soils have extremely gravelly surface textures, have an argillic horizon beginning at 2 to 7 inches, and are moderately deep to a duripan. Both of these soils often have a desert pavement surface, but when correlated with this ecological site, desert pavement has not yet formed on the surface, and instead the soils receive overwash due to runoff from surface fragments that can still infiltrate into the soil. Overwash supports the teddybear cholla community, while infiltration supports the more diverse plant community of this ecological site.

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

2121;Rizzo very cobbly loamy coarse sand, 4 to 15 percent slopes, rubbly;Rizzo;rubbly;90
2440;Rizzo complex, 8 to 15 percent slopes;Rizzo;extremely stony;15
2408;Rizzo complex, 2 to 8 percent slopes;Deprave;overwash;2; Rockhound;overwash;3
1555;Goldrose-Carsitas-Chemwash complex, 4 to 8 percent slopes;Rizzo;extremely stony;7
2409;Rizzo-Chemwash-Carsitas complex, 4 to 8 percent slopes;Rizzo;extremely stony;5
2835;Rock outcrop-Blackeagle complex, 30 to 75 percent slopes;Rizzo;extremely stony;4
2840;Rock outcrop-Stormjade complex, 30 to 75 percent slopes;Rizzo;extremely stony;3

Table 4. Representative soil features

Parent material	(1) Alluvium–granite
Surface texture	(1) Very cobbly coarse sandy loam (2) Extremely cobbly sandy loam
Family particle size	(1) Sandy
Drainage class	Excessively drained
Permeability class	Moderately rapid to rapid
Soil depth	59 in
Surface fragment cover <=3"	50–52%
Surface fragment cover >3"	25–35%
Available water capacity (0-40in)	1–1.8 in
Calcium carbonate equivalent (0-40in)	0%
Electrical conductivity (0-40in)	0 mmhos/cm
Sodium adsorption ratio (0-40in)	0
Soil reaction (1:1 water) (0-40in)	7.4–8.4
Subsurface fragment volume <=3" (Depth not specified)	25–46%
Subsurface fragment volume >3" (Depth not specified)	10–35%

Ecological dynamics

Abiotic Factors

Extreme hot temperatures and aridity, position on the fan close to mountain slopes where run-on is high, and coarse soils with high large rock fragment cover and content by volume drives the vegetation community of this ecological site. This site occurs on alluvial fans and fan remnants in an extremely arid portion of the Colorado Desert. Mean annual precipitation is 2 to 4 inches, mean maximum temperatures are over 90 F for five months of the year, and strong winds are typical during the summer months. Run-on from nearby mountain slopes, and from the large rock fragments that dominate the soil surface, disperse teddybear cholla propagules, which maintains cholla colonies. Additional run-on and a heterogeneous soil surface also provide microsites that support high shrub diversity and cover relative to adjacent landforms. Deep, coarse soils and hyperthermic soil temperatures favor dominance by the deep-rooted creosote bush, while additional run-on and a very arid climate supports dominance by brittlebush.

Teddybear cholla occurs in the warmer parts of the Mojave Desert, and in the hotter, drier parts of the Sonoran Desert. Teddybear cholla seldom regenerates from seed, and reproduces primarily by vegetative means from joint segments that detach and develop roots and new plants. The terminal joints detach easily in the cooler months, by a slight touch or wind. Dispersal of teddybear cholla propagules creates dense colonies that may be descendants of one plant (Nabhan, 2006). Run-on from nearby mountains helps to break and disperse teddybear cholla propagules in this site, and maintain the colonies that characterize the site. California barrel cactus (*Ferocactus cylindraceus*) and ocotillo (*Fouquieria splendens*) also have relatively high abundance on this ecological site. Cacti and other stem succulents are adapted to the most arid of environments with their ability to store large amounts of water. Stem succulence provides plasticity to expand and contract stems with water gain or loss. They have rapid root growth in response to even small amounts of moisture to capture water when it is available. They have spines, which are modified leaves that shade the stem and do not lose water like typical leaves. Finally, they photosynthesis using and Crassulacean acid metabolism (CAM) whereby photosynthesis occurs at night so that stomata are open during the cool of the night and water losses are minimized. Cacti can store so much water in their succulent stems that they can withstand water losses of 70 to 90 percent (Ingram 2008).

Brittlebush is an extremely drought-tolerant, drought-deciduous shrub. Adaptations in degree of leaf pubescence and leaf size allow brittlebush to occupy sites ranging from relatively mesic coastal environments to extremely arid deserts (Ehleringer and Cook 1990, Sandquist and Ehleringer 1997, Housman et al. 2002, Sandquist and Ehleringer 2003). Desert plants have smaller, more pubescent leaves, and a more compact growth form. Smaller more pubescent leaves reduce leaf temperatures and increases water use efficiency. The tradeoff is that plant productivity declines because smaller leaves have less surface area available for photosynthesis, and because pubescence reduces the absorption of solar radiation (Housman et al. 2002, Sandquist and Ehleringer 2003).

Creosote bush is a long-lived, deep-rooted evergreen shrub dominant across vast areas of the North American warm deserts. Creosote bush maintains its evergreen status by using water held in deep soil layers. Creosote bush is typically the dominant shrub on deep coarse soils with little development (Hamerlynk et al. 2002, Hamerlynk and McAuliffe 2008), such as on this ecological site.

In arid regions, coarse textured soils have greater water availability because water quickly infiltrates the soil to depths where it is not lost to evaporation (Noy-Meir 1973, Hamerlynk et al. 2002). Thus, greater amounts of water are held for a longer duration in deep, coarse soils where the development of restrictive soil horizons (such as argillic or petrocalcic horizons) has not occurred (Hamerlynk et al. 2002, Hamerlynk and McAuliffe 2008). However, little water is available at shallow depths, which favors deep-rooted species, or species that can quickly utilize available water or retain large amounts of water when it is available.

The distribution of rock fragments on the soil surface and within the soil horizon has a significant effect on the distribution and availability of soil water (Poesen and Lavee 1994, Cerda 2001, Martre et al. 2002, Li et al. 2007). Soils with greater rock content by volume have less water availability, which limits productivity relative to sandier soils (Martre et al. 2002). Small surface rock fragments can increase infiltration rates (Poesen and Lavee 1994, Cerda 2001), while large surface rock fragments increase run-on. Thus, surfaces where gravel and large fragments are heterogeneously distributed, such as this ecological site, have localized patches of relatively high water availability (i.e. patches of gravel adjacent to patches of large surface fragments). Further, large rock fragments on the soil surface and within soil horizons can act as mulch, reducing evaporation rates, increasing the temporal availability of water (Martre et al. 2002, Li et al. 2007, Hamerlynk and McAuliffe 2008), and buffering soil temperatures (Cerda, 2001). These provide microsites for plant establishment.

Disturbance dynamics

The primary disturbances influencing this ecological site are drought, invasion by non-native annual plants, and fire.

Desert regions are characterized by low mean annual precipitation and extreme variability in the amount of precipitation received in any year or decade (Hereford et al. 2006). Thus, episodic mortality in response to periods of drought is important in shaping desert community dynamics (Hereford et al. 2006, Miriti et al. 2007). This ecological site is already shaped by extremely arid conditions; nevertheless, extreme drought can still have an impact. Drought can cause reductions in cover and production due to mortality of short-lived species, branch-pruning and mortality of longer-lived species, lack of recruitment, and lack of emergence of annual species (e.g. Webb et al. 2003, Bowers 2005, Hereford et al. 2006, Miriti et al. 2007).

Non-native annual species such as red brome (*Bromus rubens*), Mediterranean grass (*Schismus barbatus*), redstem stork's bill (*Erodium cicutarium*) and Asian mustard (*Brassica tournefortii*) have become naturalized in the Colorado Desert over the past century (Brown and Minnich 1986, D'Antonio and Vitousek 1992, Brooks and Berry 2006). In lower elevations, where soil temperature regimes are hyperthermic and soil moisture is more limiting, 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). When undisturbed, the high surface rock fragment cover and low near surface water availability of this ecological site restrict establishment and biomass of non-native species, but when the soil surface is disturbed, Mediterranean grass may become more abundant.

Soil disturbance, such as from construction or off-road vehicle use not only increases the susceptibility of this site to invasion by non-native species, but increases establishment opportunities for native species as well. This can lead to higher diversity, productivity and cover in this ecological site.

The low potential for high biomass of annual species limits the continuity of fine fuels in this site, and reduces the susceptibility of this site to fire. However, this site has relatively high shrub cover, and native annual forbs and grasses can reach high cover with high precipitation, which may fuel fire (Brown and Minnich, 1986). Teddybear cholla and creosote bush are poorly adapted to fire (Webb et al. 2010), while a brittlebush dominated community recovers rapidly (Brown and Minnich 1986, Steers and Allen 2011). Repeat burning could trigger a transition to an altered state dominated by brittlebush.

State and transition model

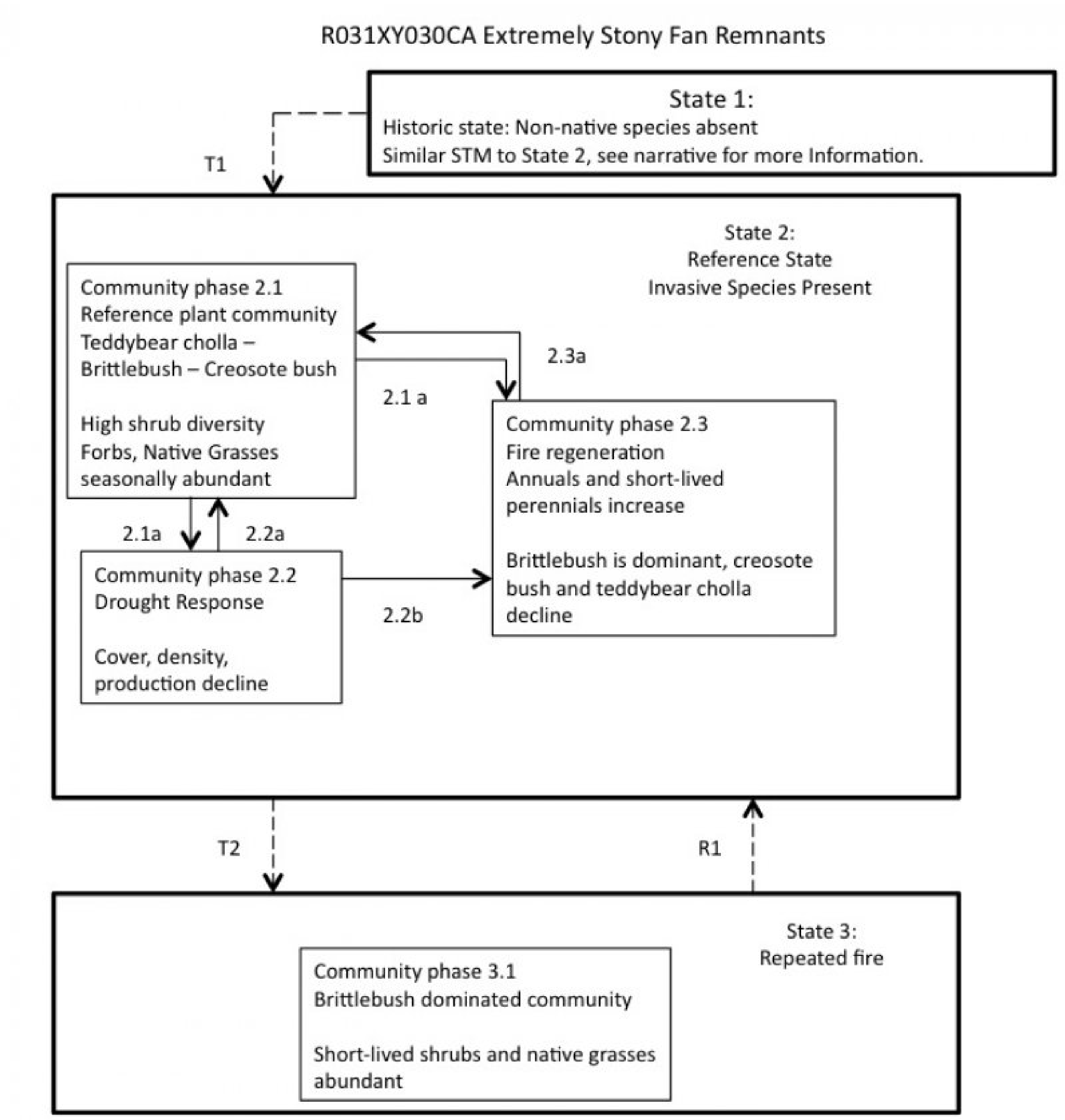

Figure 4. R031XY030CA

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 Colorado Desert. Periodic drought was the natural disturbance influencing this ecological site. 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 is naturalized in this plant community, but have not altered the ecological dynamics of this site.

Community 2.1
Reference plant community

Figure 5. Community Phase 2.1

The reference plant community of this ecological site is characterized by dense teddybear cholla colonies, and brittlebush and creosote bush are the dominant species by production. This site has relatively high shrub cover and diversity. California barrel cactus and ocotillo may be relatively abundant. Other shrubs and subshrubs include desert lavender (*Hyptis emoryi*), California fagonbush (*Fagonia laevis*), sweetbush (*Bebbia juncea*), narrowleaf silverbush (*Argythamnia lanceolata*), and burrobrush (*Hymenoclea salsola*). Native annual forbs and grasses may be seasonally abundant, and common species include brittle spineflower (*Chorizanthe brevicornu*), pincushion flower (*Chaenactis fremontii*), distant phacelia (*Phacelia distans*), chia (*Salvia columbariae*), and sixweeks threeawn (*Aristida adscensionis*). The leguminous trees desert ironwood (*Olneya tesota*) and blue paloverde (*Parkinsonia florida*) may be sparsely distributed across the site. The non-native annual grass Mediterranean grass may be sparsely present.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Shrub/Vine	150	230	300
Tree	0	0	70
Forb	0	50	70
Grass/Grasslike	0	10	15
Total	**150**	**290**	**455**

Table 6. Ground cover

Tree foliar cover	0%
Shrub/vine/liana foliar cover	10-20%
Grass/grasslike foliar cover	1-3%
Forb foliar cover	5-10%
Non-vascular plants	0%
Biological crusts	0%

Litter	15-20%
Surface fragments >0.25" and <=3"	35-45%
Surface fragments >3"	10-15%
Bedrock	0%
Water	0%
Bare ground	3-7%

Table 7. Canopy structure (% cover)

Height Above Ground (Ft)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.5	–	0-1%	0-1%	1-10%
>0.5 <= 1	–	0-1%	–	0-1%
>1 <= 2	–	5-7%	–	–
>2 <= 4.5	–	1-2%	–	–
>4.5 <= 13	–	0-1%	–	–
>13 <= 40	–	–	–	–
>40 <= 80	–	–	–	–
>80 <= 120	–	–	–	–
>120	–	–	–	–

Community 2.2
Drought response

This community phase is characterized by declines in cover and production due to branch-pruning and lack of recruitment of long-lived species including creosote bush, desert lavender, ocotillo, mortality of short-lived species (brittlebush, burrobrush, California fagonbush, narroleaf silverbush), and lack of emergence of annual species. Cactus species have low mortality during drought, but recruitment is limited (Jordan and Nobel 1981). Bowers (2005) measured no effect of drought on mortality rates of brittlebush during modest drought in the 1950s. Creosote bush exhibits branch-pruning, but low mortality in response to drought in the Mojave Desert (Webb et al. 2003, Hereford et al. 2006, Miriti et al. 2007). In the Sonoran desert, mortality of creosote bush due to severe drought may be more pronounced, but still less than 5% (Bowers 2005).

Community 2.3
Fire regeneration community

This community phase is characterized by the loss of teddybear cholla and creosote bush from the plant community. Brittlebush rapidly colonizes burned areas, and reaches dominance before associated shrub species (Brown and Minnich 1986, Steers and Allen 2011). In burned creosote bush scrub in the Colorado Desert, brittlebush seedlings overwhelmingly dominated shrub succession within the first year after burning, and within 3 to 5 year dominated total cover (Brown and Minnich, 1986). By twelve years after fire, pre-burn cover and density is reached, and is dominated by brittlebush (Steers and Allen 2011). By twenty years, there is sparse cover of creosote bush and other secondary shrubs with brittlebush (Steers and Allen 2011). Teddybear cholla is killed by fire (Webb et al. 2010), but without repeat fire, may re-colonize with time. Short-lived shrubs capable of re-colonizing from off-site sources become more abundant, and include burrobrush, sweetbush, California fagonbush and narrowleaved silverbush. Native forbs and native and non-native annual grasses become more abundant. Desert lavender and ocotillo can resprout after fire, and will likely maintain their abundance in the fire regeneration community. This is an at-risk community, as the dense brittlebush and annual community is more susceptible to repeat burning. If the fire return interval is less than 50 years, this community is 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 community pathway occurs with moderate to severe fire.

Pathway 2.2a
Community 2.2 to 2.1

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

Pathway 2.2b
Community 2.2 to 2.3

This pathway occurs with moderate to severe fire. This pathway is unlikely unless it occurs within one year of a heavy precipitation year, when standing annual biomass is still present.

Pathway 2.3a
Community 2.3 to 2.1

This community pathway occurs with time, and a lack of additional disturbance.

State 3
Repeated Fire

This State develops when the fire return interval is less than 50 years. The reference plant community has been significantly altered. It is characterized by the loss of teddybear cholla and creosote bush, and dominance by brittlebush. Data is not available for this State, and the description is based on research from nearby burned areas.

Community 3.1
Repeat fire Reference Plant Community

This community phase is dominated by brittlebush. Desert lavender, sweetbush, burrobush, narrowleaved silverbush, and California fagonbush are important species, and native annual forbs and native and non-native annual grasses are abundant during years of high precipitation.

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 Southwest Desert region in the 1860s.

Transition 2
State 2 to 3

This transition occurs when the fire return interval in the reference state is less than 50 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. In this ecological site, brittlebush naturally colonizes rapidly, and large-scale planting of creosote bush and other secondary species would be required to restore this site to the reference state. Creosote bush can be successfully propagated and outplanted, especially if outplants receive supplemental water.

Additional community tables

Table 8. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Shrub/Vine					
1	**Native shrubs**			150–300	
	brittlebush	ENFA	*Encelia farinosa*	45–100	2–4
	creosote bush	LATR2	*Larrea tridentata*	50–90	1–3
	ocotillo	FOSP2	*Fouquieria splendens*	1–75	1–3
	California barrel cactus	FECY	*Ferocactus cylindraceus*	4–45	0–1
	teddybear cholla	CYBI9	*Cylindropuntia bigelovii*	5–30	2–4
	desert lavender	HYEM	*Hyptis emoryi*	5–20	1–2
	sweetbush	BEJU	*Bebbia juncea*	0–20	0–1
	burrobrush	HYSA	*Hymenoclea salsola*	0–15	0–1
	narrowleaf silverbush	ARLA12	*Argythamnia lanceolata*	0–12	0–2
	California fagonbush	FALA	*Fagonia laevis*	1–10	1–2
2	**Trees**			0–70	
	desert ironwood	OLTE	*Olneya tesota*	0–70	0–1
	blue paloverde	PAFL6	*Parkinsonia florida*	0–15	0–1
Forb					
3	**Native forbs**			0–70	
	brittle spineflower	CHBR	*Chorizanthe brevicornu*	0–20	0–1
	pincushion flower	CHFR	*Chaenactis fremontii*	0–20	0–1
	Panamint cryptantha	CRAN4	*Cryptantha angustifolia*	0–10	0–1
	desert trumpet	ERIN4	*Eriogonum inflatum*	0–10	0–1
	pygmy poppy	ESMI	*Eschscholzia minutiflora*	0–10	0–1
	distant phacelia	PHDI	*Phacelia distans*	0–10	0–1
	chia	SACO6	*Salvia columbariae*	0–10	0–1
	whitemargin sandmat	CHAL11	*Chamaesyce albomarginata*	0–10	0–1
	lupine	LUPIN	*Lupinus*	1–10	–
Grass/Grasslike					
4	**Native grasses**			0–15	
	sixweeks threeawn	ARAD	*Aristida adscensionis*	0–15	0–1
5	**Non-native annual grasses**			0–1	
	Mediterranean grass	SCHIS	*Schismus*	0–1	0–1

Animal community

This ecological site is habitat for the threatened desert tortoise (Gopherus 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). The diverse vegetation provides shelter and forage for rodents, lizards, and birds. The cactus fruits are edible and nutritious. Some birds build their nest in the protection of the spiny chollas.

Recreational uses

This ecological site has a variety of shrubs, which provide a display of colors when they bloom, dominated by yellow from brittlebush, and the red flowers of ocotillo. Teddybear cholla colonies are a popular tourist attraction.

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.

The cholla fruits are edible and the prickly pear stems can be eaten once spines are removed (Nabhan, 2006).

Inventory data references

Community Phase 2.1:

BEVON-V1
BEVON-V2 (Type location)
BEVON-V3
WP049

Type locality

Location 1: Riverside County, CA	
UTM zone	N
UTM northing	3729207
UTM easting	3729207
General legal description	The type location is approximately 3 miles northeast (25 degrees) from Chiriaco Summit, California, just outside the southern border of Joshua Tree National Park.

Other references

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Bowers, J. E. 2005. Effects of drought on shrub survival and longevity in the northern Sonoran Desert. Journal of the Torrey Botanical Society 132:421-431.

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Approval

Kendra Moseley, 3/11/2025

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	05/12/2025
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:**

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:**