Ecological site R040XD201CA
Cobbly Fan Remnants

Accessed: 05/14/2025

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 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).

Site Concept:
This ecological site occurs on cobbly fan remnants at elevations of 1130 to 2890 feet. Soils are typically very deep with a sandy skeletal or loamy skeletal particle size control section. Soil surfaces are covered with cobbles and stones, with patches of gravelly areas. The high cover of large rock fragments acts to limit shrub density, but provides additional run-on, which increases shrub and cactus diversity. Production Reference Value (RV) is 159 pounds per acre. Creosote bush (Larrea tridentata) and brittlebush (Encelia farinosa) dominate the site. Blue paloverde (Parkinsonia florida) and desert ironwood (Olneya tesota) are sporadically present, and there is a diversity of cactus species.

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

R040XD009CA	**Gravelly Fan Remnants And Fan Aprons** This ecological site is on fan remnants, with creosote bush and Schott's dalea dominant. Brittlebush and surface rocks are less abundant.
R040XD034CA	**Gravelly, Braided, Ephemeral Stream** This ephemeral stream is on occasionally to frequently flooded braided drainageways. Desert lavender, burrobush, blue paloverde and desert ironwood are present.

R040XD200CA	**Rarely Flooded Fans** This ecological site is similar, but lacks the rocky surface, cacti diversity, and tends to be on fan aprons rather than fan remnants. Creosote bush and brittlebush are dominant.
R040XD202CA	**Stony, Occasionally Flooded Ephemeral Stream** This ecological site is in adjacent stony, inset fans subject to occasional flash floods. Desert lavender, Schott's dalea, and blue paloverde are present.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Larrea tridentata* (2) *Encelia farinosa*
Herbaceous	Not specified

Physiographic features

This ecological site is found on fan remnants and alluvial fans. Elevations range from 1130 feet to 2890 feet, with slopes ranging from 4 to 15 percent.

Table 2. Representative physiographic features

Landforms	(1) Fan remnant (2) Alluvial fan
Flooding duration	Extremely brief (0.1 to 4 hours)
Flooding frequency	None to rare
Ponding frequency	None
Elevation	344–881 m
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, and 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

Influencing water features

Soil features

The soils associated with this ecological site are very deep, excessively drained and formed in alluvium from granite or igneous rock. The surface textures are extremely gravelly loam and loamy fine sand. Subsurface horizons are loamy, silty or sandy with very or extremely gravelly modifiers. Surface rock fragments less than 3 inches in diameter range from 55 to 80 percent cover, and fragments greater than 3 inches range from 15 to 30 percent. Subsurface percent by volume of rock fragments less than 3 inches ranges from 15 to 46 percent, and greater that 3 inch rock fragments range from 0 to 14 percent (for a depths of 1 to 60 inches).

This ecological site is correlated with major components (greater that 15 percent of map unit) of the Rizzo and Rockhound soil series. The Rockhound soils are loamy-skeletal, mixed, superactive, hyperthermic Typic Haplargids. The Rizzo soils are sandy-skeletal, mixed, hyperthermic Typic Torriorthents. The Rockhound soils have loamy and silty subsurface textures, and have slow to moderately slow permeability. The Rizzo soils have sandy subsurface textures, and have rapid permeability. Both these soils have greater than 35% rock fragments in the particle control section.

The Kenalduma soils are associated with this ecological site as a minor component. These soils are loamy-skeletal, mixed, superactive, hyperthermic Argidic Argidurids. These soils have a duripan at about 16 inches below the surface.

The following map units and soil components are associated with this ecological site the Joshua Tree National Park Soil Survey (CA794):

Map unit ID; Map unit name; Component; Phase; Percent
1504; Rizzo association, 4 to 15 percent slopes, rubbly; Rizzo; rarely flooded, stony; 50 and Rockhound; cobbly; 8
2090; Deprave-Rockhound-Rizzo complex, 2 to 4 percent slopes; Kenalduma; ; 2
2140; Rockhound silt loam, 4 to 15 percent slopes; Rockhound; cobbly; 85

Table 4. Representative soil features

Parent material	(1) Alluvium–granite
Surface texture	(1) Extremely gravelly loam (2) Loamy fine sand
Family particle size	(1) Loamy
Drainage class	Well drained to excessively drained
Permeability class	Slow to rapid
Soil depth	152 cm
Surface fragment cover <=3"	55–80%
Surface fragment cover >3"	15–30%
Available water capacity (0-101.6cm)	2.54–7.87 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)	15–46%
Subsurface fragment volume >3" (Depth not specified)	0–14%

Ecological dynamics

Extreme hot temperatures and aridity, and high large rock fragment cover and content by volume drives the vegetation community of this ecological site. This ecological site occurs on non-flooded to rarely flooded fan remnants with a cobbly surface. This site is 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. A heterogeneous soil surface provides microsites that support high shrub diversity and cover relative to adjacent landforms. Creosote bush and brittlebush dominate the site. Scattered blue paloverde, desert ironwood, ocotillo (*Fouquieria splendens*) and several cactus species are secondary species.

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.

California barrel cactus (*Ferocactus cylindraceus*), branched pencil cholla (*Cylindropuntia ramosissima*), Engelmann's hedgehog cactus (*Echinocereus engelmannii*) and ocotillo are present on this ecological site. Cacti and stem succulents are adapted to the most arid of environments with their ability to store large amounts of water with stem succulence; which provides plasticity to expand and contract 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. 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).

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.

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 (Webb, 2003; Bowers, 2005; Hereford, 2006; Miriti, 2007}.

Non-native annual species such as 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 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). Creosote bush is 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

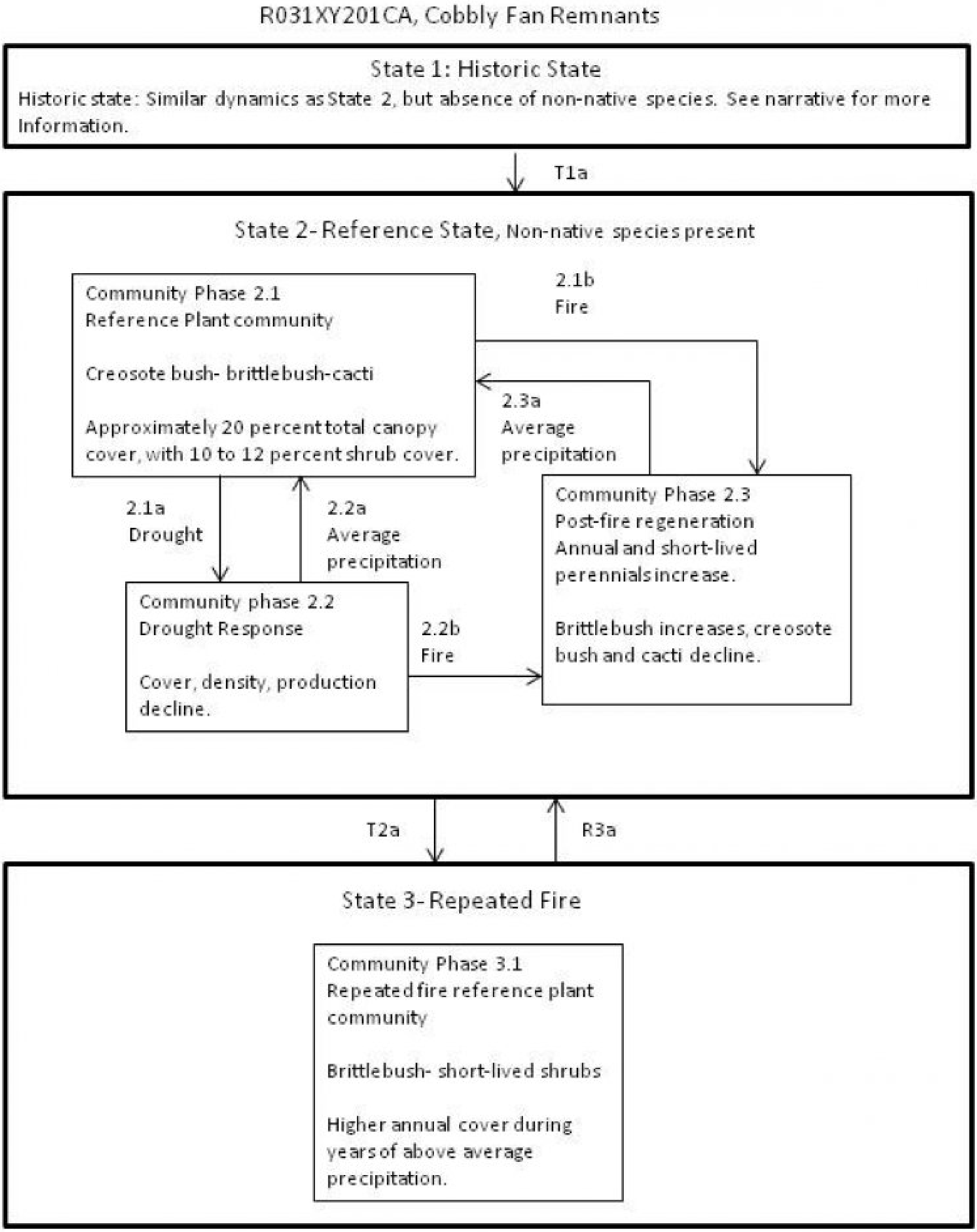

Figure 4. R031XY201CA Model

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 are naturalized in this plant community, but have not altered the ecological dynamics of this site.

Community 2.1
Reference Community

Figure 5. Reference Community

Figure 6. Reference Community

The reference plant community of this ecological site is characterized by a cobbly surface and dominance by creosote bush and brittlebush. Secondary shrubs include: California fagonbush (*Fagonia laevis*), burrobush (*Ambrosia dumosa*), white ratany (*Krameria grayi*), desert lavender (*Hyptis emoryi*), and ocotillo. Cacti include: California barrel cactus, branched pencil cholla, Engelmann's hedgehog cactus, and beavertail pricklypear. Common herbaceous species include: New Mexico silverbush (*Argythamnia neomexicana*), whitemargin sandmat (*Chamaesyce albomarginata*), cryptantha (Cryptantha sp.), Western Mojave buckwheat (*Eriogonum mohavense*), lupine (Lupinus sp.), sowthistle desertdandelion (*Malacothrix sonchoides*), curvenut combseed (*Pectocarya recurvata*), desert Indianwheat (*Plantago ovata*), and chia (*Salvia columbariae*). The leguminous trees desert ironwood and blue paloverde 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 (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Shrub/Vine	56	132	184
Forb	11	36	56
Grass/Grasslike	–	10	12
Tree	–	2	11
Total	**67**	**180**	**263**

Table 6. Ground cover

Tree foliar cover	0-1%
Shrub/vine/liana foliar cover	10-12%
Grass/grasslike foliar cover	1-3%
Forb foliar cover	6-8%
Non-vascular plants	0%
Biological crusts	0%
Litter	7-10%
Surface fragments >0.25" and <=3"	39-53%
Surface fragments >3"	13-18%
Bedrock	0%
Water	0%
Bare ground	6-11%

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, and California fagonbush), 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
Post-fire Regeneration

This community phase is characterized by the loss of cacti 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). Short-lived shrubs capable of re-colonizing from off-site sources become more abundant, and include burrobrush, sweetbush, and California fagonbush. 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 grass and forb 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 average to above average precipitation, and the recovery of vegetation.

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 cacti 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
Repeated Fire

This community is dominated by brittlebush. Native forbs and native and non-native annual grasses become more abundant.

Transition 2A
State 2 to 3

This transition occurs when the fire return interval in the reference state is less than 50 years.

Restoration pathway R3a
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 desert globemallow, burrobrush, and brittlebush. 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 7. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Tree					
1	**Trees**			0–11	
	desert ironwood	OLTE	*Olneya tesota*	0–6	0–1
	blue paloverde	PAFL6	*Parkinsonia florida*	0–6	0–1
Shrub/Vine					
1	**Shrubs**			56–184	
	creosote bush	LATR2	*Larrea tridentata*	28–84	2–5
	brittlebush	ENFA	*Encelia farinosa*	9–67	2–5
	California fagonbush	FALA	*Fagonia laevis*	1–17	1–3
	California barrel cactus	FECY	*Ferocactus cylindraceus*	0–11	0–1
	branched pencil cholla	CYRA9	*Cylindropuntia ramosissima*	0–9	0–1
	white ratany	KRGR	*Krameria grayi*	0–7	0–1
	burrobush	AMDU2	*Ambrosia dumosa*	0–6	0–1
	desert lavender	HYEM	*Hyptis emoryi*	0–6	0–1
	beavertail pricklypear	OPBA2	*Opuntia basilaris*	0–2	0–1
	Engelmann's hedgehog cactus	ECEN	*Echinocereus engelmannii*	0–2	0–1
	ocotillo	FOSP2	*Fouquieria splendens*	0–2	0–1
Forb					
2	**Forbs**			6–55	
	chia	SACO6	*Salvia columbariae*	1–17	1–3
	lupine	LUPIN	*Lupinus*	0–17	0–2
	sowthistle desertdandelion	MASO	*Malacothrix sonchoides*	6–11	5–11
	curvenut combseed	PERE	*Pectocarya recurvata*	0–11	0–4
	desert Indianwheat	PLOV	*Plantago ovata*	0–7	0–2
	New Mexico silverbush	ARNE2	*Argythamnia neomexicana*	0–1	0–1
	whitemargin sandmat	CHAL11	*Chamaesyce albomarginata*	0–1	0–1
	cryptantha	CRYPT	*Cryptantha*	0–1	0–1
	Western Mojave buckwheat	ERMO3	*Eriogonum mohavense*	0–1	0–1
Grass/Grasslike					
3	**Perennial grass**			1–11	
	purple threeawn	ARPU9	*Aristida purpurea*	1–11	1–3
4	**non-native annual grass**			0–1	
	common Mediterranean grass	SCBA	*Schismus barbatus*	0–1	0–1

Animal community

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.

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, and a diversity of cacti.

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.

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).

Inventory data references

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

1247710306- Type location
1248617612
WP003

Type locality

Location 1: Riverside County, CA	
UTM zone	N
UTM northing	3726436
UTM easting	601862
General legal description	The type location is about 5 miles east of Cactus City, CA. It is about .25 miles north of HW 10, on BLM property.

Other references

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Contributors

Marchel Munnecke

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.

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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):**

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:**

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11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):**

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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:**
