

# Ecological site R030XE200CA Xeric Very Deep Sandy Fan Aprons On Pediments

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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.

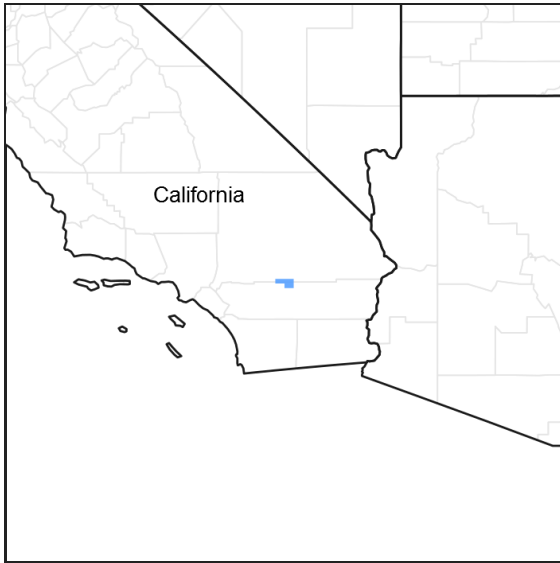


Figure 1. Mapped extent

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): 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 LRU (designated by 'XE') is found only in California at the transition zone between MLRA 20, the Southern California Mountains, and MLRA 30. Elevations range from 3500 to 5800 feet and precipitation ranges from 8 to 12 inches per year. The LRU is characterized primarily by cool thermic and mesic soil temperature regimes and aridic bordering on xeric soil moisture regimes. Precipitation is mostly winter, receiving approximately 85% between October and February, going from rain in the fall to snow into the winter. Snow can range from between 1 and 6 inches. Soils show indications of greater moisture storage with some mollic colors in the soil profile. Vegetation is highly productive and vigorous for the Mojave Desert and includes non-typical Mojave species such as, scrub oaks,

manzanita, sumac, ziziphus, mountain mahogany, presence of singleleaf pinyon, and desert needlegrass.

#### Ecological Site concept –

This site occurs on undulating fan aprons on pediments at elevations of approximately 4400 to 5200 feet and slopes of 4 to 8 percent. Soils are typically very deep sands, but exposed bedrock and rock outcrops are common.

Single-leaf pinyon pine (*Pinus monophylla*), Muller's oak (*Quercus cornelius-mulleri*), and California juniper (*Juniperus californica*) dominate the overstory, and blackbrush (*Coleogyne ramosissima*) is the dominant low shrub. Production Reference Value (RV) is 422 pounds per acre. Deep sandy soils, increased runoff from exposed bedrock and outcrops, and the xeric soil moisture regime increases the competitive ability of single-leaf pinyon pine, Muller's oak, and California juniper relative to blackbrush, and increases site suitability for other shrub species. Thus, this site has relatively high species evenness and shrub diversity.

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).

### Classification relationships

*Pinus monophylla* Woodland Alliance (Sawyer et al. 2009).

### Associated sites

R030XE196CA	<b>Sandy Xeric-Intergrade Slopes</b> R030XE196CA occurs on adjacent hill and mountain slopes. Single-leaf pinyon pine ( <i>Pinus monophylla</i> ) and Muller's oak ( <i>Quercus cornelius-mulleri</i> ) are dominant over a diverse shrub understory.
R030XY202CA	<b>Very Rarely To Rarely Flooded Thermic Ephemeral Stream</b> R030XY202CA occurs on adjacent, small, rarely flooded ephemeral drainageways. California jointfir ( <i>Ephedra californica</i> ) and burrobrush ( <i>Hymenoclea salsola</i> ) are dominant species of a diverse, productive shrub community.

### Similar sites

R030XB189CA	<b>Shallow Cool Hills</b> R030XB189CA occurs on steeper hill and mountain slopes with shallow soils. Blackbrush ( <i>Coleogyne ramosissima</i> ) and California juniper ( <i>Juniperus californica</i> ) are dominant species. Single-leaf pinyon pine ( <i>Pinus monophylla</i> ) and Muller's oak ( <i>Quercus cornelius mulleri</i> ) are trace if present.
R030XE196CA	<b>Sandy Xeric-Intergrade Slopes</b> R030XE196CA occurs on steep mountain slopes with shallow soils. Blackbrush ( <i>Coleogyne ramosissima</i> ) is a minor species if present.
R030XE191CA	<b>Dry Sandy Mountain Slopes</b> R030XE191CA occurs on steep mountain slopes with shallow soils. Blackbrush ( <i>Coleogyne ramosissima</i> ) and California juniper ( <i>Juniperus californica</i> ) are not important species.
R030XB168CA	<b>Cool Deep Sandy Fans</b> R030XB168CA occurs on fan aprons and fan remnants with a typical aridic soil moisture regime. Production is higher, and blackbrush ( <i>Coleogyne ramosissima</i> ) and California juniper ( <i>Juniperus californica</i> ) dominate.
R030XB166CA	<b>Dissected Pediment, Cool</b> R030XB166CA occurs on pediment with very shallow to shallow soils and a typical aridic soil moisture regime. Production is lower, and blackbrush ( <i>Coleogyne ramosissima</i> ) and California juniper ( <i>Juniperus californica</i> ) are dominant species.

**Table 1. Dominant plant species**

Tree	(1) <i>Pinus monophylla</i>
Shrub	(1) <i>Coleogyne ramosissima</i> (2) <i>Quercus cornelius-mulleri</i>

Herbaceous	Not specified
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## Physiographic features

This ecological site occurs on fan aprons on pediments and pediments at elevations of 4490 to 5130 feet with slopes of 4 to 8 percent. The site experiences no flooding or ponding, and runoff class is very low.

**Table 2. Representative physiographic features**

Landforms	(1) Fan apron (2) Pediment
Flooding frequency	None
Ponding frequency	None
Elevation	1,369–1,564 m
Slope	4–8%
Aspect	Aspect is not a significant factor

## Climatic features

The climate at this site is arid characterized by cool, somewhat moist winters and hot, dry summers. The average annual precipitation ranges from 7 to 10 inches with most falling as rain from November to March. Mean annual air temperature ranges from 55 to 63 degrees F, and the frost freeze period is 210 to 270 days. June, July, and August can experience average maximum temperatures of 100 degrees F while December and January can have average minimum temperatures near 20 degrees F.

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](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):

LTHC1 Lost Horse, Joshua Tree National Park  
(Period of record = 1991 to 2011) [1]

44467 Kee Ranch, CA (Period of record = 1948 to 1979) [1]

45112 Yucca Valley, CA (Period of record = 1990 to 2011) [2]

45863 Morongo Valley, CA (Period of record = 1948 to 1972) [2]

The combination of these stations were used because of a lack of data. The Lost Horse weather station is closest to this ecological site but is limited by the number of years data was collected. Kee Ranch weather station contains precipitation data for all years of the period of record but has no temperature data. The Yucca Valley weather station contains reliable temperature and precipitation data for the 20 year period of record at an elevation of 3260 ft. Morongo Valley, at elevation 2570 ft, only has precipitation data. This ecological site is generally found at elevations higher than these climate stations.

**Table 3. Representative climatic features**

Frost-free period (average)	270 days
Freeze-free period (average)	0 days
Precipitation total (average)	254 mm

## Influencing water features

### Soil features

The soils associated with this ecological site formed in alluvium derived from granitoid and/or alluvium derived from gneiss over residuum weathered from granitoid and/or residuum weathered from gneiss. Soils are typically very deep over weathered bedrock. Surface textures are sand, with sand in the subsurface. Surface rock fragments less than or equal to three inches in diameter are typically about 10 percent, with no larger fragments, Subsurface fragments less than or equal to three inches in diameter are about 2 percent (for a depth of 0 to 79 inches), with no larger fragments.

The associated soil that is greater than 15 percent of any one map unit is: Thunderclap (mixed, thermic Xeric Torripsammets). This site is associated with minor components of Smithcanyon (mixed, thermic, shallow Xeric Torripsammets); and Stubbesspring (loamy, mixed, superactive, thermic, shallow Xeric Haplargids) soils. The Smithcanyon and Stubbesspring soils typically occur on backslopes of hills and mountains and are very shallow to shallow; where this ecological site is associated with them, they occur on low hills. The Stubbesspring soils have sandy loam surface textures, and have an argillic horizon, which is 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:

4630;Thunderclap-Smithcanyon complex, 4 to 15 percent slopes;Thunderclap;;50; Smithcanyon; moderately steep;8; Stubbesspring;;5  
3293;Smithcanyon-Pinecity association, 15 to 50 percent slopes;Thunderclap;rarely flooded;3

**Table 4. Representative soil features**

Parent material	(1) Alluvium–granite (2) Residuum–gneiss
Surface texture	(1) Sand
Family particle size	(1) Sandy
Drainage class	Somewhat excessively drained
Permeability class	Rapid
Soil depth	152–203 cm
Surface fragment cover <=3"	10%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	5.08–7.87 cm
Calcium carbonate equivalent (0-101.6cm)	0–1%
Electrical conductivity (0-101.6cm)	0–2 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–4
Soil reaction (1:1 water) (0-101.6cm)	7.4–8.4
Subsurface fragment volume <=3" (Depth not specified)	2%
Subsurface fragment volume >3" (Depth not specified)	0%

## Ecological dynamics

This site occurs on undulating fan aprons over pediments, typically with very deep soils, at elevations of approximately 4400 to 5200 feet and slopes of 4 to 8 percent. Single-leaf pinyon pine, Muller's oak, and California juniper dominate the overstory, and blackbrush is the dominant low shrub. The Xeric soil moisture regime and deep soils interspersed with bedrock outcrops contribute to high shrub diversity for a blackbrush dominated site.

Single-leaf pinyon pine is a long-lived, slow-growing tree that is a widespread dominant of Mojave Desert woodlands on shallow soils on soils with xeric moisture regimes, and where precipitation is 8 to 18 inches (Zouhar 2001, Minnich 2007). Muller's oak is a long-lived, deep-rooted evergreen shrub that occurs in areas of higher rainfall such as the western margins of Mojave and Colorado Desert mountains and into the eastern slopes of the Peninsular Ranges in the California Floristic Province (Baldwin et al. 2002). California juniper is a long-lived small tree or large shrub that is a co-dominant in arid woodlands and scrub throughout California, achieving maximum dominance where mean annual precipitation is above 9.5 inches (Rhode 2002). Blackbrush is a dominant shrub in the mid-elevation zones of the Mojave and Great Basin Deserts. Extreme drought-tolerance coupled with extreme longevity allows blackbrush to achieve community dominance over shorter-lived species, provided there are long periods of time without disturbance (Pendleton and Meyer 2004). Thus, blackbrush communities are usually characterized by high blackbrush dominance, with a minor contribution of secondary shrubs (Brooks and Matchett 2003, Brooks et al. 2007).

The deep soils and additional runoff from bedrock outcrops on this site increase the availability of water, which increases the competitive ability of single-leaf pinyon pine, Muller's oak and California juniper relative to blackbrush, and increase the suitability of this site to species like desert bitterbrush (*Purshia glandulosa*) and desert almond (*Prunus fasciculata*).

### Disturbance Dynamics

Invasion by non-native species, drought and insect attack, and fire are the primary disturbances affecting this ecological site.

Non-native annual grasses (red brome [*Bromus rubens*] and cheatgrass [*Bromus tectorum*]) 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). The abundance and biomass of these grasses is highest on sandy soils with higher soil moisture availability, and where nitrogen deposition from air pollution from adjacent urban areas is high (Rao and Allen 2010, Rao et al. 2010). This ecological site receives relatively heavy nitrogen deposition due to its proximity to the greater Los Angeles area (Allen et al. 2009), and the deep sandy soils and relatively high precipitation regime of this site make it particularly susceptible to invasion by cheatgrass and red brome.

Invasion by non-native annual grasses has increased the flammability of Mojave Desert shrub 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 historic fire return interval in southern California pinyon-juniper woodlands is approximately 480 years, and in some stands there is no evidence of widespread fire (Minnich 2007, Romme et al. 2009). Similarly, fire in blackbrush shrublands was historically very rare (Brooks et al. 2007). Most desert community dominants are not adapted to fire, are slow-growing and long-lived, and require very long periods of time without disturbance to re-establish dominance. Thus an increase in fire frequency threatens to transition these communities to a permanently altered state.

Drought, and interactions with insect attack and disease are the most important drivers of community dynamics within pinyon-juniper woodlands (Minnich 2007, Romme et al. 2009). Pinyon-juniper woodlands are highly susceptible to drought, with widespread mortality and increased susceptibility to insect attack during drought (Shaw 2006, Minnich 2007, Romme et al. 2009). Trees in southern California close to urban centers may be especially at risk because increased nitrogen deposition from air pollution further increases susceptibility of pinyon pine to pathogens (Jones et al. 2004, Allen et al. 2010). Pinyon-juniper woodlands in the southwest experienced unprecedented drought and insect-induced mortality in the early 2000's, with higher mortality in lower elevation stands, and a significant increase in standing dead pinyon pines (Shaw 2006). Cone-bearing trees (> 35 years of age) are more likely to die during drought, so older stands may be more severely drought-affected (Romme et al. 2009). This ecological site occupies relatively low elevations and receives relatively heavy nitrogen deposition due

to its proximity to the greater Los Angeles area (Allen et al. 2009); thus, this ecological site may be especially vulnerable to the effects of drought.

## State and transition model

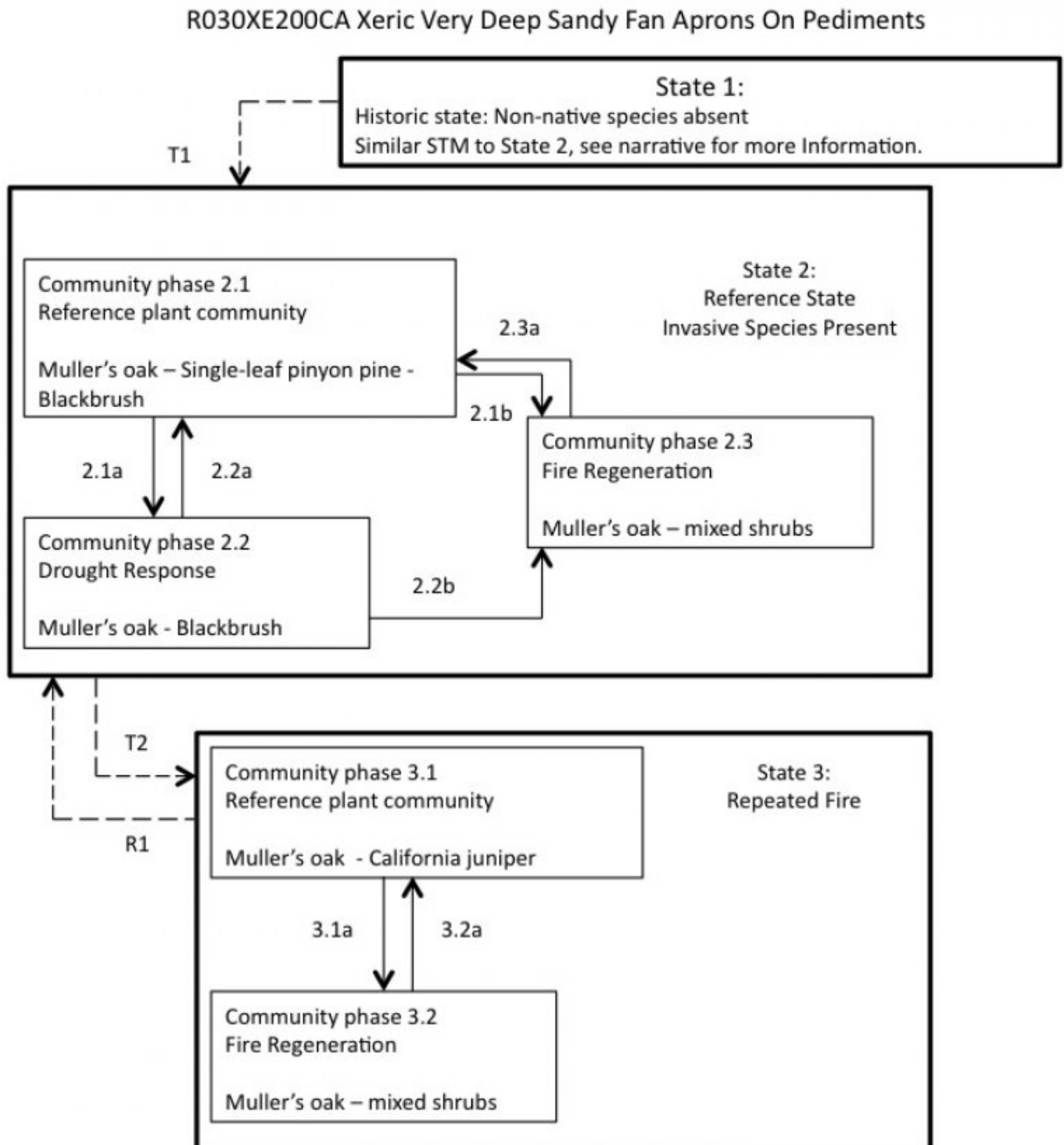


Figure 4. R030XE200CA

## 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 very rare fire were the natural disturbances influencing this ecological site. Data for this State does not exist, but it 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 red brome and cheatgrass 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

This community has developed over time in the absence of fire. Single-leaf pinyon pine, Muller's oak, and California juniper dominate the overstory, and blackbrush is the dominant low shrub. Desert bitterbrush (*Purshia glandulosa*), which is associated with the xeric precipitation regime and deep, coarse soils (Zlatnik 1999), is an important secondary shrub. Desert almond (*Prunus fasciculata*), Mojave yucca (*Yucca schidigera*), Joshua tree (*Yucca brevifolia*), and Nevada jointfir (*Ephedra nevadensis*) are also important secondary species. Native perennial bunchgrasses are sparsely present, and include desert needlegrass (*Achnatherum speciosum*), Indian ricegrass (*Achnatherum hymenoides*), and Sandberg bluegrass (*Poa secunda*). Native winter annual forbs may be abundant, and common species include bristly fiddleneck (*Amsinckia tessellata*), distant phacelia (*Phacelia distans*), and Great Basin langloisia (*Langloisia setosissima*). Non-native annual grasses may also be abundant, and include cheatgrass and red brome.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	–	157	213
Shrub/Vine	101	157	213
Tree	90	135	179
Forb	1	25	34
<b>Total</b>	<b>192</b>	<b>474</b>	<b>639</b>

## Community 2.2 Drought response

This community phase develops after prolonged or severe drought, and is characterized by mortality of single-leaf

pinyon pine and overall declines in cover, with mortality also occurring in perennial grasses and short-lived shrubs. Pinyon pine mortality is more severe in older trees, and the prevalence of large, standing dead trees increases. Mortality may occur as a direct impact from water stress, or indirectly, from attack by Pinyon Ips beetle (*Ips confusus*) of drought-stressed trees. Muller's oak has extremely high drought-tolerance, and since it is shade-intolerant, it may increase in response to the mortality of pine. California juniper is extremely drought-tolerant (Willson et al. 2008), with low rates of mortality during drought relative to pinyon pine (Breshears et al. 2005, Shaw 2006, Breshears et al. 2008, Floyd et al. 2009, Allen et al. 2010). Mortality rates of juniper species in response to drought in the early 2000's range from 2 to 26% (Breshears et al. 2005, Mueller et al. 2005, Floyd et al. 2009). Blackbrush has very low mortality in response to drought, but may exhibit branch-pruning (Webb et al. 2003). Pinyon pine is slow-growing, recruitment episodic, and seedling establishment is most successful under cover of nurse plants or rocks (Chambers et al. 1999, Pearson and Theimer 2004). Further, pinyon is dependent on seed-caching rodents for dispersal to safe sites (Chambers et al. 1999), and rodent populations also decline during drought (Beatley 1969). With reduced seed production due to mortality, fewer dispersers, fewer safe sites for establishment and slow growth rates of the individuals that do establish, the effects of drought-induced pine mortality are long-lasting. Dead standing trees persist, and their replacement will take decades.

### Community 2.3 Fire regeneration community



Figure 7. Community Phase 2.3

This community phase is characterized by the loss of pinyon pine, California juniper and blackbrush, with dominance by Muller's oak. Pinyon pine, California juniper and blackbrush are generally killed by even moderate fire intensity (Romme et al. 2009). Muller's oak is a vigorous resprouter, and will begin recovery in the first year after fire. Desert bitterbrush, desert almond, and Mojave yucca are also vigorous resprouters, and increase in importance in the fire regeneration community. The perennial grasses found in this site resprout and regenerate from seed within the first year after fire, thus increasing in response to fire (Sawyer et al. 2009). Threadleaf snakeweed (*Gutierrezia microcephala*) can rapidly recolonize from seed. Native and non-native annuals are abundant in the post-fire community, given adequate precipitation. As tall shrub cover increases, shade-dependent seedlings of California juniper and Pinyon pine begin to establish. Tree establishment may also occur in the shelter of boulders and rock outcrops (Pearson and Theimer 2004). California juniper re-establishes faster than pinyon pine (Tausch and West 1988). After fifty years with no disturbance, pine cover will begin to dominate, shading out shorter-lived shrubs, and mature woodlands re-establish at 100 to 150 years post-fire (Wangler and Minnich 1996). With favorable climatic conditions and nearby seed sources available in unburned pockets, blackbrush re-colonizes continuous soil patches. After long periods of time (> 100 years) with no disturbance, blackbrush gradually replaces shorter-lived species and regains dominance (Vasek 1983, Abella 2009, Vamstad 2009). This community is an at-risk phase. High biomass of non-native annual grasses after fire increases the susceptibility of this site to repeat burning. With frequent burning the fire return interval is too short to allow re-establishment of blackbrush, pinyon pine, and California juniper, and the site will transition to an altered state. The data presented for this community phase represent an example of vegetation recovery at four years after the West Complex Fire in Joshua Tree National Park. Trajectories of vegetation recovery in blackbrush shrub communities are highly divergent, and this divergence may persist for decades (Vamstad 2009, Engel and Abella 2011); thus this data is intended to be viewed as one potential trajectory.

Table 6. Annual production by plant type



Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	3	157	213
Forb	4	84	118
Shrub/Vine	67	84	101
Tree	–	–	22
<b>Total</b>	<b>74</b>	<b>325</b>	<b>454</b>

### Pathway 2.1a Community 2.1 to 2.2

This pathway occurs with severe or prolonged drought.

### Pathway 2.2a Community 2.2 to 2.1

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

### Pathway 2.3a Community 2.3 to 2.1



Fire regeneration community

Reference plant community

This pathway occurs with time without fire.

## State 3 Repeated fire

This state develops with a frequent fire return interval in the reference state. This state has been significantly altered from the natural range of variability found in States 1 and 2. Pinyon pine, California juniper, and blackbrush are largely lost, and Muller's oak, non-native annual grasses, native sub-shrubs, perennial grasses, and short-lived shrubs dominate the community.

### Community 3.1 Reference plant community

This reference plant community for State 3 is dominated by Muller's oak, with desert bitterbrush, desert almond, short-lived shrubs, perennial grasses and native and non-native annual forbs and grasses.

### Community 3.2 Fire regeneration community

The fire regeneration community is dominated by non-native annual species including cheatgrass, and red brome, and native forbs, including bristly fiddleneck, chia and pincushion flower (many other native forbs could also be present). Desert needlegrass, Indian ricegrass and Sandberg bluegrass may be abundant. There is a sparse cover of resprouting shrubs including Muller's oak, desert bitterbrush and desert almond. 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).

### Pathway 3.1a

## Community 3.1 to 3.2

This pathway occurs with moderate to severe fire.

### Pathway 3.2a

#### Community 3.2 to 3.1

This pathway occurs with time without fire.

### 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.

### Transition 3

#### State 2 to 3

This transition occurs if the fire return interval is less than 75 years.

## Restoration pathway 1

### State 3 to 2

Burned, blackbrush lost - State 3 This state is characterized by the loss of blackbrush from the plant community due to severe or recurrent fire. Data does not exist for this state, and community phase composition is based on literature review. The dynamics for this state are assumed to be similar to that described in State 2, except that blackbrush is no longer part of the plant community. Blackbrush lost Reference plant community - Community Phase 3.1 The reference plant community for this state is dominated by burrobrush. Mojave yucca, Nevada ephedra, and eastern Mojave buckwheat are important secondary species. Other shrub species, subshrubs and annuals are likely to remain as described in Community phase 2.1. Community Phase Pathway 3.1a This pathway occurs in response to prolonged or severe drought. Community Phase Pathway 3.1b This pathway occurs in response to moderate or severe fire. Restoration Pathway - 1 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, desert needlegrass, Indian ricegrass, and threadleaf snakeweed. Increased native cover may help to reduce non-native plant invasion, helps to stabilize soils, provides a source of food and cover for wildlife, and provides microsites that facilitate California juniper, singleleaf pinyon pine, and blackbrush 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. Blackbrush is difficult to cultivate for outplanting due to susceptibility to fungal pathogens in greenhouse environment. 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 (%)
<b>Tree</b>					
1	<b>Trees</b>			90–179	
	California juniper	JUCA7	<i>Juniperus californica</i>	56–135	3–8
	singleleaf pinyon	PIMO	<i>Pinus monophylla</i>	22–45	2–4
	Joshua tree	YUBR	<i>Yucca brevifolia</i>	1–22	0–2
<b>Shrub/Vine</b>					
2	<b>Shrubs</b>			101–213	
	Muller oak	QUIC07	<i>Quercus cornelius-mulleri</i>	56–112	2–5

Plant Name	Code	Scientific Name	Count	Percentage
blackbrush	CORA	<i>Coleogyne ramosissima</i>	29–58	5–20
desert bitterbrush	PUGL2	<i>Purshia glandulosa</i>	19–38	0–3
Nevada jointfir	EPNE	<i>Ephedra nevadensis</i>	0–12	0–4
desert almond	PRFA	<i>Prunus fasciculata</i>	0–11	0–4
Mojave yucca	YUSC2	<i>Yucca schidigera</i>	0–11	0–4
Mexican bladdersage	SAME	<i>Salazaria mexicana</i>	0–1	0–1
Wiggins' cholla	CYEC3	<i>Cylindropuntia echinocarpa</i>	0–1	0–1
kingcup cactus	ECTR	<i>Echinocereus triglochidiatus</i>	0–1	0–1
Eastern Mojave buckwheat	ERFA2	<i>Eriogonum fasciculatum</i>	0–1	0–1
threadleaf snakeweed	GUMI	<i>Gutierrezia microcephala</i>	0–1	0–1
beavertail pricklypear	OPBA2	<i>Opuntia basilaris</i>	0–1	0–1
<b>Forb</b>				
3	<b>Native forbs</b>		1–34	
	Great Basin langloisia	LASE3 <i>Langloisia setosissima</i>	0–34	0–2
	bristly fiddleneck	AMTE3 <i>Amsinckia tessellata</i>	0–11	0–1
	distant phacelia	PHDI <i>Phacelia distans</i>	0–11	0–1
	Parry's wirelettuce	STPA3 <i>Stephanomeria parryi</i>	0–6	0–1
	chia	SACO6 <i>Salvia columbariae</i>	0–1	0–1
	desert globemallow	SPAM2 <i>Sphaeralcea ambigua</i>	0–1	0–1
	woolly easterbonnets	ANWA <i>Antheropeas wallacei</i>	0–1	0–1
	bluedicks	DICA14 <i>Dichelostemma capitatum</i>	0–1	0–1
	buckwheat	ERIOG <i>Eriogonum</i>	0–1	0–1
	whitedaisy tidytips	LAGL5 <i>Layia glandulosa</i>	0–1	0–1
	golden linanthus	LEAUA3 <i>Leptosiphon aureus ssp. aureus</i>	0–1	0–1
	Mojave desertparsley	LOMO <i>Lomatium mohavense</i>	0–1	0–1
	miniature lupine	LUBI <i>Lupinus bicolor</i>	0–1	0–1
	blazingstar	MENTZ <i>Mentzelia</i>	0–1	0–1
	desert wishbone-bush	MILA6 <i>Mirabilis laevis</i>	0–1	0–1
4	<b>Non-native annual forbs</b>		0–1	
	redstem stork's bill	ERIC6 <i>Erodium cicutarium</i>	0–1	0–1
<b>Grass/Grasslike</b>				
5	<b>Perennial grasses</b>		0–17	
	desert needlegrass	ACSP12 <i>Achnatherum speciosum</i>	0–11	0–1
	Sandberg bluegrass	POSE <i>Poa secunda</i>	0–1	0–1
	Indian ricegrass	ACHY <i>Achnatherum hymenoides</i>	0–1	0–1
6	<b>Non-native annual grasses</b>		0–213	
	compact brome	BRMA3 <i>Bromus madritensis</i>	0–157	0–5
	cheatgrass	BRTE <i>Bromus tectorum</i>	0–146	0–5

Table 8. Community 2.3 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
<b>Tree</b>					
1	<b>Trees</b>			0–22	
	Joshua tree	YUBR	<i>Yucca brevifolia</i>	0–22	0–2
	California juniper	JUCA7	<i>Juniperus californica</i>	0–6	0–1
<b>Shrub/Vine</b>					
2	<b>Native shrubs</b>			67–101	
	Muller oak	QUCO7	<i>Quercus cornelius-mulleri</i>	0–84	0–3
	desert almond	PRFA	<i>Prunus fasciculata</i>	0–28	0–7
	desert bitterbrush	PUGL2	<i>Purshia glandulosa</i>	0–26	0–2
	Nevada jointfir	EPNE	<i>Ephedra nevadensis</i>	0–13	0–2
	Mojave yucca	YUSC2	<i>Yucca schidigera</i>	0–11	0–4
	threadleaf snakeweed	GUMI	<i>Gutierrezia microcephala</i>	0–6	0–1
	blackbrush	CORA	<i>Coleogyne ramosissima</i>	0–2	0–1
<b>Grass/Grasslike</b>					
3	<b>Perennial Grasses</b>			0–4	
	desert needlegrass	ACSP12	<i>Achnatherum speciosum</i>	0–3	0–1
	Indian ricegrass	ACHY	<i>Achnatherum hymenoides</i>	0–1	0–1
6	<b>Non-native annual grasses</b>			0–157	
	cheatgrass	BRTE	<i>Bromus tectorum</i>	0–146	0–20
	red brome	BRRU2	<i>Bromus rubens</i>	0–11	0–1
<b>Forb</b>					
4	<b>Native forbs</b>			4–118	
	smooth desertdandelion	MAGL3	<i>Malacothrix glabrata</i>	0–56	0–2
	Great Basin langloisia	LASE3	<i>Langloisia setosissima</i>	0–34	0–2
	small wirelettuce	STEX	<i>Stephanomeria exigua</i>	0–22	0–3
	bristly fiddleneck	AMTE3	<i>Amsinckia tessellata</i>	0–11	0–1
	desert globemallow	SPAM2	<i>Sphaeralcea ambigua</i>	0–6	0–1
	Parry's wirelettuce	STPA3	<i>Stephanomeria parryi</i>	0–6	0–1

## Animal community

This ecological site provides important habitat for birds, reptiles and mammals due to its structural diversity and pinyon woodlands.

The following reptiles and mammals are likely to be found within this ecological site (based on habitat preferences).

### REPTILES

Lizards:

- Desert banded Gecko (*Coleonyx variegatus variegatus*)
- Northern desert iguana (*Dipsosaurus dorsalis dorsalis*)
- Mojave collared lizard (*Crotaphytus bicinctores*)
- Western chuckwalla (*Sauromalus aster obesus*)
- Yellow-backed spiny lizard (*Sceloporus magister uniformus*)
- Great Basin fence lizard (*Sceloporus biseriatus longipes*)
- Western brush lizard (*Urosaurus graciosus graciosus*)
- Desert side-blotched lizard (*Uta stansburiana stejnegeri*)
- Great Basin Whiptail (*Aspidoscelis tigris tigris*)

## Snakes:

Southwestern blind snake (*Leptotyphlops humilis humilis*)  
Desert rosy boa (*Lichanura trivirgata gracia*)  
Mojave glossy snake (*Arizona occidentalis candida*) California kingsnake (*Lampropeltis getula californae*)  
Red coachwhip (*Masticophis flagellum piceus*)  
Desert night snake (*Hypsiglena torquata deserticola*)  
California kingsnake (*Lampropeltis getula californae*)  
California striped racer (*Masticophis lateralis lateralis*)  
Western leaf-nosed snake (*Phyllorhynchus decurtatus perkinsi*)  
Great Basin gopher snake (*Pituophis catenifer deserticola*)  
Western long-nosed snake (*Rhinocheilus lecontei lecontei*)  
Smith's black-headed snake (*Tantilla hobartsmithi*)  
California lyre snake (*Trimorphodon biscutatus vandenburghi*)  
Southwestern speckled rattlesnake (*Crotalus mitchelli Pyrrhus*)  
Red diamond rattlesnake (*Crotalus ruber ruber*)  
Southern pacific rattlesnake (*Crotalus helleri*)

## MAMMALS

Western spotted skunk (*Spilogale gracilis gracilis*)  
Long-tailed weasel (*Mustela latirosta*)  
California desert bat (*Myotis californicus stephensi*)  
Western pipistrelle (*Pipistrellus hesperus hesperus*)  
Desert big brown bat (*Eptesicus fuscus pallidus*)  
Desert long-legged bat (*Myotis volans interior*)  
Northern fringed bat (*Myotis thysanodes thysanodes*)  
Spotted bat (*Euderma maculatum*)  
Western mastiff bat (*Eumops perotis*)  
Hoary bat (*Lasiurus cinereus cinereus*)  
Pallid bat (*Antrozous pallidus minor*)  
Desert coyote (*Canis macrotis arsipus*)  
Common gray fox (*Urocyon cinereoargenteus scottii*)  
California mountain lion (*Felis concolor californica*)  
Desert bobcat (*Lynx rufus baileyi*)  
California ringtail (*Bassariscus astutus ocatvus*)  
Southern mule deer (*Odocoileus hemionus fuliginatus*)  
Desert bighorn sheep (*Ovis canadensis nelson*)  
Southern Desert cottontail (*Sylvilagus audobonii arizonae*)  
Dusky chipmunk (*Tamias obscurus davisii*)  
Whitetail antelope squirrel (*Ammospermophilus leucurus leucurus*)  
Western Mojave ground squirrel (*Spermophilus beecheyi parvulus*)  
Long-tailed pocket mouse (*Chaetodipus Mojavensis*)  
Merriam's kangaroo rat (*Dipodomys deserti*)  
Desert wood rat (*Neotoma fuscipes simplex*)  
Eastern dusky-footed wood rat (*Neotoma fuscipes simplex*)  
White-throated wood rat (*Neotoma albigula venusta*)  
Desert canyon mouse (*Peromyscus crinitus stephensi*)  
Southern brush mouse (*Peromyscus boylii rowleyi*)  
Sonoran deer mouse (*Peromyscus maniculatus sonoriensis*)  
Southern California pinyon mouse (*Peromyscus truei chlorus*)  
Desert grasshopper mouse (*Onychomys torridus pulcher*)  
Desert shrew

## Recreational uses

This ecological site occurs in remote, steep terrain with limited access. As such, it has important wilderness values. It may be used for cross-country hiking, solitude, botanizing, and aesthetic enjoyment.

## Wood products

Wood of single-leaf pinyon may be used for fuel wood and fence posts, particle and cement board (Zouhar 2001). It is not suitable for lumber because of its small size and irregular growth pattern (Zouhar 2001).

California juniper is a poor source of lumber because of low volume and multi-stemmed growth form. However, early ranchers used juniper for fenceposts, and it is used for fuel and as Christmas trees (Cope 1992).

## Other products

Single-leaf pinyon pine is very important for many Native American tribes. The melted gum is used to bind and heal cuts, prevent sunburn, to stop menstruation, for muscle soreness, diarrhea, rheumatism, colds, and nausea, among others. Pinyon nuts are an important food source, and were the staple food source in the past for many tribes. The pinyon seeds were one of the few foods given to babies as an alternative food source by the Cahuilla. Needles are used to make baskets, and were used as a spice to flavor meats. Wood and bark were used in house construction, and the pitch was used for water-proofing. <http://herb.umd.umich.edu/herb/search.pl?searchstring=Pinus%20monophylla>.

## Inventory data references

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

Community Phase 2.1:  
1249800639 (Type location)  
1251503837  
1249806A

Community Phase 2.3:  
1249806705  
1249806932

## Type locality

Location 1: San Bernardino County, CA	
UTM zone	N
UTM northing	563348
UTM easting	3765774
General legal description	The type location is approximately 0.2 miles east of Covington Flats Crossover Road, and 1.3 miles southwest of the intersection of Covington Flats Crossover Road and Lower Covington Flat Road in Joshua Tree National Park.

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## Contributors

Alice Lee Miller  
Allison Tokunaga

## 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:**

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2. **Presence of water flow patterns:**

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3. **Number and height of erosional pedestals or terracettes:**

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):**

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5. **Number of gullies and erosion associated with gullies:**

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6. **Extent of wind scoured, blowouts and/or depositional areas:**

---

7. **Amount of litter movement (describe size and distance expected to travel):**

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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:**
-