Ecological site R030XD040CA
Hyperthermic Steep North Slopes

Accessed: 05/21/2024

General information

Provisional. A provisional ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model and enough information to identify the ecological site.

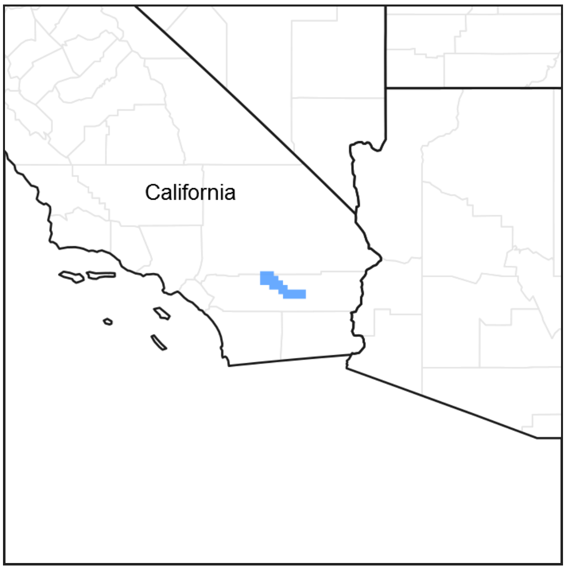

Figure 1. Mapped extent

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

MLRA notes

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

MLRA Description:

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

LRU Description:

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

Ecological Site Concept -

This site occurs on steep, dissected mountain slopes at elevations of 1150 to 3700 feet. Exposed bedrock and small gullies are frequent across the slope, contributing to high topographical diversity. At the lower elevation range of this site, it tends to occur on cooler north and east facing aspects. Dominant soils range from very shallow to moderately deep, are sandy, and have gravel and cobble surface textures. This ecological site occurs at the southern edge of the Mojave Desert (the Mojave Desert-Lower Colorado Desert or MLRA30-31 boundary), and receives relatively high summer precipitation.

Annual production reference value (RV) is 224 pounds per acre, and ranges from 145 to 436 pounds per acre depending on precipitation and localized topographical conditions. The site is weakly dominated by burrobush and Parish's goldeneye (Viguiera parishii), and a high diversity of other shrub species are typically present. Sandy soils on steep slopes, a highly dissected topography, proximity to the MLRA31 boundary, and high surface rock fragments that increasesrun-on creates the diverse shrub community that characterizes this ecological site. Relatively cooler landscape positions restrict brittlebush, which is abundant on adjacent warmer slopes.

The data in the following sections is from major (15% of map unit or greater) components only.

Associated sites

R030XB140CA	**Shallow Hill 4-6" P.Z.** R030XB140CA is found on adjacent higher elevation slopes. Burrobush (Ambrosia dumosa) and creosote bush (Larrea tridentata) dominate.
R030XB213CA	**Moderately Deep Gravelly Mountain Slopes** R030XB213CA is found on adjacent higher elevation slopes with a thermic soil temperature regime. Eastern Mojave buckwheat (Eriogonum fasciculatum), desert needlegrass (Achnatherum speciosum), and California juniper (Juniperus californica) are dominant species.
R030XD003CA	**Hyperthermic Steep South Slopes** R030XD003CA is found on adjacent slopes with warmer, more arid topographic positions. Brittlebush (Encelia farinosa) and creosote bush (Larrea tridentata) are dominant.
R030XD039CA	**Coarse Gravelly Fans** R030XD039CA is found on adjacent steep fan remnants. Brittlebush (Encelia farinosa) and creosote bush (Larrea tridentata) are dominant.
R030XY128CA	**Broad, Gravelly, Hyperthermic Ephemeral Stream** R030XY128CA occurs in medium-sized drainageways adjacent to this site. Desert lavender (Hyptis emoryi), creosote bush (Larrea tridentata) and burrobrush (Hymenoclea salsola) are dominant species.

Similar sites

R030XB140CA	**Shallow Hill 4-6" P.Z.** R030XB140CA occurs on soils with a thermic soil moisture regime. Shrub diversity is lower, and burrobush (Ambrosia dumosa)is more strongly dominant.
R030XD001CA	**Hyperthermic Dry Hills** R030XD001CA is warmer and receives less precipitation. Shrub diversity and productivity is lower. Burrobush (Ambrosia dumosa) and creosote bush (Larrea tridentata) dominate.
R030XD003CA	**Hyperthermic Steep South Slopes** R030XD003CA is found on similar soils, but tends to occur on warmer topographic positions, such as south-facing slopes. Brittlebush (Encelia farinosa) and creosotebush (Larrea tridentata) dominate.
R030XB193CA	**Very Shallow To Moderately Deep Gravelly Slopes** R030XB193CA occurs on soils with a thermic soil temperature regime, and with an argillic horizon. Jojoba (Simmondsia chinensis), waterjacket (Lycium andersonii), and Nevada jointfir (Ephedra nevadensis) are co-dominant with burrobush (Ambrosia dumosa).

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Ambrosia dumosa* (2) *Viguiera parishii*
Herbaceous	Not specified

Physiographic features

This ecological site occurs on steep mountain slopes at elevations of 1150 to 3700 feet and slopes of 30 to 75 percent. Runoff class is medium to high.

Table 2. Representative physiographic features

Landforms	(1) Mountain slope
Flooding frequency	None
Ponding frequency	None
Elevation	351–1,128 m
Slope	30–75%

Climatic features

The climate of this ecological site is characterized by hot temperatures, aridity, and a bimodal precipitation pattern. Precipitation falls as rain, with 30 percent falling in summer between July and October, and 65 percent falling in winter between November and March. The mean annual precipitation is 3 to 5 inches and mean annual air temperature is 68 to 73 degrees F. The frost free period is 300 to 360 days.

Maximum and minimum monthly climate data for this ESD were generated by the Climate Summarizer (http://www.nm.nrcs.usda.gov/technical/handbooks/nrph/Climate_Summarizer.xls) using data
from the following climate stations (results are unweighted averages):

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

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

049099, Twentynine Palms, California (Period of record = 1935 to 2011) [1]

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

Table 3. Representative climatic features

Frost-free period (average)	360 days
Freeze-free period (average)	0 days
Precipitation total (average)	127 mm

Influencing water features

Soil features

The dominant soils associated with this ecological site range from very shallow to moderately deep over bedrock. These soils occur on mountains, and formed in colluvium derived from granitoid and/or gneiss over residuum weathered from granitoid or gneiss. Soils typically have minimal soil development, with very gravelly sand, very gravelly loamy sand, gravel, or cobble surface textures and gravelly to very gravelly loamy fine sand subsurface textures. These soils are somewhat excessively drained with rapid permeability.

The associated soil series that are 15 percent or greater of any one map unit are: Bulletproof (sandy, mixed, hyperthermic, shallow Typic Torriorthents); Ironlung (sandy-skeletal, mixed, hyperthermic, shallow, Typic Torriorthents); and Whiterobe (sandy, mixed, hyperthermic Typic Torriorthents). Other soils on which this site is found are typically 10 percent or less of any map unit when associated with this site. They include: Jadestorm (loamy-skeletal, mixed, superactive, calcareous, hyperthermic, shallow Typic Torriorthents); Marbolite (loamy-skeletal, mixed, superactive, hyperthermic Lithic Haplargids); Fanhill (loamy, mixed, superactive, hyperthermic, shallow Typic Haplocambids); Contactmine (fine-loamy, mixed, superactive, thermic Typic Haplargids); Meccapass (loamy-skeletal, mixed, superactive, hyperthermic Typic Haplocambids); Bolero (sandy-skeletal, mixed, hyperthermic Lithic Torriorthents); and Goldenhills (sandy-skeletal, mixed hyperthermic Typic Torriothents).

The Bulletproof soils are sandy throughout, shallow, have gravel or cobble surface textures, and can have up to 45 percent weakly cemented paragravel above the weathered bedrock contact. The Whiterobe soils are sandy throughout, moderately deep and have very gravelly loamy sand surface textures. The Ironlung and Jadestorm soils are very shallow to shallow; the Ironlung soils are sandy-skeletal with very gravelly sand surface textures, while the Jadestorm soils are loamy-skeletal with gravel surface textures. The Meccapass soils are moderately deep and have a cambic horizon above the weathered bedrock, while the Goldenhills soils are deep. The Marbolite and Contactmine soils have argillic horizons above the weathered bedrock contacts. The Bolero soils are sandy-skeletal and shallow to bedrock. The Fanhill soils are loamy and shallow to bedrock with a cambic horizon above the weathered bedrock.

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

1240;Meccapass-Bulletproof-Rock outcrop complex, 30 to 75 percent slopes;Bulletproof;;20; Fanhill;moist;2; Jadestorm;moist;5; Marbolite;cool;2
1255;Goldenhills-Bulletproof-Fanhill-Whiterobe complex, 30 to 75 percent slopes;Bulletproof;;15
1242;Meccapass-Jadestorm-Rock outcrop complex, 15 to 75 percent slopes;Contactmine;hot;9; Bulletproof;;2; Fanhill;moist;1; Jadestorm;moist;2; Meccapass;cool;5
1250;Ironlung-Rock outcrop complex, 30 to 75 percent slopes;Bolero;moist;1; Whiterobe;cool;2
3336;Xeric Torriorthents-Bigbernie association, 30 to 75 percent slopes; Ironlung;cool;20; Goldenhills;warm;8; Ironlung;rubbly, cool;3
1260;Whiterobe-Bigbernie complex, 30 to 75 percent slopes;Whiterobe;cool;15
3345;Bigcanyon association, 30 to 75 percent slopes;Whiterobe;cool;3

Table 4. Representative soil features

Parent material	(1) Colluvium–granite (2) Residuum–gneiss
Surface texture	(1) Very gravelly loamy sand (2) Very gravelly sand (3) Cobbly
Family particle size	(1) Sandy
Drainage class	Somewhat excessively drained
Permeability class	Rapid
Soil depth	10–99 cm
Surface fragment cover <=3"	45–50%
Surface fragment cover >3"	5–40%
Available water capacity (0-101.6cm)	0.25–4.06 cm
Calcium carbonate equivalent (0-101.6cm)	0–1%
Electrical conductivity (0-101.6cm)	0–2 mmhos/cm

Sodium adsorption ratio (0-101.6cm)	0–5
Soil reaction (1:1 water) (0-101.6cm)	6.6–9
Subsurface fragment volume <=3" (Depth not specified)	11–45%
Subsurface fragment volume >3" (Depth not specified)	0–40%

Ecological dynamics

Abiotic Factors

The most important abiotic factors driving this site are steep slopes dissected with gullies and spur ridges, a high frequency of exposed bedrock, and sandy soils with a high percentage of rock fragments on the soil surface. The climatic variables affecting this site are increased summer precipitation due to proximity to the MLRA30-31 boundary; and relatively cooler topographic positions. Relatively cooler topographic positions prevent dominance by brittlebush, which is widespread and abundant on adjacent similar soils on warmer aspects. Brittlebush has reduced root growth on slopes with cooler winter soil temperatures (Bowers 1994, Sandquist and Ehleringer 1996, Martre et al. 2002).

This ecological site is weakly dominated by burrobush and Parish's goldeneye, with a high diversity of other shrub species including sweetbush (*Bebbia juncea*), creosote bush (*Larrea tridentata*), bastardsage (*Eriogonum wrightii*), white ratany (*Krameria grayi*), catclaw acacia (*Acacia greggii*), brittlebush and Schott's dalea (*Psorothamnus schottii*).

Steep slopes with exposed bedrock and high surface rock fragments increases run-on, creating habitat for species typically associated with sites where additional run-on is available (e.g. catclaw acacia, Schott's dalea, sweetbush). Highly dissected topography increases microsite heterogeneity, which allows for a diverse shrub community to persist, rather than dominance by one or two species as is found on more uniform slopes.

Sandy soils over weathered bedrock on steep slopes with relatively sparse vegetation are prone to erosion. Slope instability also contributes to high species diversity and lack of strong species dominance in this site, and increases habitat suitability for short-lived shrubs with a persistent seedbank like eastern Mojave buckwheat and bastardsage, or for species with highly dispersable seed like burrobush, Parish's goldeneye, and burrobrush (*Hymenoclea salsola*).

Disturbance Dynamics

The disturbances impacting this ecological site include drought, invasion by non-native species and fire.

Drought is an important shaping force in Mojave Desert plant communities (Webb et al. 2003, Bowers 2005, Hereford et al. 2006, Miriti et al. 2007). Short-lived perennial shrubs and perennial grasses demonstrate the highest rates of mortality (Webb et al. 2003, Bowers 2005, Hereford et al. 2006, Miriti et al. 2007), and annual species remain dormant in the soil seedbank (Beatley 1969, 1974, 1976). Long-lived species are more likely to exhibit branch-pruning, and or limited recruitment during drought (e.g. Hereford et al. 2006, Miriti et al. 2007), leading to reduced cover and biomass in drought-afflicted communities.

Non-native annual grasses (red brome [*Bromus rubens*], cheatgrass [*Bromus tectorum*] and Mediterranean grass [Schismus spp.]) 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). Annual grass cover and production is directly related to winter precipitation (Beatley 1969, Brooks and Berry 2006, Hereford et al. 2006), and several years of drought may reduce the abundance of non-native annuals in the soil seedbank (Minnich 2003). The abundance and biomass of these grasses is highest on sandy soils with higher water availability and where nitrogen deposition from air pollution from adjacent urban areas is high (Rao and Allen 2010, Rao et al. 2010).

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 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). This ecological site is susceptible to high levels of invasion of non-native annual grasses due to its sandy soils, relatively cool aspects, which increase the longevity of water in the soil, and proximity to the greater Los Angeles area. However, given the overall resilience of the species of this ecological site to fire, this site is not at risk of transitioning to a new state due to repeat fire.

State and transition model

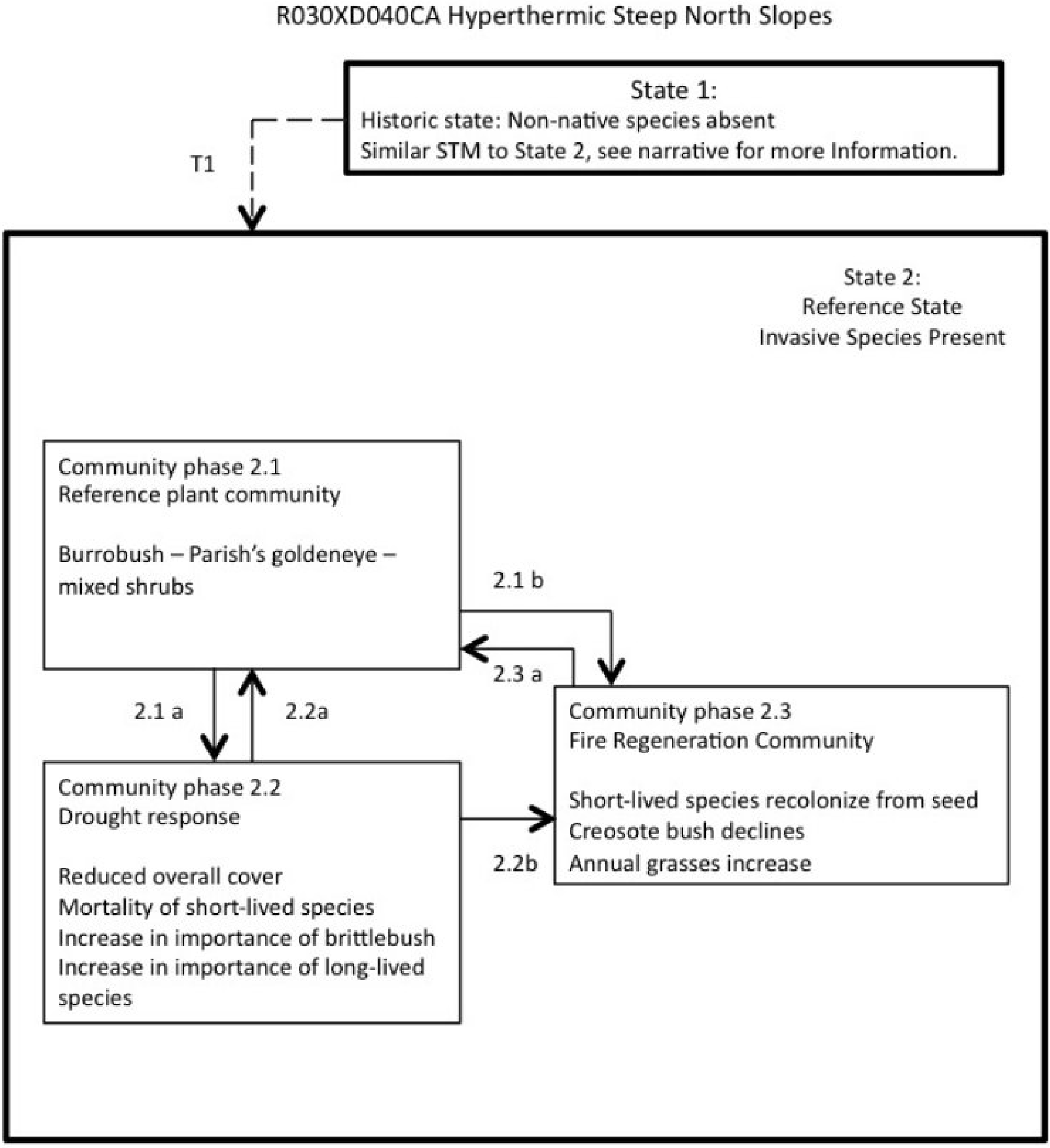

Figure 4. R030XD040CA

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 and Sonoran Deserts. 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, Mediterranean grass, and red-stem stork's bill (*Erodium cicutarium*) are naturalized at low levels in this plant community.

Community 2.1
Reference plant community

Figure 5. Community Phase 2.1

The reference plant community is weakly dominated by burrobush and Parish's goldeneye. Important secondary shrubs include sweetbush, catclaw acacia, creosote bush, brittlebush, Nevada jointfir (*Ephedra nevadensis*), bastardsage and white ratany. Schott's pygmy cedar (*Peucephyllum schottii*) may be present at low levels. Slope instability increases suitable habitat for subshrubs and perennial forbs, which include Mojave aster (*Xylorhiza tortifolia*), wishbone bush (*Mirabilis laevis* var. villosa), brownplume wirelettuce (Stephanmeria pauciflora), desert trumpet (*Eriogonum inflatum*), Cooper's dogweed (*Adenophyllum cooperi*), and narrowleaf bedstraw (*Galium angustifolium*). Annual species may be abundant and diverse in this ecological site. Species reaching high cover and biomass include Steve's dustymaiden (Chaenactis steviodes), curvenut combseed (*Pectocarya recurvata*), and bearded cryptantha (*Cryptantha barbigera*). The non-native annual forb red-stem stork's bill is typically present, as are the non-native annual grasses red brome and Mediterranean grass. Slope heterogeneity creates a highly variable plant community in this ecological site. Areas with more uniform soils have greater dominance by burrobush, brittlebush, Nevada jointfir, white ratany and creosote bush, while areas with more outcrop and erosion have a higher proportion of Schott's dalea, catclaw acacia, sweetbush, Schott's pygmy cedar and bastardsage.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Shrub/Vine	151	224	299
Forb	12	26	179
Grass/Grasslike	–	–	10
Total	**163**	**250**	**488**

Community 2.2
Drought response

This community phase is characterized by an overall decline in cover, and an increase in the importance of long-lived shrubs and brittlebush. Cover declines due to mortality of short-lived shrubs including burrobush, Parish's goldeneye, bastardsage and eastern Mojave buckwheat; branch-pruning and lack of recruitment of longer-lived species including Nevada jointfir, catclaw acacia, Schott's dalea, and creosote bush; and lack of emergence of annual forbs. Burrobush is a short-lived (< 50 years), shallow-rooted, drought-deciduous shrub that may experience high mortality in response to drought. For example, Miriti et al. (2007) observed 68% mortality in burrobush following severe drought in the Mojave Desert in 2002. Parish's goldeneye is also a short-lived, drought-deciduous shrub. It flowers profusely in response to high rainfall, and remains dormant during low-rainfall years (Green et al. 1993, Sawyer et al. 2009). It may persist through periods of drought in microsites receiving additional run-on, such as sites downslope of surface boulders (Green et al. 1993). Mortality of eastern Mojave buckwheat can be severe in response to drought; Miriti et al. (2007) measured 100% mortality during the drought of 2002. Drought response data for bastardsage is not available, but it is a short-lived shrub closely related and with similar life history to eastern Mojave buckwheat. Brittlebush is a short-lived, drought-deciduous species that can adjust degree of leaf pubescence in response to drought (Housman et al. 2002, Sandquist and Ehleringer 2003). It may suffer modest (up to 26%) mortality during severe drought (Bowers 2005), but relative to the species above, will persist in this ecological site during drought. Long-lived, deep-rooted species like creosote bush, Nevada jointfir, catclaw acacia and Schott's dalea tend to have low mortality during drought, but suffer reductions in cover due to branch die-back (Webb et al. 2003).

Community 2.3
Fire regeneration community

This ecological site is relatively resilient to the effects of fire, since most of the important species are capable of either quickly recolonizing after fire, or of resprouting. Burrobush has limited sprouting ability following fire, but relatively rapidly colonizes disturbed areas from adjacent seed sources. Parish's goldeneye has no to low sprouting ability following fire, but stands may quickly establish in newly burned areas following fire from adjacent seed sources (Sawyer et al. 2009). Eastern Mojave buckwheat has limited sprouting ability after fire, but is capable of rapid colonization from the seedbank, which does survive fire (Sawyer et al. 2009). Other short-lived species capable of quickly recolonizing from seed include sweetbush, bastardsage, Mojave aster, desert trumpet, and brownplume wirelettuce. Species capable of resprouting include catclaw acacia, Nevada jointfir, white ratany, Schott's dalea, and wishbone bush. Creosote bush is killed by moderate to severe fire, and depending on climatic conditions, may take decades to reestablish (Brown and Minnich 1986, Steers and Allen 2011). Initially, native and non-native annuals, and short-lived perennials are most abundant in the post-fire plant community. As shrub cover increases, shade-dependent seedlings of creosote bush will begin to establish. This community is an at-risk phase. Loss of vegetative cover further increases the susceptibility of this site to erosion, and high biomass of non-native annual grasses after fire increases the susceptibility of this site to repeat burning. However, given the overall resilience of the species of this ecological site to fire, this site is not at risk of transitioning to a new state due to repeat fire.

Pathway 2.1a
Community 2.1 to 2.2

This pathway occurs with severe or prolonged drought.

Pathway 2.1b
Community 2.1 to 2.3

This pathway occurs with moderate to severe fire.

Pathway 2.2a
Community 2.2 to 2.1

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

Pathway 2.2b
Community 2.2 to 2.3

This pathway occurs with moderate to severe fire. Although live annuals are largely absent from Community Phase 2.2, standing annual biomass in drought years immediately following a period of heavy precipitation poses a severe risk for fire. Cured native annual cover may pose a risk during the first year of drought, and non-native annual grasses pose a risk for three or more years (Minnich 2003, Brooks et al. 2007).

Pathway 2.3a
Community 2.3 to 2.1

This pathway occurs with time without disturbance.

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.

Additional community tables

Table 6. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Shrub/Vine					
1	**Shrubs**			150–299	
	burrobush	AMDU2	*Ambrosia dumosa*	45–112	9–16
	Parish's goldeneye	VIPA14	*Viguiera parishii*	38–67	2–6
	bastardsage	ERWR	*Eriogonum wrightii*	11–62	1–2
	catclaw acacia	ACGR	*Acacia greggii*	0–45	0–3
	creosote bush	LATR2	*Larrea tridentata*	6–38	0–5
	Nevada jointfir	EPNE	*Ephedra nevadensis*	0–37	0–3
	brittlebush	ENFA	*Encelia farinosa*	0–35	0–3
	Mojave woodyaster	XYTO2	*Xylorhiza tortifolia*	0–31	0–3
	white ratany	KRGR	*Krameria grayi*	0–24	0–2
	sweetbush	BEJU	*Bebbia juncea*	9–18	0–6
	littleleaf ratany	KRER	*Krameria erecta*	0–7	0–1
	Eastern Mojave buckwheat	ERFA2	*Eriogonum fasciculatum*	0–6	0–1
	Schott's pygmycedar	PESC4	*Peucephyllum schottii*	0–6	0–1
	Schott's dalea	PSSC5	*Psorothamnus schottii*	0–2	0–1
Grass/Grasslike					
2	**Perennial Grasses**			0–8	
	big galleta	PLRI3	*Pleuraphis rigida*	0–8	0–1
4	**Non-native annual grass**			0–45	
	red brome	BRRU2	*Bromus rubens*	0–45	0–4
	Mediterranean grass	SCHIS	*Schismus*	0–2	0–1
Forb					
3	**Native forbs**			12–179	
	Esteve's pincushion	CHST	*Chaenactis stevioides*	0–78	0–11
	curvenut combseed	PERE	*Pectocarya recurvata*	0–49	0–12
	bearded cryptantha	CRBA5	*Cryptantha barbigera*	0–40	0–1
	wishbone-bush	MILAV	*Mirabilis laevis var. villosa*	2–12	0–2
	smooth desertdandelion	MAGL3	*Malacothrix glabrata*	0–11	0–5
	narrowleaf bedstraw	GAAN2	*Galium angustifolium*	0–9	0–1
	brownplume wirelettuce	STPA4	*Stephanomeria pauciflora*	0–7	0–2
	desert trumpet	ERIN4	*Eriogonum inflatum*	0–6	0–1
	Cooper's dogweed	ADCO2	*Adenophyllum cooperi*	0–2	0–1
	brittle spineflower	CHBR	*Chorizanthe brevicornu*	0–1	0–1
	Nevin's bird's-beak	CONE	*Cordylanthus nevinii*	0–1	0–1
	pygmy poppy	ESMI	*Eschscholzia minutiflora*	0–1	0–1
	calthaleaf phacelia	PHCA2	*Phacelia calthifolia*	0–1	0–1
	chia	SACO6	*Salvia columbariae*	0–1	0–1
5	**Non-native annual forbs**			0–22	
	redstem stork's bill	ERCI6	*Erodium cicutarium*	0–22	0–2

Animal community

This ecological site provides habitat for many reptiles and mammals, including habitat for desert bighorn sheep. The species most likely to be encountered in this ecological site (based on preferred habitat characteristics) are listed below.

REPTILES:

Lizards:
Desert banded Gecko (Coleonyx variegatus variegatus)
Long-nosed leopard lizard (Gambelia wislizenii wislizenii)
Mojave collared lizard (Crotaphytus bicinctores)
Western chuckwalla (Sauromalus aster obesus)
Desert side-blotched lizard (Uta stansburiana stejnegeri)

Snakes:
Desert blind snake (Leptotyphlops humilis cahuilae)
Desert rosy boa (Lichanura trivirgata gracia)
California kingsnake (Lampropeltis getula californae)
Red coachwhip (Masticophis flagellum piceus)
Desert night snake (Hypsiglena torquata deserticola)
California kingsnake (Lampropeltis getula californae)
Western leaf-nosed snake (Phyllorynchus decurtatus perkinsi)
Sonoran gopher snake (Pituophis catenifer affinis)
Desert patch-nosed snake (Salvadora hexalepis hexalepis)
California lyre snake (Trimorphodon biscutatus vandenburghi)
Western diamondback snake (Crotalus atrox)
Colorado Desert sidewinder (Crotalus cerastes laterorepens)
Southwestern speckled rattlesnake (Crotalus mitchelli Pyrrhus)

Mammals:
Long-tailed weasel (Mustela latirosta)
California desert bat (Myotis californicus stephensi)
Western pipistrelle (Pipistrellus hesperus hesperus)
Desert big brown bat (Eptesicus fuscus pallidus)
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 (Odoceileus hemionus fuliginatus)
Desert bighorn sheep (Ovis canadensis nelson)
Southern Desert cottontail (Sylvilagus audobonii arizonae)
Whitetail antelope squirrel (Ammospermphilus leucurus leucurus)
Western Mojave ground squirrel (Spermophilus beecheyi parvulus)
Mojave rountail ground squirrel (Spermophilus tereticaudus tereticaudus)
Eastern spiny pocket mouse (Peroganthus spinatus spinatus)
Narrow-nosed (Desert) pocket mouse (Chetodipus penicillatus angustirostris)
Long-tailed pocket mouse (Chaetodipus mojavensis)
Merriam's kangaroo rat (Dipodomys deserti)
Desert kangaroo rat (Dipodomys deserti)
Desert wood rat (Neotoma fuscipes simplex)
White-throated wood rat (Neotoma albigula venusta)
Desert canyon mouse (Peromyscus crinitus stephensi)
Cactus mouse (Peromyscus eremicus eremicus)
Sonoran deer mouse (Peromyscus maniculatus sonoriensis)
Desert grasshopper mouse (Onychomys torridus pulcher)

Recreational uses

This ecological site provides aesthetic values, wilderness, and opportunities for cross-country hiking and scrambling.

Inventory data references

The following NRSC vegetation plots were used to describe this ecological site:

Community Phase 2.1:
1249810408 (Type location)
1249810401
1249810423
SMR9-008
SMR9-009 (Pit 2)
SMR9-1

Type locality

Location 1: San Bernardino County, CA	
UTM zone	N
UTM northing	550500
UTM easting	3760279
General legal description	The type location is approximately one mile north-northwest of the end of Long Canyon Road in Joshua Tree National Park.

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Contributors

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Rangeland health reference sheet

Interpreting Indicators of Rangeland Health is a qualitative assessment protocol used to determine ecosystem condition based on benchmark characteristics described in the Reference Sheet. A suite of 17 (or more) indicators are typically considered in an assessment. The ecological site(s) representative of an assessment location must be known prior to applying the protocol and must be verified based on soils and climate. Current plant community cannot be used to identify the ecological site.

Author(s)/participant(s)	
Contact for lead author	
Date	
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:**

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

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

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

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

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

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

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):**

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):**

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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:**
