

Ecological site R030XD008CA Hyperthermic Sandhill

Accessed: 05/19/2024

General information

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

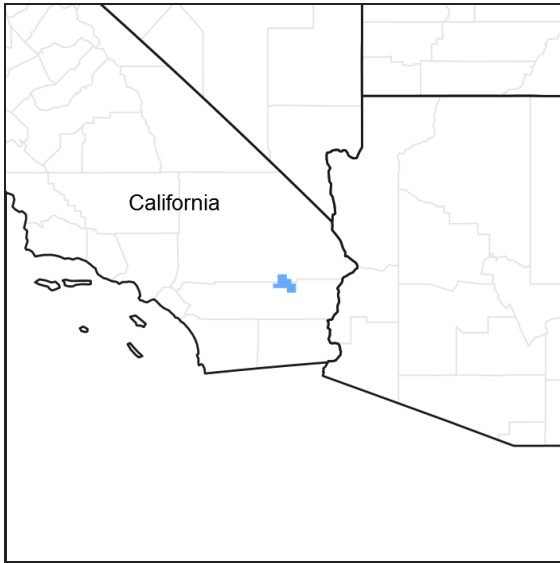


Figure 1. Mapped extent

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

MLRA notes

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

MLRA Description:

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

LRU Description:

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

widely-spaced, low-producing creosote bush (*Larrea tridentata*), burrobush (*Ambrosia dumosa*), and brittlebush (*Encelia farinosa*).

Ecological Site Concept –

This ecological site is found on stabilized dunes and steep sandsheets at elevations ranging from 950 to 2620 feet, and slopes of 8 to 30 percent. Soils are very deep fine sands that formed from eolian deposits and exhibit no soil development.

The reference community is dominated by big galleta (*Pleuraphis rigida*), and creosote bush (*Larrea tridentata*), dyebush (*Psoralea argemone*), and burrobush (*Ambrosia dumosa*) are common secondary species. Production reference value (RV) is 562 pounds per acre, and depending on precipitation and resulting annual forb production, ranges from 250 to 905 pounds per acre. Annual forbs are abundant during years of average to above average precipitation. Semi-stabilized, deep fine sands are optimum habitat for big galleta, which colonizes and stabilizes these eolian habitats with rhizomatous growth.

Data in the following sections is based on all components (major and minor) that are correlated with this ecological site.

Classification relationships

This ecological site is found within the *Pleuraphis rigida* Herbaceous Alliance (Sawyer et al. 2009), and includes the *Pleuraphis rigida*/*Larrea tridentata* Association.

Associated sites

R030XA006CA	Granitic Loam 5-7" p.z. R030XD006CA is found on adjacent fan aprons. Creosote bush (<i>Larrea tridentata</i>) is dominant.
R030XA025CA	Saline Bottom R030XD025CA is found on adjacent sandsheets. Creosote bush (<i>Larrea tridentata</i>) is dominant and big galleta (<i>Pleuraphis rigida</i>) and Emory's dyebush (<i>Psoralea argemone</i>) are important species.
R030XD001CA	Hyperthermic Dry Hills R030XD001CA is found on adjacent hill and mountain slopes. Creosote bush (<i>Larrea tridentata</i>) and burrobush (<i>Ambrosia dumosa</i>) are dominant.
R030XD003CA	Hyperthermic Steep South Slopes R030XD003CA is found on adjacent hill and mountain slopes. Brittlebush (<i>Encelia farinosa</i>) and creosote bush (<i>Larrea tridentata</i>) are dominant.
R030XD004CA	Low-Production Hyperthermic Hills R030XD004CA is found on adjacent hillslopes. Creosote bush (<i>Larrea tridentata</i>) is dominant.
R030XD014CA	Hyperthermic Sandy Plains R030XD014CA is found on adjacent sandsheets. Big galleta (<i>Pleuraphis rigida</i>) is dominant.
R030XY023CA	Hyperthermic Dissected Shallow Pediment R030XD023CA is found on adjacent pediments. Mojave indigobush (<i>Psoralea argemone</i>) and desertsenna (<i>Senna armata</i>) are dominant.
R030XD042CA	Hyperthermic Shallow To Moderately Deep Fan Remnants R030XD042 is found on adjacent fan remnants. Vegetation is sparse and dominated by creosote bush (<i>Larrea tridentata</i>).

Similar sites

R030XD025CA	Hyperthermic Sandsheets R030XD025CA is found on less steep sandsheets (slopes < 8 percent). Creosote bush (<i>Larrea tridentata</i>) dominates and big galleta (<i>Pleuraphis rigida</i>) and Emory's dyebush (<i>Psoralea argemone</i>) are important species.
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R030XD014CA	Hyperthermic Sandy Plains R030XD014CA is found on less steep and less stable sandsheets. Production is higher and big galleta (<i>Pleuraphis rigida</i>) is dominant.
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Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) <i>Larrea tridentata</i> (2) <i>Ambrosia dumosa</i>
Herbaceous	(1) <i>Pleuraphis rigida</i>

Physiographic features

This ecological site is found on stabilized dunes and steep sandsheets. Elevations range from 950 to 2620 feet, and slopes are 8 to 30 percent. Runoff class is low.

Table 2. Representative physiographic features

Landforms	(1) Dune (2) Sand sheet
Flooding frequency	None
Ponding frequency	None
Elevation	290–799 m
Slope	8–30%
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 65 percent falling in winter between November and March. The mean annual precipitation is 3 to 5 inches and mean annual air temperature is 68 to 73 degrees F. The frost free period is 300 to 340 days.

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

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

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

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

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

Table 3. Representative climatic features

Frost-free period (average)	340 days
Freeze-free period (average)	0 days
Precipitation total (average)	127 mm

Influencing water features

Soil features

The soils associated with this ecological site are very deep sands that formed from eolian deposits derived from mixed sources, granitoid or igneous parent material. Surface textures are fine sand with fine sand subsurface textures. Gravel sized (< 3 inch diameter) surface rock fragments range from 0 to 60 percent, with larger fragments typically absent. Subsurface gravel sized fragments by volume range from 0 to 5 percent, with no larger fragments present (for a depth of 0 to 59 inches). 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: Dalelake (mixed, hyperthermic Typic Torripsamments).

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

2716;Dalelake complex, 4 to 30 percent slopes;Dalelake;;75

2717;Dalelake-Rock outcrop-Buzzardsprings association, 4 to 30 percent slopes;Dalelake;;40

1230;Jadestorm-Rock outcrop complex, 30 to 75 percent slopes;Dalelake;;1

2715;Dalelake-Sheephole-Pintobasin complex, 2 to 8 percent slopes;Dalelake;;6

Table 4. Representative soil features

Parent material	(1) Eolian deposits–granite
Surface texture	(1) Fine sand
Family particle size	(1) Sandy
Drainage class	Somewhat excessively drained
Permeability class	Rapid
Soil depth	150 cm
Surface fragment cover <=3"	0–60%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	5.08–7.87 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)	6.6–8.4
Subsurface fragment volume <=3" (Depth not specified)	0–5%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

Abiotic Factors

The abiotic factors driving this site are a stable eolian environment with hyperthermic soil temperatures. This ecological site occurs on stable sand dunes and steep sandsheets on soils with a hyperthermic soil

temperature regime. Stable or dormant dunes and sandsheets are those where perennial vegetation cover is well-developed, and current rates of sand movement and deposition are low, but may become active as a result of minor climate change or disturbance (Lancaster 1994). The semi-active nature of these landforms means that factors such as burial or abrasion by blowing sand does not restrict vegetation to psammophiles (plants restricted to active eolian environments), but does restrict establishment of most species.

The plant community is strongly dominated by big galleta, a highly drought-tolerant C4 grass that occurs on a range of soil types, but is dominant only on sandy soils where soil moisture is most readily available (McAuliffe 1994, Austin et al. 2004). Big galleta colonizes and stabilizes semi-stabilized eolian habitats with rhizomatous growth (Matthews 2000), and dominance by big galleta on these habitats is an indicator of eolian stability. Big galleta exhibits rapid growth and high productivity in response to temporal high moisture availability in these deep sands (Austin et al. 2004). In arid regions, sandy soils have greater water availability because water quickly infiltrates through sand to depths where it is not lost to evaporation, and because sandy surfaces form a physical crust that further reduces evaporation (Noy-Meir 1973, Hamerlynk et al. 2002). Thus, in desert regions, where the availability of soil water is the critical resource shaping plant communities in arid environments, productivity is higher on sandy soils (Noy-Meir 1973, McAuliffe 1994, Martre et al. 2002, Hamerlynk and McAuliffe 2002, Austin et al. 2004).

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, and once established in this ecological site, individuals are large and productive. Creosote remains a secondary species in this site however, because of soil moisture restrictions and seedling sand abrasion during the establishment phase. Creosote bush establishes in response to warm season moisture; given limited warm season rain in this ecological site, the rapid infiltration of water and rapidly drying soil surfaces during the warm season, and increased erosion and abrasion during the summer, opportunities for successful establishment of creosote seedlings are rare. Burrobush is a drought-deciduous, shallow-rooted shrub commonly co-occurring with creosote bush. It is typically more abundant on soils where the development of restrictive soil horizons (such as an argillic or petrocalcic horizons) increases the temporal availability of water available at shallow soil depths (Hamerlynk et al. 2002, Hamerlynk and McAuliffe 2008). The stabilized dunes that this site occurs on are capable of retaining soil water longer than adjacent sandsheets (Barrows et al. 2009), which enhances habitat for burrobush. Dyebush is a small, drought-deciduous shrub that reaches highest abundance on sandsheets, dunes and washes, and has a largely Sonoran Desert distribution. Leaves and stems are densely tomentose, which is an adaptation to the extreme heat of open sandy soil surfaces. This ecological site is at the arid extent of the range of dyebush; consequently, it has relatively low density and low production in this site.

Annual species are an important component of the vegetation community of this ecological site, comprising up to 40 percent of biomass production during years of average to above average precipitation. Annual species, which can complete their life cycle during brief and intermittent periods of high moisture availability, then remain dormant until the next favorable period, are well-adapted to eolian environments.

Disturbance dynamics

Drought, invasion by nonnative species, and fluctuations in sand erosion and deposition are the primary disturbance affecting this ecological site.

Drought is an important shaping force in desert plant communities (Webb et al. 2003, Bowers 2005, Hereford et al. 2006, Miriti et al. 2007, Hamerlynk and McAuliffe 2008). The effects of drought may be particularly severe in deep sandy soils with little horizon development. High availability of soil moisture during normal to high precipitation conditions can lead to high growth rates and large individuals whose size cannot be sustained when water is no longer available (Hamerlynk and McAuliffe 2008). Short-lived shrubs and perennial grasses demonstrate the highest rates of drought-induced 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, 1974, 1976). Long-lived species are more likely to exhibit branch-pruning with limited recruitment during drought (Hereford et al. 2006, Miriti et al. 2007).

Severe drought, especially if coupled with additional disturbance such as off-road vehicle use, increases the susceptibility of soils to wind erosion due to loss of stabilizing plant cover, and increased erodibility of dry soils (Cooke et al. 1993, Lancaster 1994). This may trigger a transition to an altered state where stabilized sand surface become active. Wind strength, precipitation, vegetation cover, and disturbance (off-road vehicle use, fire, grazing, farming) influence the degree to which sand depositional surfaces are active or stable (Cooke et al. 1993, Lancaster

1994). Semi-stabilized sand surfaces may alternatively become more stable with changes environmental changes resulting in increased vegetation cover, changes in wind environment or decreased deposition. Increases in vegetation cover and decreases in deposition are generally due to a wetter climate (Cooke et al. 1993, Lancaster 1994).

Non-native annual species such as red brome (*Bromus rubens*), Mediterranean grass (*Schismus barbatus*), redstem stork's bill (*Erodium cicutarium*) and Asian mustard (*Brassica tournefortii*) have become naturalized 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). 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). Asian mustard and Russian thistle (*Salsola tragus*) are significant threats in eolian habitats, with Russian thistle potentially abundant on disturbed areas or more active sand. Asian mustard may become dominant on stabilized sandsheets during years of above average precipitation, during which time it has detrimental effects on the abundance and fecundity of native annuals (Barrows et al. 2009). Asian mustard is less dominant on semi-stabilized dunes (Barrows et al. 2009); probably because of increased seed burial depths in these habitats from which seedlings cannot emerge (Abella et al. 2011).

State and transition model

R030XD008CA Hyperthermic sandhill

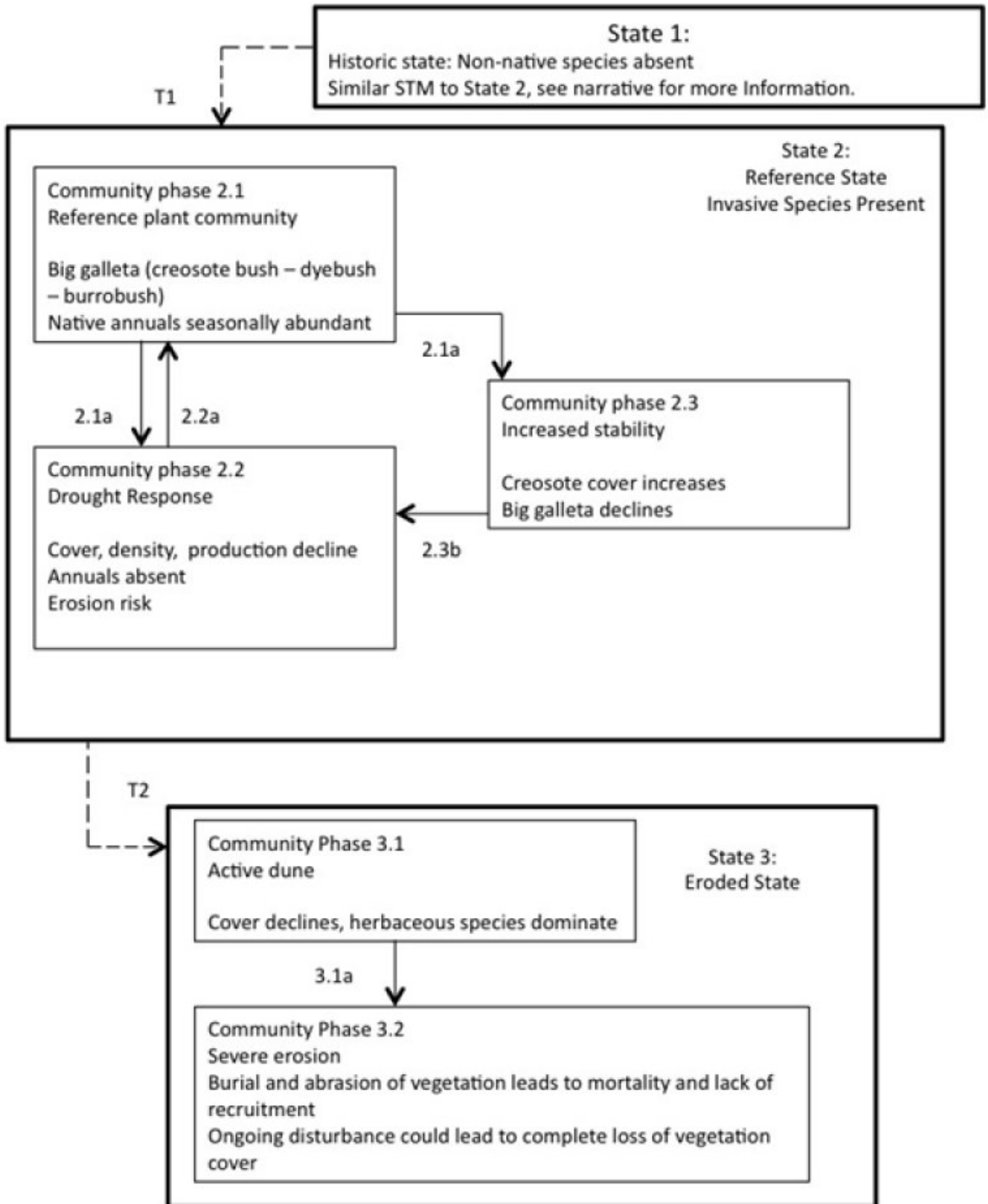


Figure 4. R030XD008CA

**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 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 and Asian mustard 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 ecological site is dominated by big galleta (*Pleuraphis rigida*). Creosote bush, dyebush, and burrobrush, are common secondary species. During years of average to above average precipitation, winter annuals are abundant in intershrub spaces; common species include pincushion flower (*Chaenactis fremontii*), cryptantha (*Cryptantha* spp.), small wirelettuce (*Stephanomeria exigua*), and bristly fiddleneck (*Amsinckia tessellata*). The non-native annuals Mediterranean grass and Asian mustard may also be abundant with average precipitation, however they will not dominate the annual plant community, unless there is more than average precipitation. Although the dunes and sandsheets that this ecological site occurs on are stable, there is still active localized movement of sand in intergrass patches, and deposition still occurs. This favors the continued dominance of big galleta, and reduces shrub establishment. Russian thistle has the potential to dominate this plant community if it becomes established. This species may be successfully controlled by hand weeding if caught early; so early detection monitoring and eradication are essential.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	252	378	504
Forb	–	168	392
Shrub/Vine	28	84	118
Total	280	630	1014

Table 6. Ground cover

Tree foliar cover	0%
Shrub/vine/liana foliar cover	5-10%
Grass/grasslike foliar cover	5-10%
Forb foliar cover	15-20%
Non-vascular plants	0%

Biological crusts	0%
Litter	15-20%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	45-50%

Community 2.2

Drought response

This community phase is characterized by declines in cover and production due to mortality and dieback of big galleta and burrobush, branch-pruning of creosote bush and dyebush, and lack of emergence of annual species. This is an at-risk phase, as the increase in bare ground increases the susceptibility of this site to wind erosion. Thus, any additional disturbance threatens to transition this community phase to an eroded state, where significant loss of ecological function has occurred.

Community 2.3

Stable phase

This community phase is characterized by increases in creosote bush cover, and declines in big galleta. It occurs with conditions that favor the establishment of creosote bush, such as successive years of high warm season precipitation, and decreases in wind intensity. Stabilization is more likely to occur on lee slopes (slopes sheltered from the wind).

Pathway 2.1a

Community 2.1 to 2.2

This pathway occurs with prolonged or severe drought.

Pathway 2.1b

Community 2.1 to 2.3

This pathway may occur over time with conditions conducive to creosote bush establishment, such as multiple years of high warm season precipitation.

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 2.2

This pathway occurs with prolonged or severe drought.

State 3

Eroded State

This state is characterized by increased rates of erosion, with an active eolian environment. This state has been significantly altered from the natural range of variability found in States 1 and 2. Increased wind erosion decreases the suitability of this ecological site for vegetation, killing established or young individuals by abrasion and burial (Okin et al. 2001). Ongoing disturbance could result in complete loss of vegetation cover. We do not have data for this state, and further research is necessary to describe the community phases and successional pathways that

may exist within the state.

Community 3.1 **Active dune**

This community phase is characterized by active dune dynamics. Vegetation cover is significantly lower than in State 2, and herbaceous cover is dominant. Psammophiles such as the native perennial, desert panicgrass (*Panicum urvilleanum*) may establish.

Community 3.2 **Severe erosion**

This community phase is characterized by severe erosion, and a near to complete loss of perennial vegetation cover. Annuals may be sparsely seasonally present.

Pathway 3.1 **Community 3.1 to 3.2**

This pathway occurs with ongoing 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 7. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Shrub/Vine					
1	Shrubs			28–118	
	creosote bush	LATR2	<i>Larrea tridentata</i>	28–84	4–8
	burrobush	AMDU2	<i>Ambrosia dumosa</i>	0–56	0–4
	California croton	CRCA5	<i>Croton californicus</i>	0–28	0–2
	dyebush	PSEM	<i>Psoralea argemone</i>	0–28	0–2
	Wiggins' cholla	CYEC3	<i>Cylindropuntia echinocarpa</i>	0–22	0–1
	white ratany	KRGR	<i>Krameria grayi</i>	0–11	0–1
Grass/Grasslike					
2	Perennial grasses			252–504	
	big galleta	PLRI3	<i>Pleuraphis rigida</i>	252–504	10–20
5	Non-native annual grasses			0–112	
	common Mediterranean grass	SCBA	<i>Schismus barbatus</i>	0–112	0–10
Forb					
3	Native forbs			0–318	
	pincushion flower	CHFR	<i>Chaenactis fremontii</i>	0–168	0–15
	cryptantha	CRYPT	<i>Cryptantha</i>	0–112	0–10
	small wirelettuce	STEX	<i>Stephanomeria exigua</i>	0–22	0–2
	bristly fiddleneck	AMTE3	<i>Amsinckia tessellata</i>	0–11	0–1
	birdcage evening primrose	OEDE2	<i>Oenothera deltooides</i>	0–1	0–2
	desert palafox	PAAR8	<i>Palafoxia arida</i>	0–1	0–1
	suncup	CAMIS	<i>Camissonia</i>	0–1	0–1
	soft prairie clover	DAMO2	<i>Dalea mollissima</i>	0–1	0–1
4	Non-native annual forbs			0–56	
	Asian mustard	BRTO	<i>Brassica tournefortii</i>	0–56	0–3

Animal community

This ecological site is preferred habitat for the threatened desert tortoise (*Gopherus agassizii agassizii*). Creosote bush shrublands provides a home for an abundance of specialist insect species, for example, creosote bush flowers provide nutrition for over twenty species of bees, and the creosote bush grasshopper (*Boottettix argentatus*) feeds solely on creosote leaves (Pavlik 2008). A diverse assemblage of reptiles and mammals are likely to be found in this site. These may include (based on habitat preferences):

Lizards:

Mojave Desert tortoise (*Gopherus agassizii agassizii*)
 Desert banded Gecko (*Coleonyx variegatus variegatus*)
 Northern desert iguana (*Dipsosaurus dorsalis dorsalis*)
 Long-nosed leopard lizard (*Gambelia wislizenii wislizenii*)
 Western chuckwalla (*Sauromalus ater obesus*)
 Mojave zebra-tailed lizard (*Callisaurus draconoides rhodostictus*)
 Southern desert horned lizard (*Phrynosoma platyrhinos calidiarum*)
 Western brush lizard (*Urosaurus graciosus graciosus*)
 Desert side-blotched lizard (*Uta stansburiana stejnegeri*)
 Great basin whiptail (*Aspidoscelis tigris tigris*)

Snakes:

Desert glossy snake (*Arizona occidentalis eburnata*)

Mojave shovel-nosed snake (*Chionactis occipitalis occipitalis*)
California kingsnake (*Lampropeltis getula californae*)
Red coachwhip (*Masticophis flagellum piceus*)
Western leaf-nosed snake (*Phyllorhynchus decurtatus perkinsi*)
Sonoran gopher snake (*Pituophis catenifer affinis*)
Western long-nosed snake (*Rhinocheilus lecontei lecontei*)
Desert patch-nosed snake (*Salvadora hexalepis hexalepis*)
Smith's black-headed snake (*Tantilla hobartsmithi*)
Western diamondback snake (*Crotalus atrox*)
Mojave Desert sidewinder (*Crotalus cerastes cerastes*)
Colorado Desert sidewinder (*Crotalus cerastes laterorepens*)

The following mammals are likely to occur in this ecological site:

American badger (*Taxidea taxus berlandieri*)
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*)
Desert kit fox (*Vulpes macrotis arsipus*)
Southern Desert cottontail (*Sylvilagus audobonii arizonae*)
Desert blacktail jackrabbit (*Lepus californicus deserticola*)
Whitetail antelope squirrel (*Ammospermophilus leucurus leucurus*)
Mojave roundtail ground squirrel (*Spermophilus tereticaudus tereticaudus*)
Mojave pocket gopher (*Thomomys bottae mojavensis*)
Coachella pocket gopher (*Thomomys bottae rupestris*)
Eastern spiny pocket mouse (*Perognathus spinatus spinatus*)
Pallid (San Diego) pocket mouse (*Chaetodipus fallax pallidus*)
Mojave little pocket mouse (*Perognathus longimembris longimembris*)
Merriam's kangaroo rat (*Dipodomys merriami merriami*)
Desert kangaroo rat (*Dipodomys deserti*)
Desert wood rat (*Neotoma fuscipes simplex*)
Sonoran deer mouse (*Peromyscus maniculatus sonoriensis*)
Desert grasshopper mouse (*Onychomys torridus pulcher*)
Desert shrew (*Notiosorex crawfordi crawfordi*)

Recreational uses

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

Other products

Creosote bush is an important medicinal plant for Native Americans. It has a very wide range of uses from treatment bowl complaints, 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>.

Dyebush branches are steeped in water to make a yellow-brown dye for coloring deerskins.

Other information

Dyebush is host to the unusual stem parasite Thurber's stemsucker (*Pilostyles thurberi*).

Inventory data references

Community phase 2.1:

11CA795128 (Type location)

D1-E

Y-13

225-7-6

Type locality

Location 1: San Bernardino County, CA	
UTM zone	N
UTM northing	3870616
UTM easting	612730
General legal description	The type location is in the Devil's Playground area of the Mojave National Preserve, approximately 6.5 miles west of the intersection of Kelbaker and Kelso-Cima Road.

Other references

Abella, S. R., A. C. Lee, and A. A. Suazo. 2011. Effects of burial depth and substrate on the emergence of *Bromus rubens* and *Brassica tournefortii*. *Bulletin of the Southern California Academy of Science* 110:17-24.

Austin, A. T., L. Yahdjian, J. M. Stark, J. Belnap, A. Porporato, U. Norton, D. A. Ravetta, and S. M. Scheaffer. 2004. Water pulses and biogeochemical cycles in arid and semiarid ecosystems. *Oecologia* 141:221-235.

Barrows, C. W., E. B. Allen, M. L. Brooks, and M. F. Allen. 2009. Effects of an invasive plant on a desert sand dune landscape. *Biological Invasions* 11:673-686.

Beatley, J. C. 1969. Dependence of desert rodents on winter annuals and precipitation. *Ecology* 50:721-724.

Beatley, J. C. 1974. Effects of rainfall and temperature on the distribution and behavior of *Larrea tridentata* (Creosote-bush) in the Mojave Desert of Nevada. *Ecology* 55:245-261.

Beatley, J. C. 1976. Rainfall and fluctuating plant populations in relation to distributions and numbers of desert rodents in southern Nevada. *Oecologia* 24:21-42.

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

Brooks, M. L. 1999. Habitat invasibility and dominance by alien annual plants in the western Mojave Desert. *Biological Invasions* 1:325-337.

Brooks, M. L. and K. H. Berry. 2006. Dominance and environmental correlates of alien annual plants in the Mojave Desert, USA. *Journal of Arid Environments* 67:100-124.

Cooke, R. U., A. Warren, and A. S. Goudie. 1993. *Desert Geomorphology*. UCL Press, London.

D'Antonio, C. M. and P. M. Vitousek. 1992. Biological invasions by exotic grasses, the grass/fire cycle, and global change. *Annual Review of Ecology and Systematics* 23:63-87.

Hamerlynk, E. P. and J. R. McAuliffe. 2008. Soil-dependent canopy die-back and plant mortality in two Mojave Desert shrubs. *Journal of Arid Environments* 72:1793-1802.

Hamerlynk, E. P., J. R. McAuliffe, E. V. McDonald, and S. D. Smith. 2002. Ecological responses of two Mojave desert shrubs to soil horizon development and soil water dynamics. *Ecology* 83:768-779.

- Hereford, R., R. H. Webb, and C. I. Longpre. 2006. Precipitation history and ecosystem response to multidecadal precipitation variability in the Mojave Desert region, 1893-2001. *Journal of Arid Environments* 67:13-34.
- Lancaster, N. 1994. Controls on aeolian activity: some new perspectives from the Kelso Dunes, Mojave Desert, California. *Journal of Arid Environments* 27:113-125.
- Martre, P., G. B. North, E. G. Bobich, and P. S. Nobel. 2002. Root deployment and shoot growth for two desert species in response to soil rockiness. *American Journal of Botany* 89:1933-1939.
- Matthews, Robin F. 2000. *Pleuraphis rigida*. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: <http://www.fs.fed.us/database/feis/> [2012, April 4].
- McAuliffe, J. R. 1994. Landscape evolution, soil formation, and ecological patterns and processes in Sonoran Desert bajadas. *Ecological Monographs* 64:112-148.
- Minnich, R. A. and A. C. Sanders. 2000. *Brassica tournefortii* (Gouan.) Sahara mustard. Pages 68-72 in C. Bossard, M. Hoshovsky, and J. Randall, editors. Noxious wildland weeds of California. University of California Press, Berkeley, CA.
- Miriti, M. N., S. Rodriguez-Buritica, S. J. Wright, and H. F. Howe. 2007. Episodic death across species of desert shrubs. *Ecology* 88:32-36.
- Norton, J. B., T. A. Monaco, and U. Norton. 2007. Mediterranean annual grasses in western North America: kids in a candy store. *Plant Soil* 298:1-5.
- Noy-Meir, I. 1973. Desert ecosystems: environment and producers. *Annual Review of Ecology and Systematics* 4:25-51.
- Okin, G. S., B. Murray, and W. H. Schlesinger. 2001. Degradation of sandy arid shrubland environments: observations, process modelling, and management implications. *Journal of Arid Environments* 47:123-144.
- Pavlik, B. M. 2008. *The California Deserts: an ecological rediscovery*. University of California Press, Ltd., Berkeley and Los Angeles, California.
- Reid, C. R., S. Goodrich, and J. E. Bowns. 2006. Cheatgrass and red brome: history and biology of two invaders. Pages 27-32 in *Shrublands under fire: disturbance and recovery in a changing world*. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Cedar City, Utah.
- Rickard, W. H. and J. C. Beatley. 1965. Canopy-coverage of the desert shrub vegetation mosaic of the Nevada test site. *Ecology* 46:524-529.
- Sawyer, J. O., T. Keeler-Woolf, and J. M. Evans. 2009. *A manual of California vegetation*. 2nd edition. California Native Plant Society, Sacramento, California.
- Webb, R. H., M. B. Muroy, T. C. Esque, D. E. Boyer, L. A. DeFalco, D. F. Haines, D. Oldershaw, S. J. Scoles, K. A. Thomas, J. B. Blainey, and P. A. Medica. 2003. Perennial vegetation data from permanent plots on the Nevada Test Site, Nye County, Nevada. U.S. Geological Society, Tucson, AZ.

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Rangeland health reference sheet

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

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

Indicators

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

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

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

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

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

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

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

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

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

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial**

distribution on infiltration and runoff:

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

12. **Functional/Structural Groups (list in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to):**

Dominant:

Sub-dominant:

Other:

Additional:

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):**
-

14. **Average percent litter cover (%) and depth (in):**
-

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):**
-

16. **Potential invasive (including noxious) species (native and non-native). List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site:**
-

17. **Perennial plant reproductive capability:**
-