USDA Natural Resources Conservation Service

Ecological site R030XB187CA
Rarely Flooded Warm Thermic Ephemeral System

Last updated: 10/21/2024
Accessed: 05/13/2025

General information

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

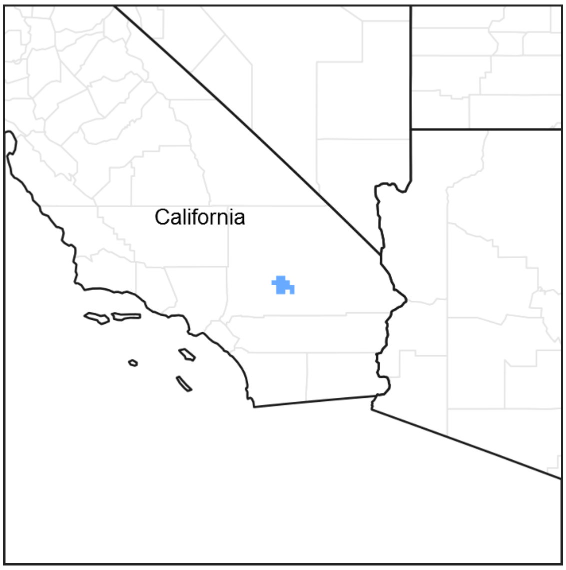

Figure 1. Mapped extent

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

MLRA notes

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

MLRA statement:
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.

Ecological site concept

Ecological Site Concept:
This ecological site occurs on rarely flooded drainageways. These are first order drainageways with a zone of active scouring. These small drainages generally develop from surface flow across alluvial fans, but may also receive additional run-off from small mountain drainageways. This ecological site is associated with very deep, somewhat excessively drained soils that have sand or loamy sand textures throughout. This site is associated with a rare flooding regime, where flash flooding may occur 1 to 5 times in 100 years. However, even minimal precipitation will drain to this site, providing higher water availability in the drainageway than the surrounding fans. This site supports

a productive and diverse shrub community composed of a mix of long and short-lived species. Creosote bush (Larrea tridentata) and burrobrush (Hymenoclea salsola) dominate. Elevations range from 2,140 to 4,170 feet, with 2 to 4 percent slopes.

Data ranges in the physiographic data, climate data, water features, and soil data sections of this Ecological Site Description are based on major and minor components, since it is often only associated with minor components.

This is a group concept and provisional STM that also covers the following ecological sites: R030XB136CA, R030XY159CA R030XY223CA R030XB011CA R030XY136CA

Associated sites

R030XB192CA	**Very Rarely Flooded, Warm Thermic Fan Piedmonts** This ecological site is not situated in a drainageway, and is dominated by creosote bush and desert senna.
R030XB005NV	**Arid Active Alluvial Fans** This ecological site is on alluvial fans adjacent to this site at the lower elevations. Creosote bush and burrobush dominate.
R030XB174CA	**Sandy Fan Aprons** This ecological site is on adjacent alluvial fans, with deep to very deep soils with creosote bush and Joshua Tree.
R030XB183CA	**Loamy Very Deep Fan Remnants** This ecological site is on alluvial fans at the upper elevations of this site with blackbrush and creosote bush.
R030XB191CA	**Sandy Pediment** This ecological site is on pediments with shallow to very shallow soils, with big galleta, creosote bush and blackbrush.

Similar sites

R030XY202CA	**Very Rarely To Rarely Flooded Thermic Ephemeral Stream** This very rarely flooded ephemeral stream is at the upper headwaters, with limited catchment size, Nevada jointfir is common.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Larrea tridentata* (2) *Hymenoclea salsola*
Herbaceous	Not specified

Physiographic features

This ecological site occurs in drainageways on fan piedmonts. It occurs at elevations of 2,120 to 4,170 feet and slopes range from 2 to 4 percent.

Table 2. Representative physiographic features

Landforms	(1) Drainageway
Flooding duration	Extremely brief (0.1 to 4 hours) to very brief (4 to 48 hours)
Flooding frequency	None to rare
Ponding frequency	None
Elevation	646–1,271 m
Slope	2–4%

Aspect	Aspect is not a significant factor

Climatic features

The climate is arid with hot, dry summers and warm, moist winters. The mean annual precipitation is 76 to 178 millimeters (3 to 7 inches); mean annual air temperature is 12.7 to 20 degrees C. (55 to 68 degrees F.), and the frost-free season is 210 to 320 days.

Freeze free period was not entered, thus defaults to 0.

The Joshua Tree weather station is nearby this ecological site and within the elevation range of this ecological site, but is lacking precipitation data for the years between 1975 and 2008.

Table 3. Representative climatic features

Frost-free period (average)	320 days
Freeze-free period (average)	
Precipitation total (average)	1,727 mm

Influencing water features

This ecological site exists in small drainageways which are influenced by rare flash flood events.

Soil features

This ecological site is associated with the Morongo soil series, and only exists as a 5 percent or less component within a mapunit. The Morongo soils are alluvial soils derived from granitoid and/or gneissic rocks. These soils are very deep with sand and loamy sand surface textures, and sand, loamy sand, and gravelly loamy sand subsurface textures (for a depth of 0.8 to 60 inches). For rock fragments less than 3 inches in diameter, the percent surface cover ranges from 40 to 85 percent, and subsurface volume ranges from 5 to 15 percent (for a depth of 0.8 to 60 inches). For rock fragments greater than 3 inches in diameter, the percent surface cover ranges from 0 to 5 percent, and are absent in subsurface horizons. This soil is somewhat excessively drained with moderate to rapid permeability. The Morongo soils are classified as mixed, thermic Typic Torripsamments.

This ecological site has been correlated to the following map units and soil components in the Joshua Tree National Park Soil Survey (CA794):

Map unit, percent, component and phase
3677, 2 Morongo rarely flooded
3683, 3 Morongo rarely flooded
3684, 5 Morongo rarely flooded
4245, 3 Morongo rarely flooded

Table 4. Representative soil features

Parent material	(1) Alluvium–granite
Surface texture	(1) Sand (2) Loamy sand
Family particle size	(1) Sandy
Drainage class	Somewhat excessively drained
Permeability class	Moderate to rapid
Soil depth	152 cm
Surface fragment cover <=3"	40–85%

Surface fragment cover >3"	0–5%
Available water capacity (0-101.6cm)	4.06–7.11 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)	7.6–8.2
Subsurface fragment volume <=3" (Depth not specified)	5–15%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

This ecological site describes the dynamics of first and second order ephemeral stream systems. This ecological site occurs on broad low relief drainageways, which experience rare, low energy flood events. This site has thermic soil temperatures, with 3 to 7 inches mean annual precipitation (MAP). Elevations range from 2,120 to 4,170 feet. The distinguishing features are the small drainage size (generally less than 800 acres based on preliminary GIS analysis of catchment size) and a rare flooding regime with creosote bush and burrobrush dominant.

Soil disturbance from flash flood events is the primary driver of plant community dynamics within this ecological site. Ephemeral streams lack permanent flow except in response to rainfall events (Bull 1997, Levick et al. 2008). These ephemeral streams are characterized by extreme and rapid variations in flooding regime, and a high degree of temporal and spatial variability in hydrologic processes (Bull 1997, Stanley et al. 1997, Levick et al. 2008, Shaw and Cooper 2008).

This broad low energy wash typically occurs as side channel to a larger ephemeral stream, primarily the Large Thermic Ephemeral Stream System, R030XY167CA. R030XY167CA occurs in large drainageways, and desert willow is a distinguishing species. In some instances, this ecological site does not connect with a larger drainage system, and surface flow eventually infiltrates into the substratum, where the active channel is replaced with upland vegetation.

This site can experience channel avulsion (defined as the “diversion of the majority of the surface flow to a different channel, with total or partial abandonment of the original channel” [(Field 2001)]). As sediment deposits in the active drainageway the likelihood of channel avulsion increases because of decreased drainageway volume. Cycles of channel avulsion on alluvial fans are an ongoing and a long-term process in the development of alluvial fans, and can occur after any substantial overland flow event when existing channel capacity is rapidly and dramatically exceeded.

The dominant plants in this ecological site are creosote bush and burrobrush, with peach thorn (*Lycium cooperi*), desertsenna (*Senna armata*), and jojoba (*Simmondsia chinensis*) common secondary species. Creosote bush is present along the channel margins of this site or on raised bars within the active flooding zone. Individuals are larger and more productive in the wash than in neighboring alluvial fans, without the extra run-on. Burrobrush is a pioneer species that can quickly colonize disturbed areas, and may establish in ephemeral washes and upland sites (Sawyer et al. 2009). In this ecological site, it is dominant in channels where flooding frequency is highest. This drought-tolerant vegetation that exists along the ephemeral streams is referred to as xeroriparian vegetation. It is distinct from the surrounding landforms due to a difference in species composition, size, and production (Johnson et al. 1984, Levick et al. 2008). Xeroriparian vegetation is present because the increased availability of water and flood disturbances in these drainageways. Phreatophytes, deep rooted species that primarily rely on a deep water source, such as catclaw acacia (*Acacia greggii*) and desert willow (*Chilopsis linearis*), are generally absent from this ecological site. Catclaw acacia and desert willow also require more frequent flooding for seedling establishment.

Other disturbances such as drought, fire, and human hydrologic alterations can affect the community composition and/or hydrologic process of this site. Drought is common in the desert, and can cause mortality or die-back of vegetation. Decreased vegetative cover can lead to increased erosion and change sediment deposition patterns, possibly increasing the chance of channel migration.

Historically fire was very uncommon in these ephemeral drainages; however the presence of continuous and flashy fuels from non-native grasses in adjacent upland sites can increase the possibility of fire. Invasion by non-native annual grasses has increased the flammability of desert vegetation communities (Brooks 1999, Brooks et al. 2004), and after fire, Mojave Desert ecosystems appear to be more susceptible to invasion by exotic grasses, leading to a grass-fire cycle (D'Antonio and Vitousek 1992). Very wet (El Nino) years followed by severe drought produce conditions where large areas where creosote scrub burn (Brown and Minnich 1986, DeFalco et al. 2010).

When modifications affect the hydrologic function of this ephemeral stream system, this ecological site has the potential to transition to a hydrologically altered state (State 3). Once this threshold is crossed, it is extremely difficult to repair the hydrologic system.

Modifications to hydrology such as surface flow alterations, ground water depletion, and loss of the xeroriparian vegetation can have irreversible impacts on hydrologic processes (Nishikawa et al. 2004, Levick et al. 2008). An increase in cover of impermeable surfaces (such as pavement, homes, malls, etc.) reduces the amount of runoff that can infiltrate into the soil creating higher surface runoff and greater peak flows. The runoff is collected in ditches, culverts, and drainage networks, and diverted to the nearest ephemeral stream. In some areas, retaining walls are built along ephemeral streams to reduce damage to property from flood events. These confined channels reduce the ability for the stream to spread out and decrease flow velocity to allow sediment deposition. As a result, the channels will generally incise, with a higher volume of concentrated flows.

State and transition model

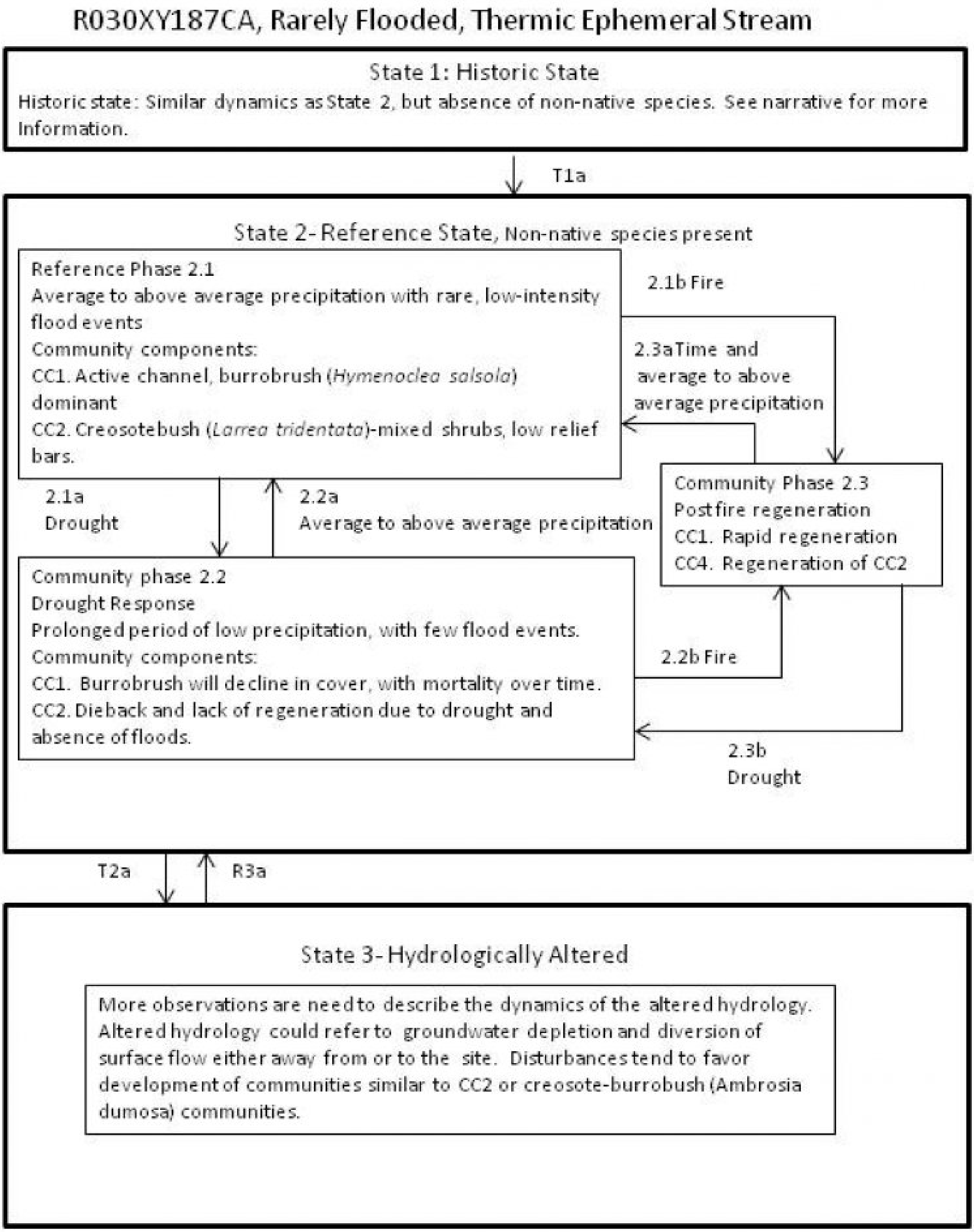

Figure 3. R030XY187CA

State 1
Historic State

State 1 represents the historic-natural condition for this ecological site. It is similar to State 2, but has only native species. If we were to include dynamics for this state it would be the same as displayed in State 2. The presence of non-native species is minimal in State 2, and has not altered the hydrology or fire frequency.

State 2
Reference State

This state represents the most common and most ecologically intact condition for this ecological site at the present time.

Community 2.1
Reference Phase

Figure 4. CC1

Figure 5. CC2

Figure 6. CC2, high production

This community phase is dependent upon unimpaired hydrologic function and average to above average precipitation. At any given point along the stream the following community components are generally present. The relative spatial extent of these communities varies as the channel morphology fluctuates from flash flood events. Steeper reaches may be more incised with less chance of sheet flow over the banks. In lower slope reaches sediment fills the main channel, increasing the chance of sheet flow across the area. Areas with sheet flow have a higher area of surface disturbance and will have more disturbance dependent species. Two community components are present, including: Community Component 1 (CC1): This community is present in the lower positions which have the most flood activity. This community may have small channels that have frequent surface flow. Data for this community was not collected independently from CC2, so the data is combined in the tables below. However this community is dominated by burrobrush and annual forbs. Community Component 2 (CC2): This community is present on low relief bars within the drainageway. Creosote bush dominates, with a mix of shorter lived shrubs. The increased run-on and rare floods provide additional moisture and surface disturbance, which enable species such as burrobrush, dessertsenna, bladderpod spiderflower (*Cleome isomeris*), and Mojave indigobush (*Psorothamnus arborescens*) to establish. Forbs are abundant in years of high rainfall, but may be patchily present every year due to run-on. Common forbs include pincushion flower (*Chaenactis fremontii*), Esteve's pincushion (*Chaenactis stevioides*), cryptantha (Cryptantha spp.), smooth desertdandelion (*Malacothrix glabrata*), and curvenut combseed (*Pectocarya recurvata*).

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Shrub/Vine	213	235	252
Forb	31	73	112
Grass/Grasslike	–	1	1
Total	**244**	**309**	**365**

Table 6. Ground cover

Tree foliar cover	0%
Shrub/vine/liana foliar cover	7-17%
Grass/grasslike foliar cover	0-2%
Forb foliar cover	8-13%
Non-vascular plants	0%
Biological crusts	0%
Litter	0-1%
Surface fragments >0.25" and <=3"	78-90%
Surface fragments >3"	0-1%
Bedrock	0%
Water	0%
Bare ground	10-21%

Community 2.2
Drought Response

This community develops with prolonged or severe drought. It is difficult to determine the exact duration or intensity of drought that will cause this change, but a one to two year severe drought (of approximately 60 percent or less of average annual precipitation) can cause severe mortality in short lived perennials (Bowers 2005, Hereford et al. 2006, Miriti et al. 2007). During drought years, flood events are unlikely. The plant community components remain similar to those described in Community Phase 2.1, but show a decline in overall health, cover and production due to drought. Shorter lived species in CC2 may suffer high mortality while longer lived species may have severe branch die back.

Community 2.3

Post-fire Regeneration

This community phase results from fire, which is historically rare in desert ephemeral drainageway communities. An increase in the abundance of invasive annual grasses and annual forb cover in associated upland communities has led to an increase in fire frequency (Brown and Minnich 1986, Brooks et al. 2004, Brooks and Matchett 2006, Rao and Allen 2010, Steers and Allen 2011) in upland communities as well as ephemeral drainageways. If extreme precipitation events follow fire, and especially if upslope hill communities also burned, then this community phase is vulnerable to channel entrenchment and transition to State 3, altered hydrology. This is because upslope and riparian vegetation act to reduce runoff and slow water flow, thus protecting soils from erosion and maintaining a system of braided channeling and sheet flow that supports the full range of vegetation communities in the ephemeral stream complex (Bull 1997). CC1 This community will recover quickly after fire, since it is dominated by burrobrush which is a pioneer species, and will reproduce prolifically from off-site wind dispersed seed. CC2 Shorter lived shrubs such as bladderpod spiderflower, dessert senna, and burrobrush will most likely recover quickly after fire from seed. Creosote bsh can resprout after fire, but is very uncommon. Moderate to severe fires usually result in severe mortality of creosote bush, and it can take decades to recover. Waterjacket and peach thorn can vigorously resprout after fire, and may be the dominant shrubs during this phase. This phase may have more species diversity due to the absence of creosote dominance. Complete recovery to pre-fire plant composition may take a long time.

Pathway 2.1a
Community 2.1 to 2.2

This pathway is caused by a prolonged or severe drought.

Pathway 2.1b
Community 2.1 to 2.3

This pathway is caused by moderate to severe fire.

Pathway 2.2a
Community 2.2 to 2.1

This pathway occurs with the return of average to above average precipitation and associate flood events.

Pathway 2.2b
Community 2.2 to 2.3

This pathway occurs as a result of fire. Given low cover of annuals during drought, this pathway is unlikely except in periods immediately following heavy precipitation years.

Pathway 2.3a
Community 2.3 to 2.1

This pathway occurs in response to the passing of time with average to above average precipitation and associated flood events.

Pathway 2.3b
Community 2.3 to 2.2

This pathway occurs in response to the passing of time with drought conditions and absence of flooding.

State 3
Hydrologically altered

State 3 represents altered hydrological conditions typical of similar watersheds. Data is needed to develop a successional diagram for this state. This site may be hydrologically altered due to surface flow alterations, changes in sediment transport capacity, or ground water depletion.

Community 3.1
Hydrologically Altered

Channel entrenchment can develop due to a range of interacting factors (Bull 1997), including the creation of drainage ditches in urban areas (NRCS staff observations), increased runoff and infiltration in downstream reaches due to an increase in impervious surfaces with urbanization (Nishikawa et. al. 2004). Incised arroyos may form due to extreme climatic events, especially if they follow a period of drought or a fire that also burns upslope hill communities (Bull 1997). Data is needed for this process, which is thought to occur in CA698. Landform alterations or road development can divert water away from washes eliminating water flow and flood disturbances. Over time species like burrobrush and desertsenna may die out, leaving a community dominated by stable upland species.

Transition 1
State 1 to 2

This transition occurs with the introdution of non-native species. Once naturalized, this transition is very difficult to reverse. The state and transition model and general dynamics described in State 2 would be similar to this state, but the introduction of non-natives may increase the potential for fire.

Transition T2a
State 2 to 3

Triggers that can cause a transition to State 3 include ground water depletion, surface flow alterations, and prolonged drought. Any of the community phases from this state can cross the threshold to State 3, but community phase 2.3 and the later stages of 2.2 are especially vulnerable because decreases in vegetation density (and upland vegetation density) leave soils more susceptible to erosion (Bull 1997).

Restoration pathway R3a
State 3 to 2

Restoration effort should be based on restoring proper hydrologic function to individual drainageways. Restoration in the upper watershed may be needed for proper function at a given location along the drainageway. Roads can be redesigned to allow proper stream alignment and flow. Seeds or plants of appropriate species may need to be reintroduced to the restored channels.

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**			213–252	
	creosote bush	LATR2	*Larrea tridentata*	84–129	1–4
	burrobrush	HYSA	*Hymenoclea salsola*	11–45	2–6
	desertsenna	SEAR8	*Senna armata*	20–45	1–3
	white ratany	KRGR	*Krameria grayi*	0–45	0–2
	peach thorn	LYCO2	*Lycium cooperi*	0–39	0–4
	Mojave indigobush	PSAR4	*Psorothamnus arborescens*	0–17	0–2
	jojoba	SICH	*Simmondsia chinensis*	0–17	0–1
	water jacket	LYAN	*Lycium andersonii*	0–11	0–1
	bladderpod spiderflower	CLIS	*Cleome isomeris*	0–11	0–1
	Wiggins' cholla	CYEC3	*Cylindropuntia echinocarpa*	0–11	0–1
	Mojave yucca	YUSC2	*Yucca schidigera*	0–6	0–1
	branched pencil cholla	CYRA9	*Cylindropuntia ramosissima*	0–4	0–1
Forb					
2	**Forbs**			31–112	
	Esteve's pincushion	CHST	*Chaenactis stevioides*	11–90	1–3
	Thurber's sandpaper plant	PETH4	*Petalonyx thurberi*	0–29	0–1
	red brome	BRRU2	*Bromus rubens*	6–28	–
	cryptantha	CRYPT	*Cryptantha*	0–11	0–3
	pincushion flower	CHFR	*Chaenactis fremontii*	0–11	0–3
	smooth desertdandelion	MAGL3	*Malacothrix glabrata*	0–11	0–1
	curvenut combseed	PERE	*Pectocarya recurvata*	0–6	0–2
	Mojave desertstar	MOBE2	*Monoptilon bellioides*	0–1	0–1
	purplemat	NADE	*Nama demissum*	0–1	0–1
	Great Basin langloisia	LASES	*Langloisia setosissima ssp. setosissima*	0–1	0–1
	Bigelow's tickseed	COBI	*Coreopsis bigelovii*	0–1	0–1
	woolly easterbonnets	ANWA	*Antheropeas wallacei*	0–1	0–1
	suncup	CAMIS	*Camissonia*	0–1	0–1
	western tansymustard	DEPI	*Descurainia pinnata*	0–1	0
4	**Non-native forbs**			0–1	
	redstem stork's bill	ERCI6	*Erodium cicutarium*	0–1	0–1
Grass/Grasslike					
3	**non-native grass**			0–1	
	Mediterranean grass	SCHIS	*Schismus*	0–1	0–2

Animal community

The desert tortoise (Gopherus agassizii agassizii), Southern Desert Cottontail (Sylvilagus audubonii arizonae), Desert Coyote (Canis latrans mearnsi), Desert Kit Fox desert (Vulpes macrotis arsipus), and several species of snakes, lizards, rodents, utilize this ecological site. Large shrubs create structural diversity that may help support a higher diversity of fauna, and ephemeral drainages provide important wildlife migration corridors.

Hydrological functions

Ephemeral drainages provide some similar hydrologic functions as perennial streams. A properly functioning system will maintain water quality by allowing energy dissipation during high water flow. These systems transport nutrients and sediments, and store sediments and nutrients in deposition zones. Ephemeral drainages provide temporary storage of surface water, and longer duration storage of subsurface water (Levick et al. 2008).

Recreational uses

These drainageways provide open travel corridors for hiking trails and wildlife viewing.

Other products

Creosote bush is an important medicinal plant for indigenous people. The leaves and twigs are used in several methods to create medicine. An insect, (Tachardiella larreae) produces lac deposits that hardens like plastic and is used a commercial sealing wax and by indigenous people to seal lids. Creosote bush resin is used as a wood preservative (Marshall 1995).

The leaves and twigs of burrobrush are also used for medicinal purposes (Tesky, 1993).

Inventory data references

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

State 2
CC2
1249706111, Morongo
1249706106, Morongo (type location)

Type locality

Location 1: San Bernardino County, CA	
UTM zone	N
UTM northing	3769480
UTM easting	590274
General legal description	The type location is approximately 3 miles in from the North entrance station and .2 miles east of Park Blvd., in Joshua Tree National Park.

Other references

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Approval

Kendra Moseley, 10/21/2024

Rangeland health reference sheet

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

Author(s)/participant(s)	
Contact for lead author	
Date	05/13/2025
Approved by	Kendra Moseley
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

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

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

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

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

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

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

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

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

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

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

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

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

    Dominant:

    Sub-dominant:

    Other:

    Additional:

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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:**
