Ecological site R040XD019CA
Coarse Gravelly Wash

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General information

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

MLRA notes

Major Land Resource Area (MLRA): 040X–Sonoran Basin and Range

MLRA Description:
Major land resource area (MLRA) 31 is the Lower Colorado Desert. This area is in the extreme southeastern part of California, in areas along the Colorado River, and in Western Arizona. The area is comprised of rough, barren, steep, and strongly dissected mountain ranges, generally northwest to southwest trending that are separated by intermontane basins. Elevation ranges from approximately 275 feet below sea level at the lowest point in the Salton Trough to 2700 feet along low northwest to southeast trending mountain ranges. The average annual precipitation is 2 to 6 inches with high temporal and spatial variability. Winter temperatures are mild, summer temperatures are hot, and seasonal and diurnal temperature fluctuations are large. Monthly minimum temperature averages range from 40 to 80 degrees F (4 to 27 degrees C). Monthly maximum temperature averages range from 65 to 110 degrees F (18 to 43 degrees C) (WRCC 2002). Temperatures are rarely below 28 degrees F, and extremely rarely fall below 24 degrees F. Precipitation is bimodal, with approximately 20 to 40 percent of annual precipitation falling between July and September. This summer rainfall, in combination with very hot temperatures and very few to no days of hard freeze are what characterize this MLRA and distinguish it from the Mojave Desert (MLRA 30).

Ecological Site Concept -

This ecological site occurs on first and second order ephemeral streams, which typically experience frequent flash flood events. These ephemeral streams exist in narrow and deeply inset drainageways among fan remnants and alluvial fans. This ecological site is often adjacent to fan remnants with desert pavement surfaces. Soils are very deep sands. These relatively narrow drainageways concentrate flow and reduce the ability of flow to disperse energy by spreading out as sheet flow or diverging into braided channels. Runoff quickly and deeply infiltrates the deep sands of this site, providing a deep water source.
Catclaw acacia (Acacia greggii), creosote bush (Larrea tridentata), brittlebush (Encelia farinosa), and desert lavender (Hyptis emoryi) are dominant, with blue paloverde (Parkinsonia florida) scattered along the drainageway.

Data ranges in the physiographic data, climate data, water features, and soil data sections of this Ecological Site Description are based on all components.

Ecological site concept

This description was copied from and is equivalent to R031XY019CA. There is ongoing LRU concept development and designation where a request was made by the Region 8 Ecological Site Specialist to avoid using the default XY LRU.

Associated sites

R040XD017CA	**Steep Granitic Slope 4-6" p.z.** This ecological site occurs on hills, with burrobush, teddybear cholla, creosote bush, and a mix of other species.
R040XD021CA	**Very Gravelly Wash** This small ephemeral stream ecological site is on inset fans and interfluves among desert pavement surfaces. It often drains into this larger ephemeral stream. Creosote bush and brittlebush are present.
R040XD001CA	**Limy Hill 4-6" p.z.** This ecological site occurs on hills and sideslopes of fan remnants. Creosote bush and burrobush are present.
R040XD009CA	**Gravelly Fan Remnants And Fan Aprons** This ecological site occurs on fan remnants and fan aprons near the mountain base. Additional run-on and rocky surfaces promote a creosote bush-Schott's dalea community.

Similar sites

R040XD010CA	**Valley Wash** This ephemeral stream is larger and is in broad valley bottoms. Blue paloverde and desert willow are the dominant trees.
R040XD021CA	**Very Gravelly Wash** This small ephemeral stream ecological site is on inset fans and interfluves among desert pavement surfaces. It often drains into this larger ephemeral stream. Creosote bush and brittlebush are present.

Table 1. Dominant plant species

Tree	(1) *Parkinsonia florida*
Shrub	(1) *Encelia farinosa* (2) *Acacia greggii*
Herbaceous	(1) *Chamaesyce albomarginata*

Physiographic features

This site occurs in incised drainageways, bars on drainagways, and undulating braided drainageways. Slopes range from 0 to 8 percent, and elevations range from 460 to 1740 feet.

Table 2. Representative physiographic features

Landforms	(1) Drainageway
Flooding duration	Extremely brief (0.1 to 4 hours)
Flooding frequency	Rare to frequent
Elevation	460–1,740 ft
Slope	0–8%
Aspect	Aspect is not a significant factor

Climatic features

The Colorado Desert of California represents the north westernmost portion of the Sonoran Desert. The subtropical Colorado Desert results from the descent of cold air which is heated by compression and arrives hot and dry at the earth's surface. Precipitation is frontal in nature during the winter and convectional in the summer. Reduced summer rainfall and high potential evapotranspiration make the Colorado Desert one of the most arid regions in North America. Summer temperatures frequently exceed 105 degrees F. The mean annual temperature ranges from 70 to 79 degrees F. The average annual precipitation ranges from 2 to 6 inches with most falling as rain. Snowfall is rare. Approximately 35% of the annual precipitation occurs from July to September as a result of intense convection storms. Spring months are the windiest.

Table 3. Representative climatic features

Frost-free period (average)	365 days
Freeze-free period (average)	365 days
Precipitation total (average)	6 in

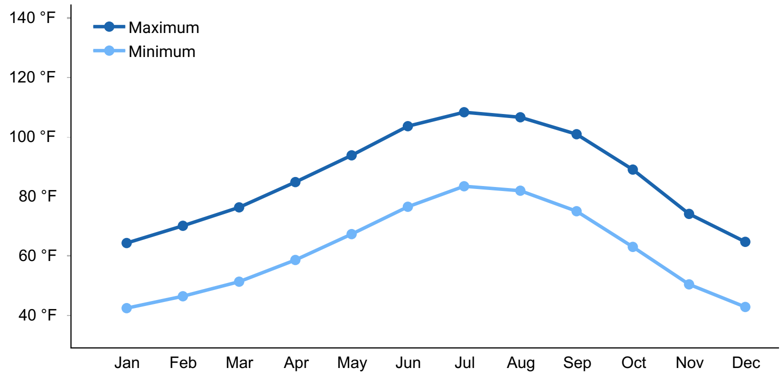

Figure 1. Monthly average minimum and maximum temperature

Influencing water features

Soil features

This site occurs in deeply cut drainageways. The soils consist of very deep, excessively drained soils formed in stratified alluvium from igneous or granitoid sources. The surface textures are very gravelly sand, gravelly sand, and loamy sand. The subsurface textures are stratified layers of coarse sand, sand, and loamy sand, with very or extremely gravelly modifiers. Surface rock fragments less than 3 inches in diameter range from 20 to 65 percent cover, and larger fragments range from 3 to 50 percent cover. Subsurface percent by volume of rock fragments less than 3 inches ranges from 20 to 46, and larger fragments range from 0 to 12 percent. The soils series associated with this site are Rizzo (sandy-skeletal, mixed, hyperthermic Typic Torriorthents) and Carsitas (mixed, hyperthermic Typic Torripsamments).

This ecological site has been correlated to the following map units and soil components in the Colorado Desert Area Soil Survey (CA803):

Map unit; Map unit name; Component; phase; percent
1200; Goldroad very gravelly sandy loam, 15 to 50 percent slopes; Rizzo; frequently flooded; 3
1400; Sunrock complex, 8 to 50 percent slopes; Rizzo; frequently flooded; 3
1402; Sunrock-Cheme family-Rock outcrop association, 8 to 50 percent slopes; Rizzo; frequently flooded; 2
1500; Rizzo extremely gravelly fine sandy loam, 2 to 8 percent slopes; Rizzo;frequently flooded; 8
1501; Rizzo gravelly loamy sand, 30 to 75 percent slopes; Rizzo; frequently flooded; 3
1502; Rizzo-Lithic Torriorthents-Emptygun association, 8 to 75 percent slopes; Rizzo;frequently flooded; 2
1506; Rizzo extremely gravelly loamy sand, 2 to 8 percent slopes; Rizzo; frequently flooded; 8
2000; Emptygun very gravelly fine sandy loam, 8 to 30 percent slopes; Rizzo; frequently flooded; 3
2001; Emptygun-Chemehuevi association, 2 to 30 percent slopes; Rizzo;frequently flooded; 4
2002; Emptygun association, 8 to 60 percent slopes;Rizzo; frequently flooded; 3
2011; Havasulake gravelly silt loam, 1 to 4 percent slopes;Rizzo;frequently flooded;5
2012; Havasulake gravelly sandy loam, 1 to 4 percent slopes;Rizzo;frequently flooded; 5
2030; Garywash gravelly fine sandy loam, 4 to 15 percent slopes; Rizzo;frequently flooded; 2
2031; Garywash-Chemehuevi complex, 2 to 8 percent slopes;Rizzo;frequently flooded; 4
2420;Carsitas complex, 0 to 4 percent slopes;Carsitas;rarely flooded;15

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; Map unit name; Component; phase; percent
2403; Rizzo-Rizzo, occasionally flooded complex, 2 to 8 percent slopes; Rizzo; occasionally flooded; 15
2420; Carsitas complex, 0 to 4 percent slopes; Carsitas; rarely flooded; 15 (This mapunit is also in CA803 where the two surveys join.)

Table 4. Representative soil features

Surface texture	(1) Extremely gravelly sand
Family particle size	(1) Sandy
Drainage class	Somewhat excessively drained to excessively drained
Permeability class	Moderately rapid to rapid
Soil depth	60 in
Surface fragment cover <=3"	20–65%
Surface fragment cover >3"	3–50%
Available water capacity (0-40in)	0.8–2.4 in
Calcium carbonate equivalent (0-40in)	0–5%
Electrical conductivity (0-40in)	0–2 mmhos/cm
Sodium adsorption ratio (0-40in)	0–4
Soil reaction (1:1 water) (0-40in)	6.6–8.4
Subsurface fragment volume <=3" (Depth not specified)	20–46%
Subsurface fragment volume >3" (Depth not specified)	0–12%

Ecological dynamics

This ecological site occurs on first and second order ephemeral streams, which typically experience frequent flash flood events. This ephemeral stream exists in narrow and deeply inset drainageways among fan remnants and alluvial fans. This ecological site is often adjacent to fan remnants with desert pavement surfaces. Desert pavement surfaces impede water infiltration, creating runoff to these drainageways. Run-off can quickly and deeply infiltrate into the very deep, sandy soils of the drainageway, providing a deep water source that supports blue paloverde, catclaw acacia and desert lavender. The relatively narrow drainageway concentrates flow and reduces the ability of flow to disperse energy by spreading out as sheet flow or diverging into braided channels.

The drought-tolerant vegetation that exists on ephemeral streams and drainageways 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 of the increased availability of water and soil disturbances in these drainageways. Blue paloverde, catclaw acacia, and desert lavender are present along the channel. These species are primarily phreatophytes when associated with this ecological site, that is, they have deep roots and primarily rely on a deep water source. A deep water source typically refers to a water table or a zone of saturated soils. However, these ephemeral desert streams do not generally have water tables within reach of plant roots, and here plants are accessing deep ground water (Nilsen et al. 1984).

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).

A properly functioning ephemeral drainage will provide some similar hydrologic functions as perennial streams. Ephemeral streams maintain water quality by allowing energy dissipation during high water flow. They transport nutrients and sediments, store sediments and nutrients in deposition zones, provide temporary storage of surface water, and longer duration storage of subsurface water. The structure and forage provided by xeroriparian vegetation, and the availability of water (although brief), significantly increases animal abundance along ephemeral streams relative to upland areas. The open channels provide important migration corridors for wildlife (Levick et al. 2008).

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 hydrology of the 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 generally scour and incise. These processes eventually cause higher peak flows due to increased runoff and concentrated flows. Higher flow velocities may cause uprooting, stem breakage or scour under the roots of xeroriparian vegetation. This loss of root structure along the stream increases scour potential, and the loss of above ground vegetation will increase flow velocity. When the xeroriparian community is lost, important animal species dependent upon this community may be lost from the area as well. Ground water drawdown from household wells (Nishikawa et al. 2004) can deplete the water source for phreatophytes, such as blue paloverde, desert willow, and catclaw acacia, potentially eliminating this species from certain areas.

This ecological site is very unlikely to burn, or to burn extensively due to the large expanses of barren desert pavement between the vegetated channels. Non-native species were not recorded in the plot data, but are present in low amounts in the area. However, they will not likely form a continuous fuel load to carry fire.

State and transition model

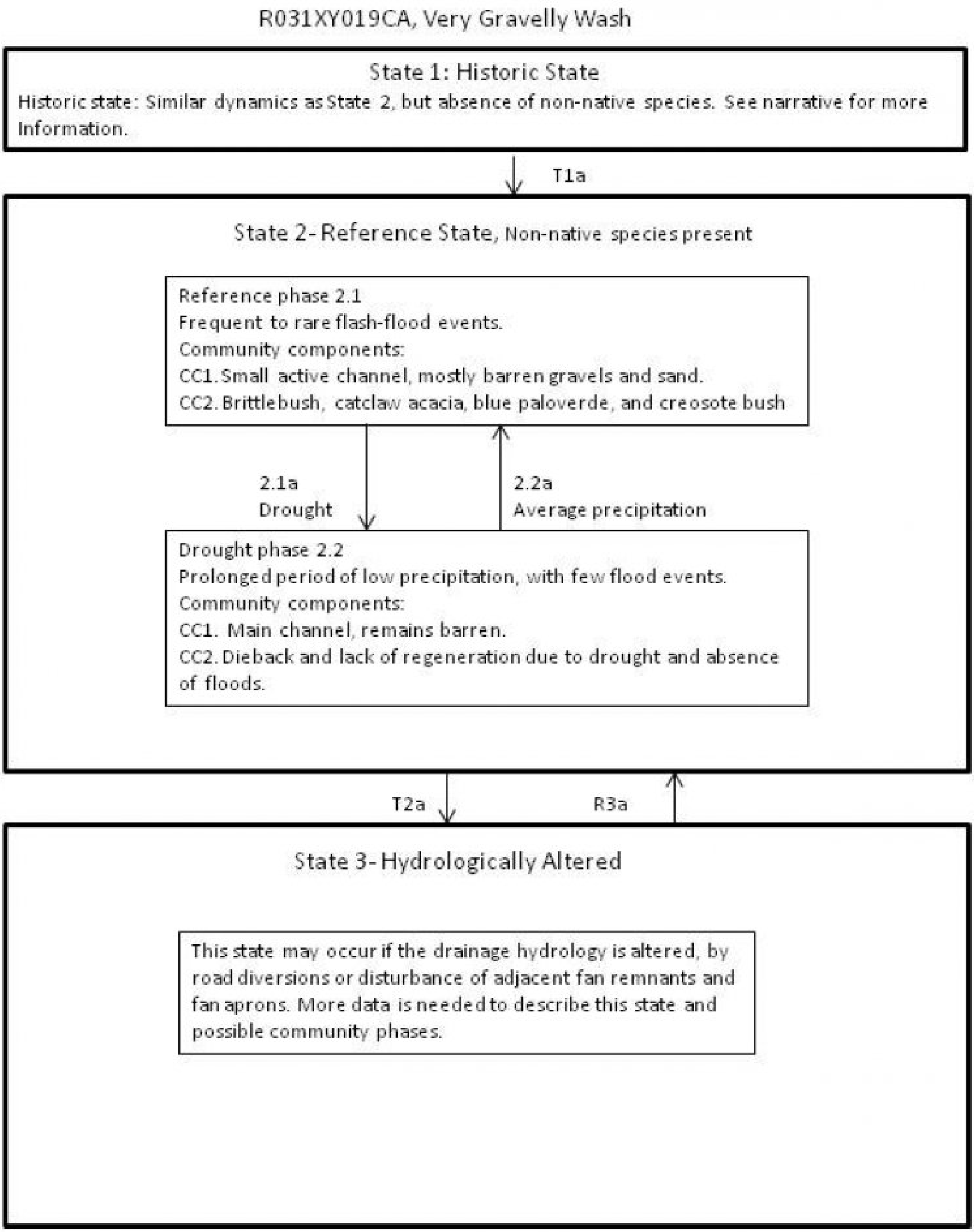

Figure 2. R031XY019CA model

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 Community

Figure 3. Coarse Gravelly Wash

Figure 4. Course Gravelly Wash

This community phase is dependent upon unimpaired hydrologic function and average to above average precipitation conditions. This ephemeral stream occurs mostly in deep channels, 40 to 60 feet wide. While the site is located in a low precipitation zone, the run-off from surrounding areas into the channel provides sufficient moisture for high productivity (relative to ecological sites within this MLRA). There are two community components associated with this community phase. Community component one is in the most actively flooded region of the drainageway, which is composed of barren sands and gravels. Community component two is adjacent to the active zone in the drainageway, and on the sideslopes of the drainageway. Brittlebrush, catclaw acacia and creosote bush are typically dominant, and desert lavender and creosote bush are common secondary shrubs. Blue paloverde is scattered along the drainageway. Where flow is less concentrated, minor shrubs like Anderson wolfberry (*Lycium andersonii*), burrobrush (*Hymenoclea salsola*) and sweetbush (*Bebbia juncea*), burrobush (*Ambrosia dumosa*), and Schott's dalea (*Psorothamnus schottii*) are present. The potential plant community of the site is 90% shrubs, 5% forbs, 3% grasses, and 2% trees. The total vegetation cover of the site is 30%. Big galleta (*Pleuraphis rigida*), has low cover in the more defined drainageways. Annual production varies with precipitation, but whitemargin sandmat (*Chamaesyce albomarginata*) and New Mexico silverbush (*Argythamnia neomexicana*) are typically present. Non-native species were not recorded, but are do occur in this ecological site.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Shrub/Vine	740	886	983
Forb	10	12	13
Tree	0	5	10
Grass/Grasslike	0	1	2
Total	**750**	**904**	**1008**

Table 6. Ground cover

Tree foliar cover	0-2%
Shrub/vine/liana foliar cover	20-25%
Grass/grasslike foliar cover	0-1%
Forb foliar cover	5-7%
Non-vascular plants	0%
Biological crusts	0%
Litter	0%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	0%

Table 7. Soil surface cover

Tree basal cover	0-2%
Shrub/vine/liana basal cover	15-20%
Grass/grasslike basal cover	0-1%
Forb basal cover	1-3%
Non-vascular plants	0%
Biological crusts	0%
Litter	8-10%
Surface fragments >0.25" and <=3"	60-70%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	5-7%

Table 8. Canopy structure (% cover)

Height Above Ground (Ft)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.5	–	–	–	2-5%
>0.5 <= 1	–	–	0-1%	–
>1 <= 2	–	1-2%	–	–
>2 <= 4.5	–	5-7%	–	–
>4.5 <= 13	–	7-10%	–	–
>13 <= 40	–	–	–	–
>40 <= 80	–	–	–	–
>80 <= 120	–	–	–	–
>120	–	–	–	–

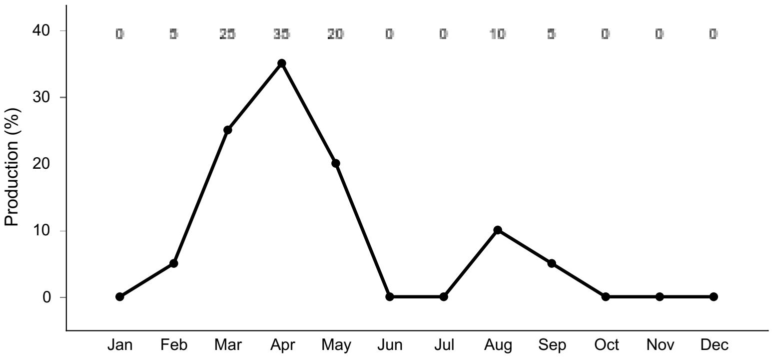

Figure 6. Plant community growth curve (percent production by month). CA3012, Brittlebush. Growth starts in early spring; flowering and seed set occur by July. Dormancy occurs during the hot summer months. Late summer and fall rains will break dormancy..

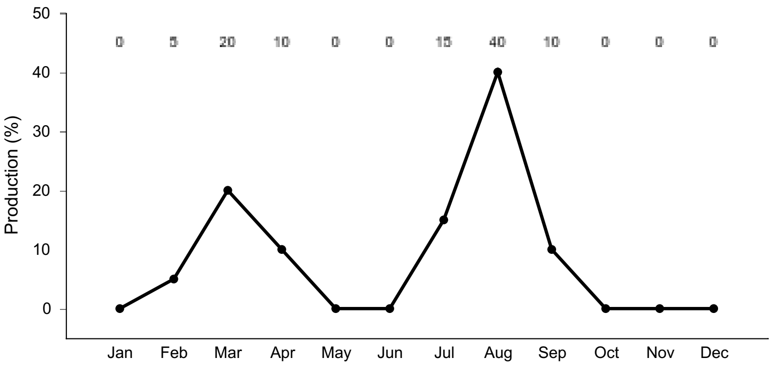

Figure 7. Plant community growth curve (percent production by month). CA3024, Big galleta. Some green up in spring; dormant May and June; most growth occurs after summer rains..

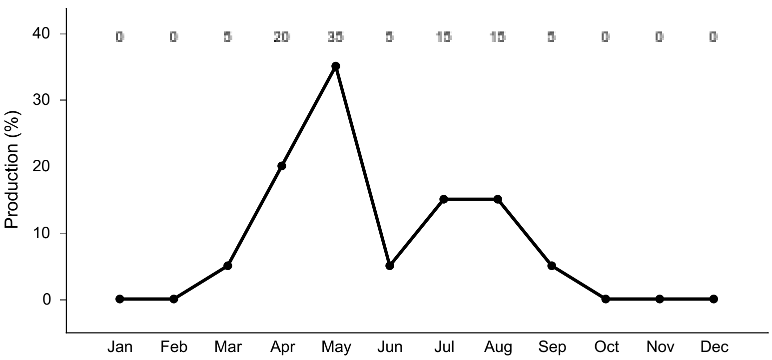

Figure 8. Plant community growth curve (percent production by month). CA3075, White ratany. Growth begins in spring, slows in early summer, and then picks back up after summer rains begin, setting seed in late summer..

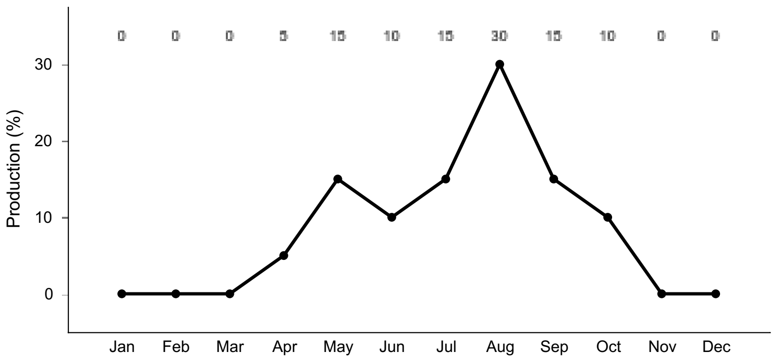

Figure 9. Plant community growth curve (percent production by month). CA3091, Catclaw acacia. Growth starts in early spring, flowering and seed set occur by July. Dormancy occurs during the hot summer months. With sufficient summer/fall precipitation, some vegetation may break dormancy and produce a flush of growth..

Community 2.2
Drought Response

This community develops with prolonged or severe drought. 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 perennials (such as burrobrush, sweetbush, and burrobush) 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). Long-lived shrubs (such as creosote bush, white ratany, and desert lavender) 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. Brittlebush, when dominant on lower landscape positions, such as alluvial fans, is generally associated with a disturbance community, such as an ephemeral stream (Sawyer et al. 2009). Brittlebush is an extremely drought-tolerant, drought-deciduous shrub. Adaptations in degree of leaf pubescence and leaf size allow brittlebush to occupy sites ranging from relatively mesic coastal environments to extremely arid deserts (Ehleringer and Cook 1990, Sandquist and Ehleringer 1997, Housman et al. 2002, Sandquist and Ehleringer 2003). Frosts cause branch die-back and mortality in adult brittlebush (Sandquist and Ehleringer 1996), and reduce seedling establishment (Bowers 1994). Brittlebush seedlings emerge over multiple pulses in response to cool season rains, with emergence triggered by a minimum of 19 mm of precipitation, and seedlings are killed if freezing temperatures occur within nine days of the trigger event (Bowers 1994). Creosote bush is a long-lived, deep-rooted evergreen shrub dominant across vast areas of the North American warm deserts. Once established, it has very low levels of drought-induced mortality, and it is one of the few shrubs capable of persisting in this extreme environment. White ratany is a long-lived, drought-deciduous shrub that co-occurs as a secondary species with creosote bush over much of its range. It is a root parasite that obtains nutrients from the roots of host plants, which may help to sustain it during of drought. If drought persists or the channel becomes less active due to flow diversion, creosote bush may become the main species in the drainageway.

Pathway 2.1a
Community 2.1 to 2.2

This pathway is caused by a prolonged or severe drought.

Pathway 2.2a
Community 2.2 to 2.1

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

State 3
Hydrologically Altered

This state may occur if the drainage hydrology is altered, or if the surrounding stable landform surface is disturbed. This state was not observed within the Joshua Tree National Park survey, but downcutting of these drainageways was observed outside the park. More data is needed to describe this state and possible community phases.

Community 3.1
Hydrologically Altered

Headcutting may occur when drainages are bisected by roads, and roadside ditches are manually created or created as a result of erosion from runoff. If the ditches have a lower base level, the natural drainages may headcut to level out the channel gradient. Roads and ditches can either divert flow away from, or concentrate flow to, an area below the road. Loss of flow will cause species richness to decline. Increased flow will cause the channel to erode, widening and/or downcutting to accommodate the increased flow. If the adjacent stable landform surfaces are disturbed, it may alter sediment delivery and flow distribution to the drainageways.

Restoration pathway R3a
State 3 to 2

Restoration from State 3 back to State 2 would be an intensive task. Individual site assessments would be required to determine proper restoration methods. Some hydrological modifications are not feasible restored, such as ground water depletion. However, road diversions can be redesigned to allow proper stream alignment and flow. Since these channels are relatively confined and do not braid or migrate, proper locations for culverts or breaks are easier to identify. Seeds or plants of appropriate species may need to be reintroduced to the restored channels.

Additional community tables

Table 9. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Shrub/Vine					
1	**Dominant Shrubs**			740–973	
	brittlebush	ENFA	*Encelia farinosa*	256–340	–
	catclaw acacia	ACGR	*Acacia greggii*	240–310	–
	creosote bush	LATR2	*Larrea tridentata*	176–233	–
	desert lavender	HYEM	*Hyptis emoryi*	62–80	–
	burrobrush	HYSA	*Hymenoclea salsola*	8–10	–
2	**Minor Shrubs**			0–10	
	Schott's dalea	PSSC5	*Psorothamnus schottii*	0–15	0–4
	burrobush	AMDU2	*Ambrosia dumosa*	0–2	–
	sweetbush	BEJU	*Bebbia juncea*	0–2	–
	white ratany	KRGR	*Krameria grayi*	0–2	–
	water jacket	LYAN	*Lycium andersonii*	0–2	–
Tree					
3	**Tree**			0–10	
	blue paloverde	PAFL6	*Parkinsonia florida*	0–10	0–3
Forb					
4	**Native Forbs**			10–13	
	whitemargin sandmat	CHAL11	*Chamaesyce albomarginata*	7–9	–
	New Mexico silverbush	ARNE2	*Argythamnia neomexicana*	3–4	–
Grass/Grasslike					
5	**Perennial grass**			0–2	
	big galleta	PLRI3	*Pleuraphis rigida*	0–2	–

Animal community

This site provides good habitat for small animals and good vertical structure for birds to perch on. The root mounds of creosote bush are readily used by burrowing ground squirrels, other rodents , and lizards.Cover is necessary for a wide variety of animals as a refuge from predators. The number of large shrubs and high plant cover allow for many suitable hiding places. Some of the animals that use cover as protection include rodents, birds, snakes, and lizards.

Abundant wildflowers after spring rains would provide food for animals including desert tortoise.

Hydrological functions

Ephemeral drainages maintain water quality by allowing energy dissipation from flow events. 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

The banks of this site would be a nice wildlife viewing spot. The high production of the site would draw many animals looking for both food and cover. The impressive wildflower bloom after heavy rains would provide many photography opportunities.

Other information

The dominant plant of the site, brittlebush, was favored by Native Americans of the area for its fragrant sap which they would dry and burn like incense. This practice was observed by the early Spanish settlers and prompted them to name the plant 'incienso,' or incense in spanish. This same sap is a water soluble substance that inhibits the growth of several winter annuals.

Inventory data references

There is one plot from Joshua Tree National Park that represents this ecological site, H3-G. The type location information below is from the Chemehuevi Wash OHV area.

Type locality

Location 1: San Bernardino County, CA	
UTM zone	N
UTM northing	3808184
UTM easting	729768
Latitude	34° 23′ 22″
Longitude	114° 30′ 2″
General legal description	This site occurs about 5 miles east of West Well on the powerline road in Chemehuevi Wash OHV area. The powerline road intersects another road which goes to the south. The site is off this intersecting road, about 1/2 mile south.

Other references

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Approval

Scott Woodall, 2/08/2019

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)	Dustin Detweiler
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Date	11/03/2014
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** Many rills may be present with less than 10 feet apart, especially after intense storm events during exceptionally dry periods. Within this ephemeral stream system rills gently merge in and out of water flow patterns.

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2. **Presence of water flow patterns:** Yes, water flow patterns should be expected as this is an ephemeral stream system. Water flow patterns are extensive throughout this site except on alluvial terraces, bars, or stream terraces. These landforms may have some water flow patterns from intense storms but will not have extensive water flow patterns like the main river wash areas. A great amount of spatial and temporal variability of water flow patterns within ephemeral stream systems should be expected.

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3. **Number and height of erosional pedestals or terracettes:** Rarely any terracettes at this site but few debris dams may be present among plants within the ephemeral stream. Some plants may be pedestalled, especially after flash flooding events. The number of debris dams and pedestalled plants within desert washes are often a reflection of the rangeland health of the upland portions of the ephemeral stream's watershed. Removal of plants by drought, fire, land clearing (such as roads), and/or heavy grazing in the surrounding uplands will amplify flash flooding effects.

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare ground is between 5-10% due to a high surface fragment cover.

5. **Number of gullies and erosion associated with gullies:** This is an ephemeral stream which is essentially synonymous with a gully.

6. **Extent of wind scoured, blowouts and/or depositional areas:** There are no blowouts but many areas of this ESD are washed out. Many flooding borne depositional areas exist throughout this site from fine silt to gravels and cobbles.

7. **Amount of litter movement (describe size and distance expected to travel):** Litter movement is extensive with medium woody material moving great distances in the most active portions of the ephemeral stream system.

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Most of the wash is 0 to 1 single grain structure with some cementation. Some areas under shrubs can have a stability value up to 3.

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Soil surface structure can be structure-less weak fine subangular blocky structure or moderate thin platy structure. If an A horizon exists, it is usually pale brown (dry) and up to 2 inches thick. Being a wash, A horizons may not exist and should be expected to be highly variable in both color and depth.

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Plants are widely spaced perennial shrubs. Annual plant growth is limited to bars protected from frequent flooding events. Gravels, cobbles and loose sand probably influence infiltration more than the sparse perennial plant composition. In portions of the ephemeral stream where removal processes are greater than depositional processes, then cemented layers maybe exposed at the surface. Cemented layers will reduce infiltration. Runoff is generally downstream and can contribute to channel migration processes.

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** None. Platy or massive sub-surface horizons, not to be interpreted as compacted layers.

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: Mixed Desert shrubs

    Sub-dominant: Annual forbs > perennial grasses

    Other:

    Additional:

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Plant mortality is random and based on which plants have been uprooted during a flash flood. Perennial grasses are likely to be the first to exhibit mortality during drought.

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14. **Average percent litter cover (%) and depth (in):** Litter cover may increase as time since last precipitation event increases. Flash flooding moves much of the litter either further downstream or under shrubs. Litter cover is usually individual pieces of plant debris rather than an accumulated layer of litter. Litter cover averages between 5-10% cover.

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** For normal or average growing season, in the mid-elevation range of this ecological site and the main channel vegetation of this ecological site, annual production is ±900 lbs/ac.

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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:** Potential invaders on this site include red brome, Mediterranean grass, and redstem filaree. Annual species are unlikely to dominate this ecological site as seeds are often washed away.

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17. **Perennial plant reproductive capability:** All functional groups should reproduce in average and above-average growing season years. Little reproduction occurs in drought years. Even during low intensity drought years, ephemeral streams may have a higher reproductive capability than the surrounding upland landforms because water from precipitation events is concentrated into these areas.
