# Ecological site R040XD010CA
# Valley 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.

**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): 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).

## Classification relationships

Sawyer, J.O. and T. Keeler-Wolf. 1995. Manual of California Vegetation - Catclaw Acacia Series

NDDB/Holland Type and Status: Mojavean Desert Scrub (43000), Riparian Scrubs (63000).
Mojave Wash Scrub (34250) G3 S3.2
Mojave Desert Wash Scrub (63700) G3 S2.1

Barry Type: G7411124
Brown Lowe Pase type: 143.153, 153.141, 154.123, 153.161
Cheatham & Haller type: Desert Dry Wash Woodland.
PSW-45 type: Catclaw Series.
Stone & Sumida (1983): Wash Community
Thorne Type: Desert Microphyll Woodland
WHR Type: Desert Wash

## Ecological site concept

This ephemeral stream occurs on large, broad, frequently flooded, valley bottom drainageways and channels,

located at medial and distal positions on alluvial fans. Volume and velocity of the stream flow slowed in these landform positions, relative to positions closer to the mountain front, and sediment transport is predominately fine materials such as sands and gravels.
The main channels provide a deep water source and a frequent flooding regime, which support blue paloverde, desert willow, catclaw acacia and smoketree. Burrobrush (Hymenoclea salsola) is a common species throughout. A range of flooding intensities along and across the drainageway supports several community components.

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

## Associated sites

| | |
|---|---|
| R040XD001CA | **Limy Hill 4-6" p.z.**<br>This ecological site is found on hillslopes and northfacing sideslopes of fan remnants. Creosote bush and burrobush are present. |
| R040XD017CA | **Steep Granitic Slope 4-6" p.z.**<br>This ecological site occurs on hills, with burrobush, teddybear cholla, creosote bush, and a mix of other species. |

**Table 1. Dominant plant species**

| | |
|---|---|
| Tree | (1) *Parkinsonia florida*<br>(2) *Chilopsis linearis* |
| Shrub | (1) *Acacia greggii*<br>(2) *Hymenoclea salsola* |
| Herbaceous | (1) *Chamaesyce albomarginata*<br>(2) *Oenothera deltoides* |

## Physiographic features

This site occurs on drainageways, channels, 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<br>(2) Channel |
| Flooding duration | Extremely brief (0.1 to 4 hours) |
| Flooding frequency | Occasional 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-western most 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. The mean annual temperature ranges from 70 to 79 degrees F. The mean 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 |

## Influencing water features

## Soil features

The soils on this site consist of very deep, excessively drained soils that formed in stratified sandy alluvium from mixed sources; and of very deep, excessively drained soils that formed in alluvium from mixed rock sources that are dominated by granite. Surface textures are gravelly sand, very gravelly sand, fine sandy loam, extremely gravelly fine sandy loam, and sand, with similar subsurface textures. Surface gravels (< 3 mm in diameter) range from 20 to 65 percent, and larger fragments range from 1 to 5 percent. Subsurface gravels by volume (for a depth of 0 to 59 inches) range from 20 to 45 percent, and larger fragments by volume range from 0 to 8 percent.

Soils series associated with this site include: 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 1211;Stormjade-Whipple complex, 8 to 50 percent slopes;Rizzo; frequently flooded; 2
1403; Sunrock-Emptygun-Rock outcrop association, 8 to 50 percent slopes; Rizzo; frequently flooded; 3
1503; Rizzo association, 2 to 8 percent slopes; Rizzo; frequently flooded ;30
2003; Emptygun-Havasulake association, 0 to 50 percent slopes; Rizzo; frequently flooded; 6
2400; Rizzo-Chemwash association, 2 to 8 percent slopes;Rizzo; frequently flooded; 55
2401; Rizzo-Chemwash association, eroded, 2 to 8 percent slopes; Rizzo; frequently flooded; 60
2420; Carsitas complex, 0 to 4 percent slopes; Carsitas; frequently flooded; 45 and Carsitas; occasionally flooded; 40

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
2420; Carsitas complex, 0 to 4 percent slopes; Carsitas; frequently flooded; 45 and Carsitas; occasionally flooded; 40 (This mapunit is also in CA803 where they join.)

**Table 4. Representative soil features**

| | |
|---|---|
| Parent material | (1) Alluvium–granite |
| Surface texture | (1) Gravelly sand<br>(2) Very gravelly sand<br>(3) Sand |
| Family particle size | (1) Sandy |
| Drainage class | Somewhat excessively drained to excessively drained |
| Permeability class | Moderate to rapid |
| Soil depth | 60 in |
| Surface fragment cover <=3" | 20–65% |
| Surface fragment cover >3" | 1–5% |
| 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) | 20–45% |
| Subsurface fragment volume >3" (Depth not specified) | 0–8% |

## Ecological dynamics

This ecological site occurs on third order or larger ephemeral drainages. Large, occasional to frequent flash flood events shape this ecological site. Although this site has large drainage basins, it is located on medial and distal positions of alluvial fans where volume and velocity of the stream flow has slowed, and sediment transport is predominately fine materials (such as sands and gravels). The main channels provide a deep water source and a frequent flooding regime, which support blue paloverde, desert willow, catclaw acacia and smoketree. A range of flooding intensities along and across the drainageway supports several community components.

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).

Flood intensity, scour and sediment transport vary across the drainageway and channel segments, which creates a complex of plant communities. 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 flood disturbances in these drainageways. Blue paloverde, desert willow, smoketree, and catclaw acacia are present along active channel margins. These species are phreatophytes, 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). Catclaw acacia and mixed shrubs are present on adjacent overflow flood zones, and upland shrubs are present on stable islands. Collectively, all of these plant communities are part of the xeroriparian vegetation, and provide xeroriparian habitat.

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)]) dynamics include a constant flux of balancing erosional and depositional channel reaches. As sediment deposits in the main channel of the depositional zone, the likelihood of channel avulsion increases because of decreased channel volume. Cycles of channel avulsion on fan piedmonts is an ongoing and a long-term process in the development of alluvial fans and associated landforms, and can occur after any substantial overland flow event when existing channel capacity is very rapidly and dramatically exceeded.

If channel avulsion occurs at the apex of the alluvial fan, it is more likely to capture the majority of the stream flow. Upper fans extend into the base of mountains, which provide a direct sediment source which is transported over time, by larger flood events, to distal reaches of the drainage. This ecological site generally occurs on the medial to distal positions of a fan apron, or in broad valley bottoms, at the low point between the opposing fan aprons. At the distal reaches of the fan aprons, surface flow dissipates and percolates out of the channel into substratum. Below this point the active channel becomes vegetated with stable upland vegetation, such as creosote bush (*Larrea tridentata*).

Water availability, sediment flux, and channel migrations result in a dynamic complex of hydrologically and disturbance determined plant communities. Physical disturbance of soils as a result of flash flooding makes predictability of temporary channel development and configuration very low except when considered at a very coarse scale. Typical runoff events may result in an apparently stable mosaic of plant species distribution and channel configuration while more extreme events may completely reconfigure the mosaic and establish the foundation of a new or modified plant community mosaic until the next extreme runoff event occurs.

The associated plant communities occur on microfeatures within the drainageway that are related to flooding frequency and intensity, but are also influenced by other disturbances such as fire and drought.

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.

## State and transition model

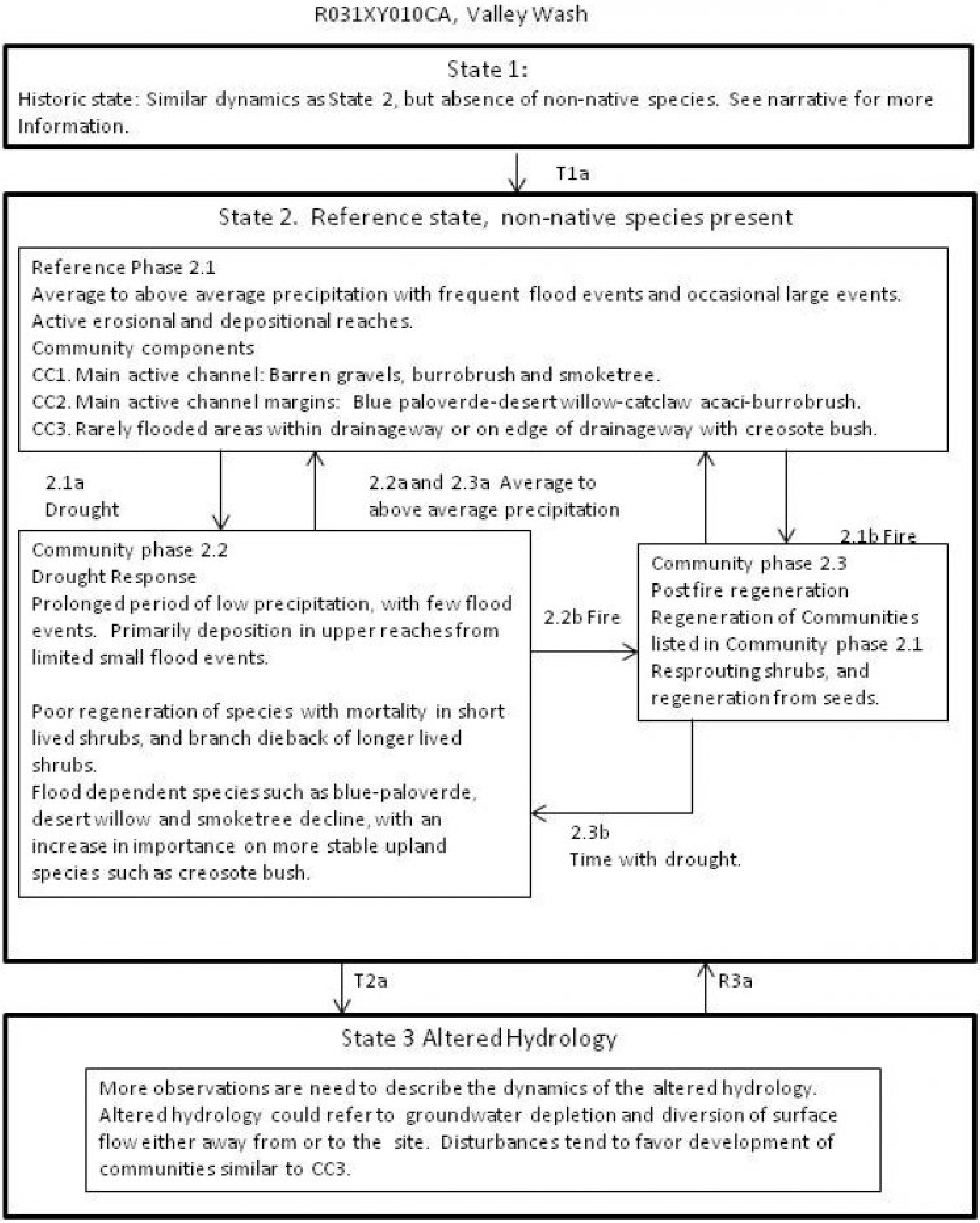


**Figure 3. R031XY010CA Model**

## 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 4. CC1 and CC2 on margins**

**Figure 5. CC3 creosote bush**

**Figure 6. CC2 higher production**

This community phase is dependent upon unimpaired hydrologic function and average to above average precipitation. Site specific historical data to determine flood size or frequency is not available. However, historic precipitation data and runoff frequency calculated by measuring sediment deposits indicate greater than one-inch precipitation events and runoff events occur in approximately 4.5 to 5 year intervals (Griffeths et al. 2006). Precipitation events of greater than one inch would flood the active channel, and extend to portions of the higher relief sediment bars. It is difficult to determine the frequency of large flood events that would have enough volume to overflow onto the upper topographic positions. Precipitation of less than an inch occurs more often and creates surface flow in the active channel. Within the drainageway there are 3 distinct zones, each with its own distinct plant community component (CC): the active channel (CC1), the channel margin (CC2), and the adjacent rarely flooded areas (CC3). The active channel is almost bare, with the force of seasonal flooding enough to prevent most plants from establishing. Smoketree, burrobush and Mojave rabbitbrush (*Ericameria paniculata*) are the only species that thrive in this component. Just outside the active channel is a zone where water-dependent trees and large shrubs are found. These include blue paloverde, desert willow, and catclaw acacia. Further away from the active channel, and extending to the drainageway boundary, is a rarely flooded zone. This area receives a slow-moving film of water during flood events. The flooding in this zone is not violent enough to significantly disturb the area and prevent upland plants like creosote bush (*Larrea tridentata*) from establishing. This area does, however, sustain many plants which require more moisture than the surrounding dry upland landforms provide. Both creosote bush and burrobush (*Ambrosia dumosa*), which are found on adjacent landforms, are able to tolerate the moderate amount of disturbance, and are more productive as a result of the increased moisture. The potential vegetation community is 75% shrubs, 10% trees, 10% forbs, and 5% grasses. The total plant cover of the site is 25%. The data in the tables below is the combination of the 3 community components, since data was not collected exclusively within one community component.

**Table 5. Annual production by plant type**

| Plant Type | Low (Lb/Acre) | Representative Value (Lb/Acre) | High (Lb/Acre) |
|---|---|---|---|
| Tree | 38 | 350 | 710 |
| Shrub/Vine | 153 | 239 | 302 |
| Forb | 0 | 25 | 50 |
| Grass/Grasslike | 0 | 4 | 8 |
| **Total** | **191** | **618** | **1070** |

**Table 6. Ground cover**

| | |
|---|---|
| Tree foliar cover | 2-3% |
| Shrub/vine/liana foliar cover | 20-25% |
| Grass/grasslike foliar cover | 0-1% |
| Forb foliar cover | 2-3% |
| 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% |
| Shrub/vine/liana basal cover | 3-5% |
| Grass/grasslike basal cover | 0% |
| Forb basal cover | 0-1% |

| | |
|---|---|
| Non-vascular plants | 0% |
| Biological crusts | 0% |
| Litter | 3-5% |
| Surface fragments >0.25" and <=3" | 80-85% |
| Surface fragments >3" | 0% |
| Bedrock | 0% |
| Water | 0% |
| Bare ground | 3-5% |

**Table 8. Canopy structure (% cover)**

| Height Above Ground (Ft) | Tree | Shrub/Vine | Grass/ Grasslike | Forb |
|---|---|---|---|---|
| <0.5 | – | – | 0-1% | 2-3% |
| >0.5 <= 1 | – | – | – | – |
| >1 <= 2 | – | 1-2% | – | – |
| >2 <= 4.5 | – | 3-5% | – | – |
| >4.5 <= 13 | – | 10-15% | – | – |
| >13 <= 40 | 1-2% | – | – | – |
| >40 <= 80 | – | – | – | – |
| >80 <= 120 | – | – | – | – |
| >120 | – | – | – | – |

## Community 2.2
## Drought Response

This community phase develops after severe or prolonged drought, and absence of flood events. The plant community components remain the same, as described in Community Phase 2.1, but the proportion of each community type across the drainageway will shift in response to drier conditions, and overall growth and cover declines. With prolonged drought and absence of flood events, the deep rooted phreatophytes along the channel margin will decline. They will initially suffer branch die-back, but if drought conditions persist or channel avulsion diverts flood waters from the previously active channel, they may suffer high mortality. Desert willow fruit production may be inhibited in response to drought (DePree and Ludwig 1978, Petersen et al. 1982). Further, moderate flooding in wet years is necessary for desert willow establishment (seeds dispersed in fall and winter establish in freshly deposited sediment), and establishment may be sporadic (Uchytil 1990, Sawyer et al. 2009). Desert willow seed has no dormancy, and seeds probably do not survive beyond the spring after dispersal occurs (Magill 1974). So although desert willow is long-lived (> 100 years), stands will not replace themselves in the absence of suitable recruitment conditions, and new stands of desert willow will not establish in suitable unoccupied locations. Since catclaw acacia produces a long-lived seed bank, and burrobush can take advantage of any moisture (i.e. not necessarily surface flow), these species may increase if the drought is not prolonged or severe. Blue paloverde and smoketree will not regenerate without floods to scarify and leach the seeds, and to provide sufficient soil moisture. Severe drought can cause mortality in shorter lived shrubs such as burrobrush, bladderpod spiderflower, and Mojave rabbitbrush. Creosote bush may suffer branch die-back, but may persist in long term drought, becoming dominant as other species die off. With an overall decrease in cover and the potential loss of root structure, this site is susceptible to erosion when floods return to the drainageway.

## 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 et al. 2010, Steers and Allen) in upland communities as well as ephemeral drainageways. Smoketree, desert willow, and catclaw acacia can resprout after flood events and after fire. Catclaw acacia in particular may become more abundant several years post fire. The shorter lived shrubs, such as burrobrush, sweetbush and Mojave rabbitrush will recolonize quickly from wind dispersed seed. Non-native annual grasses do not reach high cover in this site due to the frequent flood disturbance, so it is unlikely that this site will carry fire easily or convert to a grass-fire cycle after a burn. 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 sheetflow that supports the full range of vegetation communities in the riparian complex (Bull 1997).

### Pathway 2.1a
### Community 2.1 to 2.2

This pathway occurs in response to greater than 5 years of drought, and an absence of flood events. The active, freshly scoured portion of the channel declines and a lack of freshly deposited sediment and moist conditions inhibits recruitment of blue paloverde, desert willow, smoketree and catclaw acacia among other species.

### Pathway 2.1b
### Community 2.1 to 2.3

This pathway occurs in response to fire. Desert washes historically burn very infrequently (Uchytil 1990), but an increase in the abundance of invasive annual grasses and annual forb cover in general in associated upland communities (Brown and Minnich 1986, Brooks et al. 2004, Brooks and Matchett 2006, Rao et al. 2010, Steers and Allen 2011) has led to an increase in fire frequency in desert wash communities.

### 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.

### 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 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.

### Community 3.1

### Hydrologically Altered

Surface flow alterations, increase in impervious surfaces, and ground water depletion can hydrologically alter this system. Surface flow alterations from roads and ditches can divert flow away from or to a new area. If water is diverted away from the original channel, the flood dependent species will die out and be replaced with more upland species such as creosote bush and burrobush. 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) which cause increased runoff and infiltration in downstream reaches due to an increase in impervious surfaces (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). Research in other arid lands ephemeral stream systems has shown that channel entrenchment can lead to mortality in xeroriparian communities in a time span of only decades (Bull 1997 and references therein). Several of the associated communities in the reference state of the ecological site are lost, and only a productive creosote bush community may be left. In an in-depth study addressing management of groundwater resources in the Joshua Tree-Twentynine Palms area, Nishikwawa et al. (2004) found that significant draw-down of upper and middle aquifers is occurring due to household wells, and that natural regeneration of aquifers is very limited. Desert willow is a phreatophyte that relies on groundwater to survive adverse droughty conditions (de Soyza et al. 2004). With severe ground-water depletion, existing desert willow trees will no longer be able to access water and will die. Data on the timeframe within which this might occur is not available. CC2 would die out, leaving CC3 through CC5. Catclaw acacia does not depend on groundwater for survival, although it does need regular flooding (or run-on on stony slopes).

### Restoration pathway T3a
### 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, impervious pavement, road diversions, and channel armoring can be redesigned to allow proper infiltration and channel flow. Entrenched channels can be built up with check dams, stones, or woody debris to increase the frequency of overflow on to the alluvial fan. Seeds or plants of appropriate species may need to be reintroduced to the restored channels, and associated sheet-flow areas.

## Additional community tables

**Table 9. Community 2.1 plant community composition**

| Group | Common Name | Symbol | Scientific Name | Annual Production (Lb/Acre) | Foliar Cover (%) |
|---|---|---|---|---|---|
| **Tree** | | | | | |
| 1 | **Desert trees** | | | 38–780 | |
| | desert willow | CHLI2 | *Chilopsis linearis* | 18–380 | 1–16 |
| | blue paloverde | PAFL6 | *Parkinsonia florida* | 20–340 | 2–13 |
| | smoketree | PSSP3 | *Psorothamnus spinosus* | 0–70 | 0–10 |
| **Shrub/Vine** | | | | | |
| 2 | **Wash shrubs** | | | 75–250 | |
| | catclaw acacia | ACGR | *Acacia greggii* | 0–168 | 0–2 |
| | burrobrush | HYSA | *Hymenoclea salsola* | 36–70 | 1–10 |
| | Schott's dalea | PSSC5 | *Psorothamnus schottii* | 0–30 | 0–1 |
| | desert lavender | HYEM | *Hyptis emoryi* | 0–20 | 0–2 |
| | Mojave rabbitbrush | ERPA29 | *Ericameria paniculata* | 0–8 | 0–1 |
| | sweetbush | BEJU | *Bebbia juncea* | 0–4 | 0–1 |
| | Thurber's sandpaper plant | PETH4 | *Petalonyx thurberi* | 0–1 | 0–1 |
| 3 | **Upland Shrubs** | | | 25–51 | |
| | creosote bush | LATR2 | *Larrea tridentata* | 0–48 | 0–3 |
| | burrobush | AMDU2 | *Ambrosia dumosa* | 0–3 | 0–1 |

| | | | | | |
|---|---|---|---|---|---|
| **Grass/Grasslike** | | | | | |
| 4 | **Annual Grasses** | | | 0–6 | |
| | sixweeks threeawn | ARAD | *Aristida adscensionis* | 0–2 | 0–1 |
| | sixweeks grama | BOBA2 | *Bouteloua barbata* | 0–2 | 0–1 |
| | low woollygrass | DAPU7 | *Dasyochloa pulchella* | 0–2 | 0–1 |
| 5 | **Perennial Grass** | | | 0–2 | |
| | big galleta | PLRI3 | *Pleuraphis rigida* | 0–2 | 0–1 |
| 8 | **Non-native grass** | | | 0–17 | |
| | common Mediterranean grass | SCBA | *Schismus barbatus* | 0–17 | 0–6 |
| **Forb** | | | | | |
| 6 | **Forbs** | | | 0–50 | |
| | smooth desertdandelion | MAGL3 | *Malacothrix glabrata* | 0–8 | 0–2 |
| | sowthistle desertdandelion | MASO | *Malacothrix sonchoides* | 0–8 | 0–2 |
| | pincushion flower | CHFR | *Chaenactis fremontii* | 0–5 | 0–2 |
| | cryptantha | CRYPT | *Cryptantha* | 0–5 | 0–1 |
| | coyote gourd | CUPA | *Cucurbita palmata* | 0–5 | 0–1 |
| | pygmy poppy | ESMI | *Eschscholzia minutiflora* | 0–5 | 0–1 |
| | yellow pepperweed | LEFL2 | *Lepidium flavum* | 0–5 | 0–1 |
| | birdcage evening primrose | OEDE2 | *Oenothera deltoides* | 0–5 | 0–1 |
| | distant phacelia | PHDI | *Phacelia distans* | 0–5 | 0–1 |
| | desert Indianwheat | PLOV | *Plantago ovata* | 0–5 | 0–1 |
| | chia | SACO6 | *Salvia columbariae* | 0–5 | 0–1 |
| | desert globemallow | SPAM2 | *Sphaeralcea ambigua* | 0–5 | 0–1 |
| | trailing windmills | ALIN | *Allionia incarnata* | 0–5 | 0–1 |
| | Mexican whorled milkweed | ASFA | *Asclepias fascicularis* | 0–5 | 0–1 |
| | whitemargin sandmat | CHAL11 | *Chamaesyce albomarginata* | 0–5 | 0–1 |
| 7 | **Non-native forb** | | | 0–250 | |
| | Asian mustard | BRTO | *Brassica tournefortii* | 0–250 | 0–18 |

## Animal community

This site has very complex vertical structure, which provides both perches and nest habitat for many bird species. The mere presence of true trees in this desert landscape means that the site probably receives more bird species, both resident and migrant, than any other area for miles around. The abundant low shrub cover is well suited for jack rabbits and other rodents to hide under. The site also has a moderate amount of creosote bush which provides good burrowing habitat in its root apron. Abundant wildflowers after spring rains would also attract many animals to the site for food plants.

## 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

This site is well suited for many types of recreation. Bird watching would be excellent here, since the desert trees attract many resident and migrant birds. Since this site is the drainage for much of the surrounding area, even in drought years some plants in the wash flower, providing opportunities for photography. Naturalists would find the wash fascinating for its diversity of shrubs and abundant wildflowers in wet years, and especially for its desert trees.

### Type locality

| Location 1: San Bernardino County, CA | |
|---|---|
| UTM zone | N |
| UTM northing | 3814449 |
| UTM easting | 731352 |
| Latitude | 34° 26′ 44″ |
| Longitude | 114° 28′ 54″ |
| General legal description | This site occurs 1/3 mile south of West Well in Chemehuevi Wash OHV area. |

| Location 2: San Bernardino County, CA | |
|---|---|
| UTM zone | N |
| UTM northing | 3814123 |
| UTM easting | 730734 |
| Latitude | 34° 26′ 34″ |
| Longitude | 114° 29′ 19″ |
| General legal description | This site occurs 3/4 mile south of West Well in Chemehuevi Wash OHV area. |

### Other references


Brooks, M. L., C. M. D'Antonio, D. M. Richardson, J. B. Grace, J. E. Keeley, J. M. DiTomaso, R. J. Hobbs, M. Pellant, and D. Pyke. 2004. Effects of invasive alien plants on fire regimes. Bioscience 54:677-689.

Brooks, M. L. and J. R. Matchett. 2006. Spatial and temporal patterns of wildfires in the Mojave Desert, 1980-2004. Journal of Arid Environments 67:148-164.

Brown, D. E. and R. A. Minnich. 1986. Fire and Changes in Creosote Bush Scrub of the Western Sonoran Desert, California. American Midland Naturalist 116:411-422.

Bull, W. B. 1997. Discontinuous ephemeral streams. Geomorphology 19:227-276.

DePree, E. and J. A. Ludwig. 1978. Vegetative and Reproductive Growth Patterns in Desert Willow (Chilopsis linearis (Cav.). The Southwestern Naturalist 23:239-245.

Field, J. 2001. Channel avulsion on alluvial fans in southern Arizona. Geomorphology 37:93-104.

Griffeths, P. G., R. Hereford, and R. H. Webb. 2006. Sediment yield and runoff frequency of small drainage basins in the Mojave Desert, U.S.A. Geomorphology 74:232-244.

Johnson, R. R., Bennet, P.S., Haight, L.T., S. W. Carothers, and J. M. Simpson. 1984. A riparian classification system. Pages 375-383 in R. E. Warner and K. M. Hendrix, editors. California riparian systems. University of California Press, Berkeley, CA.

Levick, L., J. .Fonseca, D. Goodrich, M. Hernandez, D. Semmens, J. Stromberg, R. Leidy, M. Scianni, D. P. Guertin, M. Tluczek, and W. Kepner. 2008. The ecological and hydrological significance of ephemeral and intermittent streams in the arid and semi-arid American Southwest.

Magill, A. W. 1974. Chilopsis linearis (Cav.) Sweet desertwillow. U.S. Department of Agriculture, Forest Service, Washington, DC.

Nilsen, E. T., M. R. Sharifi, and P. W. Rundel. 1984. Comparative water relations of phreatophytes in the Sonoran Desert of California. Ecology 65:767-778.

Nishikawa, T., J. A. Izbicki, C. L. Stamos, and P. Martin. 2004. Evaluation of geohydrologic framework, recharge estimates, and ground-water flow of the Joshua Tree area, San Bernardino County, California., U.S. Geological Survey.
Petersen, C., J. H. Brown, and A. Kodric-Brown. 1982. An experimental study of floral display and fruit set in Chilopsis linearis (Bignoniaceae). Oecologia 55:7-11.

Sawyer, J. O., T. Keeler-Woolf, and J. M. Evans. 2009. A manual of California vegetation. 2nd edition. California Native Plant Society, Sacramento, California.

Shaw, J. R. and D. J. Cooper. 2008. Linkages among watersheds, stream reaches, and riparian vegetation in dryland ephemeral stream networks. Journal of Hydrology 350:69-73.

Stanley, E. H., S. G. Fisher, and N. B. Grimm. 1997. Ecosystem expansion and contraction in streams. Bioscience 47:427-439.

Steers, R. J. and E. B. Allen. 2011. Fire effects on perennial vegetation in the western Colorado Desert, USA. Fire Ecology 7:59-74.

Uchytil, R. J. 1990. Chilopsis linearis. In: Fire Effects Information System. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory

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## Approval

Kendra Moseley, 3/11/2025

## 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 | 05/11/2025 |
| 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:

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:**