Ecological site R030XB138NV
DRY GRAVELLY WASH 5-7 P.Z.

Last updated: 2/26/2025
Accessed: 09/03/2026

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): 030X–Mojave Basin and Range

This Major Land Resource Area (MLRA) is in the Basin and Range Province of the Intermontane Plateaus. Most of the MLRA is in the Sonoran Desert Section of this province. The northern third is in the Great Basin Section, and the southeastern part is in the Mexican Highland Section. A small part of the southwest corner is in the Salton Trough Section. Broad basins, valleys, and old lakebeds make up most of the area, but widely spaced mountains trending north to south occur throughout the area. Isolated, short mountain ranges are separated by an aggraded desert plain. The mountains are fault blocks that have been tilted up. Long alluvial fans coalesce with dry lakebeds between some of the ranges. Elevation ranges from 282 feet (85 meters) below sea level, the lowest elevation occurring on dry land in the world, in Badwater Basin in Death Valley to 3,950 feet (1,205 meters) above sea level in valleys and basins. Some mountain ranges have peaks that exceed 11,100 feet (3,385 meters). The 30XB Land Resource Unit (LRU) is found across the eastern half of California, much of the lower and mid-elevations of Nevada, the southernmost portions of western Utah, and the mid-elevations of northwestern Arizona. Elevations range from 1800 to 5000 feet and precipitation ranges from 4 to 9 inches per year, but is generally between 5 to 6 inches. This LRU is characterized primarily by summer precipitation. Summer precipitation falls between July and September in the form of rain, and winter precipitation falls starting in November and ends between February and March, also mostly in the form of rain; however, it does receive between 0 and 3 inches of snow, with an average of 1 inch. The soil temperature regime is thermic and the soil moisture regime is typic-aridic. Vegetation includes creosotebush (LATR2), white bursage (AMDU2), Nevada ephedra (EPNE), range ratany (KRER) Spanish dagger (YUSC2), Joshua tree (YUBR), cholla (OPUNT), big galleta (PLRI3) and several other warm season grasses. At the upper elevations, plant production and diversity are greater and blackbrush (CORA), sagebrush (ARTEM), and singleleaf pinyon (PIMO) are common. All plant species provided to characterize the broader LRU may or may not be present on a particular ecological site.

Ecological site concept

This site occurs in ephemeral drainageways. Slopes range from 2 to 8 percent. Elevations range from 3000 to 5000 feet. The soils associated with this site are very deep, well drained to somewhat excessively drained, and are formed in alluvium derived from limestone and dolomite. Please refer to group concept R030XB186CA to view the provisional STM.

Similar sites

R030XB137NV	**GRAVELLY WASH 5-7 P.Z.** PRFA dominant shrub; more productive site
R030XB051NV	**UPLAND WASH** AMER, PLRI3 dominant species; more productive site
R030XB133NV	**GRAVELLY INSET FAN 5-7 P.Z.** AMDU2, MESP2, PSFR dominant shrubs; more productive site

R030XB132NV	**GRAVELLY WASH 3-5 P.Z.** ACGR, PSFR dominant shrubs; more productive site

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Psorothamnus fremontii* (2) *Hymenoclea salsola*
Herbaceous	(1) *Pleuraphis rigida*

Physiographic features

This site occurs in ephemeral drainageways. Slopes range from 2 to 8 percent. Elevations range from 3000 to 5000 feet.

Table 2. Representative physiographic features

Landforms	(1) Drainageway
Flooding duration	Brief (2 to 7 days)
Flooding frequency	Occasional
Elevation	910 – 1,520 m
Slope	0 – 10 %
Aspect	Aspect is not a significant factor

Climatic features

The climate is hot and arid, with mild winters and very hot summers. Precipitation is greatest in the winter with a lesser secondary peak in summer, typical of the Mojave Desert. Average annual precipitation is 5 to 7 inches. Mean annual air temperature is 63 to 68 degrees F. The average growing season is about 210 to 320 days.

Table 3 Representative climatic features

Frost-free period (average)	320 days
Freeze-free period (average)	
Precipitation total (average)	180 mm

Influencing water features

This site is subject to occasional flooding after summer convection storms or during spring runoff.

Soil features

The soils associated with this site are very deep, well drained to somewhat excessively drained, and are formed in alluvium derived from limestone and dolomite. Runoff is negligible to very low and permeability is moderate to moderately rapid. The soils are occasionally flooded. Soils correlated to this site include Colosseum, a sandy-skeletal, carbonatic, thermic Typic Haplocalcid, and Elbowcanyon, a loamy-skeletal, carbonatic, thermic Typic Torriorthent.

Table 4. Representative soil features

Parent material	(1) Alluvium – limestone (2) Alluvium – dolomite
Surface texture	(1) Very gravelly fine sandy loam
Family particle size	(1) Loamy
Drainage class	Well drained to somewhat excessively drained
Permeability class	Moderate to moderately rapid
Soil depth	180 – 210 cm
Surface fragment cover <=3"	80 – 90 %
Surface fragment cover >3"	0 – 10 %
Available water capacity (0-101.6cm)	3.18 – 7.8 cm
Calcium carbonate equivalent (0-101.6cm)	30 – 60 %
Electrical conductivity (0-101.6cm)	Not specified
Sodium adsorption ratio (0-101.6cm)	Not specified

Soil reaction (1:1 water) (0-101.6cm)	8.2 – 8.4
Subsurface fragment volume <=3" (Depth not specified)	20 – 60 %
Subsurface fragment volume >3" (Depth not specified)	0 – 20 %

Ecological dynamics

Please refer to group concept R030XB186CA to view the provisional STM.

Ephemeral streams are unique in that they lack permanent flow although they perform the same critical hydrologic functions as perennial streams; they move water, sediment, nutrients and debris through the stream network and provide connectivity within the watershed. These systems experience extreme and rapid variations in flood magnitudes as a response to heavy rain events. The fundamental difference between ephemeral and perennial streams is that ephemeral stream channels have sizeable transmission losses when they flow. Ephemeral streams are also characterized by wider channels, low sinuosity, and flat bed topography. The sparseness of vegetation along the stream banks contributes to channel widening tendencies. (Levick et al 2008).

Along the desert washes, vegetation composition and structure overlap considerably with those of the surrounding desert uplands. An example of this is creosotebush and white bursage commonly occur in the washes and adjoining uplands. As water availability increases, the vegetation becomes increasingly distinct from the upland vegetation with respect of physiognomy and species composition. Canopy cover increases and mesoriparian and hydroriparian species increase in abundance (Levick et al 2008).

As a result of decreased flow rates in the downstream direction, more silts and fines are deposited in the channel, which can be advantageous to biotic communities. Many of the species (white burrobush, desert rabbitbrush) occurring on this site are generally considered to be increasers or pioneers in the presence of disturbance (Abella 2010). These species produce prolific numbers of wind-dispersed seeds and are more abundant in ephemeral streams with intense flood scour (Levick et al 2008). Rainfall and flood flow events can trigger a pulse of germination of annual and perennial forbs from a diverse soil seed bank. Some species have resprouting capabilities; an adaptation to withstand flooding flows. Fremont dalea also has nitrogen fixing bacteria associated with its roots, which can be an important influence on local nitrogen availability. The increased availability of nutrients on these sites compared to the surrounding area increases the likelihood of encountering invasive species, like saltcedar (Tamarix spp.). Saltcedar is successful in arid environments due to its ability to tolerate unpredictable periods of moisture. Perturbation of these systems by natural or anthropogenic causes can result in the development of continuous incised channels.

Flooding is a natural disturbance. Floods help to redistribute nutrients across the landscape, as well as, encouraging resprouting and seedling establishment. Seedling establishment and canopy expansion is greater for plants growing in the drainageways than the surrounding area. However, these plants are less tolerant of extended dry periods because they are adapted to increased soil moisture (Hamerlynk and McAuliffe 2008). Very large rainfall events rarely occur but have the potential to remove existing vegetation and deposit new sediment, initiating secondary succession.

Ephemeral stream channels are more sensitive to disturbance than their perennial counterparts. Recreational activities, especially OHV use, remove the protective vegetative cover, and change the sediment transport relationship in these systems. Loss of vegetative cover leaves channels more susceptible to entrenchment and channel widening resulting in habitat loss. In order for restoration attempts to succeed, it is important to wait until the system has reached a new dynamic equilibrium. Once the system has stabilized, restoration steps should include removal of disturbance, control of non-natives, and revegetation with native species (Briggs 1996).

Fire Ecology:

Wildfire is infrequent and patchy in this system, however, years with increased annual precipitation result in increased production from annuals and increase the chances of wildfire. Post-fire, creosotebush and other fire intolerant shrubs decrease. Fire tolerant species such as Fremont's dalea, bursage, burrobush and ephedra are able to sprout from the root crown and may increase following wildfire. Fire also favors an increase of perennial native grasses. This site is also susceptible to invasion by non-native species including Tamarix. Tamarix initially established along major drainages in the Southwest deserts but successfully invaded outlying ephemeral waters and springs through windblown seeds and possibly the occasional planting. The deep, extensive root system extends to the water table and is capable of extracting water from unsaturated soil horizons. Tamarix is characterized as a facultative phreatophyte and a halophyte, giving it a competitive advantage over native species in areas where salinities are elevated and water tables are depressed. Non-native annual grasses and forbs will also establish throughout ephemeral stream systems, primarily due to propagule pressure from surrounding uplands.

State and transition model

Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
Grass/Grasslike					
1	**Primary perennial grasses**			15-28	
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	1-9	–
	desert needlegrass	ACSP12	*Achnatherum speciosum*	1-9	–
	low woollygrass	DAPU7	*Dasyochloa pulchella*	1-9	–
	squirreltail	ELEL5	*Elymus elymoides*	1-9	–
	big galleta	PLRI3	*Pleuraphis rigida*	1-9	–
Forb					
2	**Perennial forbs**			15-28	
	Cooper's dogweed	ADCO2	*Adenophyllum cooperi*	1-6	–
	woolly desert marigold	BAPL3	*Baileya pleniradiata*	1-6	–
	suncup	CAMIS	*Camissonia*	1-6	–
	Indian paintbrush	CASTI2	*Castilleja*	1-6	–
	desert trumpet	ERIN4	*Eriogonum inflatum*	1-6	–
	desert globemallow	SPAM2	*Sphaeralcea ambigua*	1-6	–
3	**Annual forbs**			1-28	
	redroot cryptantha	CRMIM	*Cryptantha micrantha var. micrantha*	1-6	–
	manybristle chinchweed	PEPA2	*Pectis papposa*	1-6	–
	New Mexico plumeseed	RANE	*Rafinesquia neomexicana*	1-6	–
	wirelettuce	STEPH	*Stephanomeria*	1-6	–
Shrub/Vine					
4	**Primary shrubs**			166-253	
	Fremont's dalea	PSFR	*Psorothamnus fremontii*	99-140	–
	burrobrush	HYSA	*Hymenoclea salsola*	56-84	–
	brittlebush	ENCEL	*Encelia*	6-15	–
	Nevada jointfir	EPNE	*Ephedra nevadensis*	6-15	–
5	**Secondary shrubs**			28-56	
	burrobush	AMDU2	*Ambrosia dumosa*	3-9	–
	fourwing saltbush	ATCA2	*Atriplex canescens*	3-9	–
	brickellbush	BRICK	*Brickellia*	3-9	–
	Mojave rabbitbrush	ERPA29	*Ericameria paniculata*	3-9	–
	littleleaf ratany	KRER	*Krameria erecta*	3-9	–
	creosote bush	LATR2	*Larrea tridentata*	3-9	–
	desert pepperweed	LEFR2	*Lepidium fremontii*	3-9	–
	water jacket	LYAN	*Lycium andersonii*	3-9	–
	desert almond	PRFA	*Prunus fasciculata*	3-9	–
	purple sage	SADO4	*Salvia dorrii*	3-9	–
	Mexican bladdersage	SAME	*Salazaria mexicana*	3-9	–
	turpentinebroom	THMO	*Thamnosma montana*	3-9	–
	banana yucca	YUBA	*Yucca baccata*	3-9	–
	Joshua tree	YUBR	*Yucca brevifolia*	3-9	–

	Mojave yucca	YUSC2	*Yucca schidigera*	3-9	–
	beavertail pricklypear	OPBA2	*Opuntia basilaris*	1-3	–
	Engelmann's hedgehog cactus	ECEN	*Echinocereus engelmannii*	1-3	–
	cottontop cactus	ECPOP	*Echinocactus polycephalus var. polycephalus*	1-3	–

Table 6. Community 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 7. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 8. Community 2.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 9. Community 3.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 10. Community 3.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Animal community

Livestock Interpretations: This site is suitable for livestock grazing. However, domestic livestock grazing should be carefully managed to avoid damage to the plant community. Perennial grass species including desert needlegrass, Indian ricegrass, and big galleta are palatable to domestic livestock. However, they account for only five percent of total production and therefore provide a limited forage resource. Nevada ephedra is important to domestic livestock on winter ranges. It is typically browsed heavily without inducing toxicity. Stocking rates vary over time depending upon season of use, climatic variations, site and previous and current management goals. A safe starting stocking rate is an estimated stocking rate that is fine tuned by the client by adaptive management through the year and from year to year. Wildlife Interpretations: The microclimates created in and around ephemeral streams provide important wildlife habitats, especially for less mobile species. These areas provide predator protection, breeding and nesting sites, shade, movement corridors, migration stopover sites, and food sources and subsequently support the greatest concentrations of wildlife. The desert tortoise, (Gopherus agassizii) a federally listed species, commonly uses ephemeral washes for travel, excavation or burrows and for feeding (Jennings 1997). Mule deer and small mammals commonly forage on desert almond. Nevada ephedra is preferred forage for mule deer, bighorn sheep and pronghorn in the spring and late summer when new growth is available. Birds commonly eat ephedra seeds.

Hydrological functions

This site experiences occasional flooding. Rills are none to few. Waterflow patterns are common. Sparse shrub canopy and associated litter break raindrop impact. Perennial herbaceous plants slow runoff and increase infiltration.

Recreational uses

Aesthetic value is derived from the diverse floral and faunal composition and the colorful flowering of wild flowers and shrubs during the spring and early summer. This site offers rewarding opportunities for photography and nature study. This site is suitable for hiking, nature study, photography, and has potential for upland and big game hunting.

Type locality

Location 1: Clark County, NV	
Township/Range/Section	T17S R60E S34
UTM zone	N

UTM northing	4032064
UTM easting	656989
Latitude	36° 25′ 15″
Longitude	115° 14′ 56″
General legal description	Approximately 1.2 miles from Lower White Blotch Spring, near Fossil Ridge. South of the Yucca Forest in the Desert National Wildlife Refuge, Clark County, Nevada. USGS Gass Peak, 7.5 minute topographic quadrangle. Mt. Diablo Meridian

Other references

Abella, S.R. 2010. Disturbance and plant succession in the Mojave and Sonoran Desert of the American Southwest. Int. J. Environ. Res. Public Health. 7: 1248-1284.

Briggs, M.K. 1996. Riparian Ecosystem Recovery in Arid Lands: Strategies and Reference. University of Arizona Press. Tucson, Arizona.

Fire Effects Information System (Online; http://www.fs.fed.us/database/feis/plants/)
USDA-NRCS Plants Database (Online; http://plants.usda.gov)

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

Jennings, W.B. 1997. Habitat use and food preferences of the desert tortoise, Gopherus agassizii, in the western Mojave Desert and impacts of off-road vehicles. pp. 42-45 in Proceedings: Conservation, Restoration, and Management of Tortoises and Turtles, an International Conference.

Levick, L.R., D.C Goodrich, M. Hernandez, J. Fonseca, D.J. Semmens, J. Stromberg, M. Tluczek, R.A. Leidy, M. Scianni, D.P. Guertin, and W.G. Kepner. 2008. The Ecological and Hydrological Significance of Ephemeral and Intermittent Streams in the Arid and Semi-arid American Southwest. U.S. Environmental Protection Agency. Office of Research and Development. Washington D.C.

Contributors

E. Hourihan
E.Hourihan
PN-E

Approval

Sarah Quistberg, 2/26/2025

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)	P.Novak-Echenique
Contact for lead author	State Rangeland Management Specialist
Date	06/28/2011
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** **Rills are none to few.**

2. **Presence of water flow patterns:** **Water flow patterns are few to common. They are typically connected.**

3. **Number and height of erosional pedestals or terracettes:** **Pedestals are rare with occurrence typically limited to areas within water flow patterns.**

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** **Bare ground up to 10%, depending on amount of surface rock fragments.**

5. **Number of gullies and erosion associated with gullies:** **None.**

6. **Extent of wind scoured, blowouts and/or depositional areas:** **None.**

7. **Amount of litter movement (describe size and distance expected to travel):** **Fine litter (foliage from grasses and annual & perennial forbs) expected to move distance of slope length (<10 ft) during intense summer convection storms or rapid snowmelt events. Persistent litter (large woody material) will remain in place except during large rainfall events.**

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** **Soil stability values should be 1 to 4 on most soil textures found on this site. (To be field tested.)**

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Surface structure is moderate, very thick platy. Soil surface colors are yellowish brown and soils are typified by an ochric epipedon. Organic matter of the surface 2 to 3 inches is less than 1 percent.

---

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Sparse shrub canopy and associated litter break raindrop impact. Perennial herbaceous plants slow runoff and increase infiltration.

---

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, should 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: Reference Plant Community: Mojave Desert shrubs >> deep-rooted perennial forbs> deep-rooted, warm-season, bunchgrasses > deep-rooted, cool-season, bunchgrasses > annual forbs > shallow-rooted grasses.

    Sub-dominant:

    Other: succulents, annual grasses

    Additional:

---

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Dead branches within individual shrubs common and standing dead shrub canopy material may be as much as 25% of total woody canopy; mature bunchgrasses commonly (<20%) have dead centers.

---

14. **Average percent litter cover (%) and depth (in):** Between plant interspaces and under canopy up to 20% and depth (<¼-inch).

---

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** For normal or average growing season ±250 lbs/ac. Favorable years 350+ lb/ac and unfavorable years 100 lbs/ac.

---

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, redstem filaree and saltcedar.

---

17. **Perennial plant reproductive capability:** All functional groups should reproduce in above-average and average growing season years. Less reproduction will occur in below-average precipitation years. Some functional groups may not grow during below-average years.
