USDA Natural Resources
Conservation Service

Ecological site R030XB137NV
GRAVELLY WASH 5-7 P.Z.

Last updated: 2/26/2025
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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.

Ecological site concept

This site occurs in ephemeral drainageways. Slopes typically range from 4 to 8 percent. Elevations range from 3500 to 5100 feet. The soils associated with this site are very deep, well drained to somewhat excessively drained, and formed in alluvium derived from limestone and dolomite.

Please refer to group concept R030XB052NV to view the provisional STM.

Similar sites

R030XB133NV	**GRAVELLY INSET FAN 5-7 P.Z.** AMDU2, MESP2 and PSFR dominant shrubs; more productive site.
R030XB138NV	**DRY GRAVELLY WASH 5-7 P.Z.** PRFA none to sparse; less productive.
R030XB051NV	**UPLAND WASH** AMER and PLRI3 dominant species; more productive site.
R030XB132NV	**GRAVELLY WASH 3-5 P.Z.** ACGR and PSFR dominant shrubs; more productive site.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Prunus fasciculata* (2) *Psorothamnus fremontii*
Herbaceous	Not specified

Physiographic features

This site occurs in ephemeral drainageways. Slopes typically range from 4 to 8 percent. Elevations range from 3500 to 5100 feet.

Table 2. Representative physiographic features

Landforms	(1) Drainageway
Flooding duration	Brief (2 to 7 days)
Flooding frequency	Occasional
Elevation	3,500–5,100 ft
Slope	4–8%

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 about 66 degrees F. The average growing season is about 280 to 320 days.

Table 3. Representative climatic features

Frost-free period (average)	320 days
Freeze-free period (average)	
Precipitation total (average)	7 in

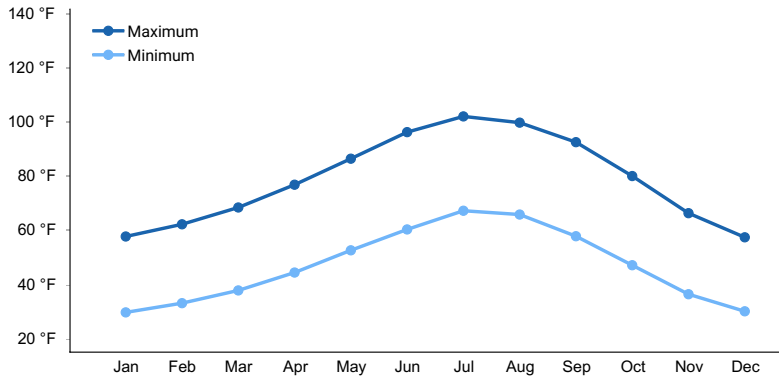


Figure 1. Monthly average minimum and maximum temperature

Influencing water features

This site receives occasional flooding during spring runoff and summer convection storms.

Soil features

The soils associated with this site are very deep, well drained to somewhat excessively drained, and 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. Soil series correlated to this ecological site include Colosseum, a sandy-skeletal, carbonatic, thermic Typic Haplocalcid and Elbowcanyon, a loamy-skeletal, carbonatic, thermic Typic Torriorthents.

Table 4. Representative soil features

Parent material	(1) Alluvium–dolomite (2) Alluvium–limestone
Surface texture	(1) Very gravelly fine sandy loam
Family particle size	(1) Sandy
Drainage class	Well drained to somewhat excessively drained
Permeability class	Moderate to moderately rapid
Soil depth	72–84 in
Surface fragment cover <=3"	75–95%
Surface fragment cover >3"	1–8%
Available water capacity (0-40in)	1.06–3.86 in

Calcium carbonate equivalent (0-40in)	10–50%
Electrical conductivity (0-40in)	0–2 mmhos/cm
Sodium adsorption ratio (0-40in)	0–5
Soil reaction (1:1 water) (0-40in)	7.9–8.4
Subsurface fragment volume <=3" (Depth not specified)	30–80%
Subsurface fragment volume >3" (Depth not specified)	0–7%

Ecological dynamics

Please refer to group concept R030XB052NV 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).

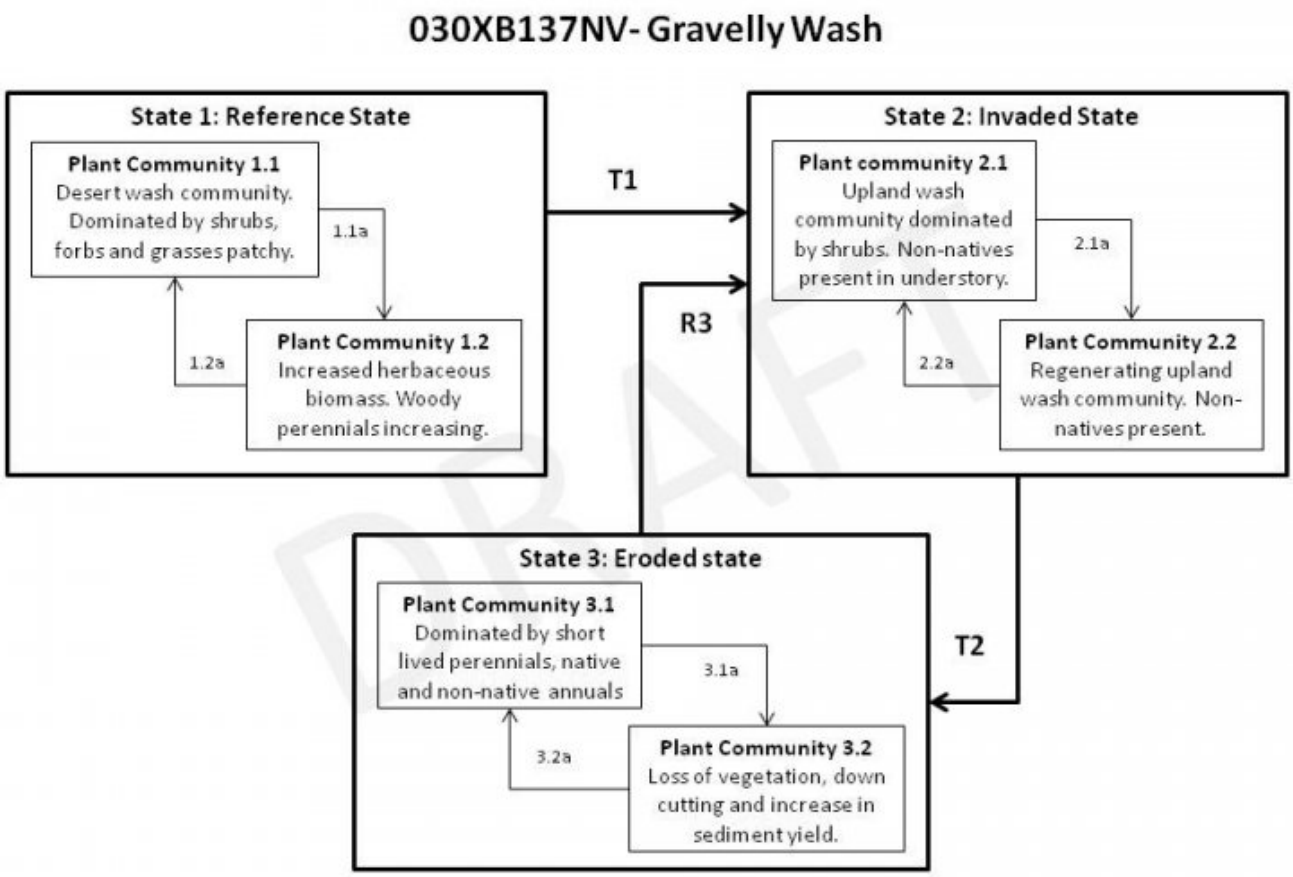
As a result of decreased flow rates in the downstream direction, more silts and fines are deposited in the channel, which can be advantageous to biotic communities. Many of the species (white burrobush, encelia) occurring on this site are generally considered to be increasers or pioneers in the presence 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 this site compared to the surrounding area increases the likelihood of invasion by 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 within this site due to their location on the landscape. 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, baccharis and other fire intolerant shrubs decrease. Fire tolerant species such as bursage, burrobush, ephedra, desert willow and acacia 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 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 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



State 1
Reference State

The reference state is representative of the natural range of variability under pristine conditions. Plant community phase changes are driven by drought, infrequent wildfire, disease, insect attack and occasional flooding in response to heavy rainfall events. Fire is rare in this system. This ecological site experiences seasonal flooding and is important for redistributing moisture and nutrients throughout the landscape. Plant community dynamics are controlled by interactions between weather patterns and disturbance regimes.

Community 1.1
Reference Plant Community

Figure 2. Gravelly Wash

The reference plant community is characteristic of a healthy, mid to late-seral plant community phase. Dominant plant species include desert almond, Fremont's dalea and white burrobush. Nevada ephedra and Yucca species are other important species associated with this ecological site. Potential vegetative composition is about 10 percent grasses, 10 percent forbs and 85 percent shrubs. Approximate ground cover (basal and crown) is 15 to 35 percent. Annual natives are abundant in years with increased spring time precipitation.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Shrub/Vine	280	400	560
Forb	35	50	70
Grass/Grasslike	35	50	70
Total	**350**	**500**	**700**

Community 1.2
Plant Community 1.2

This plant community is characteristic of a post-disturbance plant community. Initially, herbaceous biomass and short lived perennials increase. Additional run-in moisture from surrounding landscape increases the ecological resilience and helps this site recover following a disturbance. Sprouting shrubs quickly recover and provide favorable sites for establishment of other shrub seedlings. Desert almond and Fremont's dalea commonly sprout from root suckers following flooding and burial by sediment. Mexican bladdersage and ephedra are also capable of sprouting. This plant community is 'at-risk' of invasion by non-native species. Non-natives take advantage of the increased availability of critical resources following a disturbance.

Pathway 1.1a
Community 1.1 to 1.2

Severe seasonal flooding, wildfire, prolonged drought, disease and/or insect attack.

Pathway 1.2a
Community 1.2 to 1.1

Absence from disturbance and natural regeneration over time.

State 2
Invaded State

The Invaded State is characterized by the presence of non-native species in the understory. Non-native annuals will persist once introduced into the plant community, due to their annual growth form, abundant seed production and long term seed viability. Non-native annuals such as red brome, redstem filaree, and Mediterranean grass are potential invaders on this ecological site. Saltcedar is also a potential invader. A biotic threshold is crossed with the introduction of non-natives that are difficult to remove from the system and have the potential to alter disturbance regimes significantly from their historic range of variation. Non-native annuals are highly flammable and promote wildfire where fires historically have been infrequent.

Community 2.1
Invaded Plant Community 2.1

This plant community is compositionally similar to the reference plant community with a trace of non-natives in the understory. Ecological processes have not been compromised at this time. However, ecological resilience is reduced by the presence of non-natives and this community phase will respond differently following a disturbance when compared to the reference plant community. Non-natives compete with native species for space, water and critical resources like nitrogen. Fine fuels provided by non-native annuals create a continuous fuel bed, facilitating the spread of fire.

Community 2.2
Invaded Plant Community 2.2

This plant community is characteristic of a post-disturbance plant community. It is dominated by herbaceous biomass, which may or may not be non-native, woody perennials are increasing. Sprouting shrubs quickly recover and provide favorable microsites for establishment of other shrubs. Desert almond, Fremont's dalea, ephedra and Anderson wolfberry commonly sprout from root crown following disturbance. This plant community phase is characterized as "at-risk". The initial decrease in long-lived perennial shrubs reduces the stability of the site, leaving it vulnerable to increased erosion. Management actions to prevent this community phase from cross a irreversible threshold into state 3, include reducing surface disturbances, managing non-natives and protecting remaining native vegetation. Actions could include management of off-road vehicle use.

Pathway 2.1a
Community 2.1 to 2.2

Severe seasonal flooding, prolonged drought, wildfire, disease and/or insect attack.

Pathway 2.2a
Community 2.2 to 2.1

Absence from disturbance and natural regeneration over time.

State 3
Eroded State

The eroded state is characterized by increased erosion, channel entrenchment, sediment transport and the loss of perennial vegetation. Natural ecosystem processes are disrupted and sediment and nutrients are increasingly redistributed downstream. Feedbacks contributing to the stability of this state include soil erosion, nutrient loss, increased runoff and decreased infiltration. These feedbacks prevent the establishment of native vegetation and lead to further ecological damage. This state is considered to be hydrologically impaired. Non-natives persist in the plant community due to their annual growth form, persistent seed bank and competitive ability.

Community 3.1
Eroded Plant Community 3.1

This plant community is dominated by short-lived perennial shrubs and non-natives, characteristic of a short disturbance return interval. The ability of this site to dissipate energy during large flow event is severely reduced contributing to ecological damage downstream. Common evidence of water erosion and soil loss. Loss of perennial native vegetation has reduced organic mater inputs, accelerating loss of soil stability and erosion by wind and

water.

Community 3.2
Eroded Plant Community 3.2

This plant community is characterized by a loss of stability, increased erosion, and channel incision. Ecological processes have been altered including connectivity within the watershed, ground water recharge and habitat quality.

Pathway 3.1a
Community 3.1 to 3.2

Large scale disturbance removes remaining perennial shrubs.

Pathway 3.2a
Community 3.2 to 3.1

With time and the exclusion of disturbance some perennial plants return to the system increasing stability.

Transition T1
State 1 to 2

Introduction of non-native species due to a combination of factors including: 1) surface disturbance, 2) changes in the kinds of animals and their grazing patterns, 3) drought and/or 4) changes in fire history.

Transition T2
State 2 to 3

Reoccurring disturbance on a short return interval and removal of stabilizing vegetation.

Restoration pathway R3
State 3 to 2

Restoration pathway. Ecological processes can be restored to the site, but non-natives remain. Possible restoration techniques include stabilizing the site by reestablishing native perennials and the use of erosion control structures to dissipate energy and reestablish the flood plain.

Additional community tables

Table 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	**Perennial Grasses**			25–50	
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	5–10	–
	desert needlegrass	ACSP12	*Achnatherum speciosum*	5–10	–
	low woollygrass	DAPU7	*Dasyochloa pulchella*	5–10	–
	bush muhly	MUPO2	*Muhlenbergia porteri*	5–10	–
	big galleta	PLRI3	*Pleuraphis rigida*	5–10	–
2	**Annual Grasses**			1–10	
Forb					
3	**Perennial Forbs**			25–50	
	woolly desert marigold	BAPL3	*Baileya pleniradiata*	2–10	–
	suncup	CAMIS	*Camissonia*	2–10	–

	Indian paintbrush	CASTI2	*Castilleja*	2–10	–
	desert trumpet	ERIN4	*Eriogonum inflatum*	2–10	–
	desert globemallow	SPAM2	*Sphaeralcea ambigua*	2–10	–
4	**Annual Forbs**			1–25	
	redroot cryptantha	CRMIM	*Cryptantha micrantha var. micrantha*	1–8	–
	Franklin's phacelia	PHFR	*Phacelia franklinii*	1–8	–
	New Mexico plumeseed	RANE	*Rafinesquia neomexicana*	1–8	–
Shrub/Vine					
5	**Primary Shrubs**			245–450	
	desert almond	PRFA	*Prunus fasciculata*	125–200	–
	Fremont's dalea	PSFR	*Psorothamnus fremontii*	75–125	–
	burrobrush	HYSA	*Hymenoclea salsola*	25–50	–
	Nevada jointfir	EPNE	*Ephedra nevadensis*	10–25	–
	banana yucca	YUBA	*Yucca baccata*	5–10	–
	Joshua tree	YUBR	*Yucca brevifolia*	5–10	–
	Mojave yucca	YUSC2	*Yucca schidigera*	5–10	–
6	**Secondary Shrubs**			50–100	
	burrobush	AMDU2	*Ambrosia dumosa*	5–15	–
	blackbrush	CORA	*Coleogyne ramosissima*	5–15	–
	Virgin River brittlebush	ENVI	*Encelia virginensis*	5–15	–
	Apache plume	FAPA	*Fallugia paradoxa*	5–15	–
	littleleaf ratany	KRER	*Krameria erecta*	5–15	–
	creosote bush	LATR2	*Larrea tridentata*	5–15	–
	water jacket	LYAN	*Lycium andersonii*	5–15	–
	spiny menodora	MESP2	*Menodora spinescens*	5–15	–
	purple sage	SADO4	*Salvia dorrii*	5–15	–
	Mexican bladdersage	SAME	*Salazaria mexicana*	5–15	–
	turpentinebroom	THMO	*Thamnosma montana*	5–15	–
	beavertail pricklypear	OPBA2	*Opuntia basilaris*	1–10	–
	Wiggins' cholla	CYEC3	*Cylindropuntia echinocarpa*	1–10	–
	Engelmann's hedgehog cactus	ECEN	*Echinocereus engelmannii*	1–10	–
	cottontop cactus	ECPOP	*Echinocactus polycephalus var. polycephalus*	1–10	–

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, bush muhly and big galleta are palatable to domestic livestock. However, they account for only five to ten percent of total production and therefore provide a limited forage resource. Livestock commonly forage on desert almond in the spring and following rainy periods. Nevada ephedra is important to domestic livestock on winter ranges. It is typically browsed heavily without inducing toxicity. Yucca species are not considered palatable to domestic livestock. Signs of heavy browse should be considered an indication of poor range condition. 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 this 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 also 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. Banana yucca is eaten by mule deer when new growth is available. Joshua tree and Spanish dagger are important for small mammals, birds, reptiles, insects and spiders. Utilization by mule deer and pronghorn is limited to accessible blooms and fruits. Yuccas provide important nest material, nesting site and habitat for a variety of wildlife.

Hydrological functions

Runoff is low and permeability is moderate to moderately rapid. 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 S25
UTM zone	N
UTM northing	4033838
UTM easting	660555
Latitude	36° 26′ 10″
Longitude	115° 12′ 31″
General legal description	Approximately .75 mile from Fossil Ridge, near White Spot Spring. southeast of Yucca Forest in the Desert National Wildlife Refuge, Clark County, Nevada. Mt. Diablo Meridian. USGS Gass Peak, 7.5 minute topographic quadrangle.

Other references

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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.

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Contributors

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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	Sarah Quistberg
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

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

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2. **Presence of water flow patterns:** Water flow patterns are common and may be long (> 3m) and connected.

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

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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 up to 10%, depending on amount of surface rock fragments.

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

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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 and runoff 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, platy. Soil surface colors are pale browns 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. Subangular blocky structure or calcic 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: Mojave Desert shrubs

    Sub-dominant: perennial forbs> deep-rooted, warm-season, bunchgrasses > deep-rooted, cool-season, bunchgrasses > annual forbs > shallow-rooted grasses

    Other:

    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 (±25%) have dead centers.

14. **Average percent litter cover (%) and depth (in):** Between plant interspaces and under canopy up to 35% 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 ±500 lbs/ac. Favorable years ±700 lbs/ac and unfavorable years

±350 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, salt cedar, annual mustards, Mediterranean grass, and redstem filaree.

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17. **Perennial plant reproductive capability:** All functional groups should reproduce in average and above-average growing season years. Less reproduction will occur in below-average precipitation years.
