USDA Natural Resources
Conservation Service

Ecological site R030XB008NV
SHALLOW GRANITIC HILL 5-7 P.Z.

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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 on hill and mountain summits and sideslopes on all exposures. Slopes range from 8 to over 50 percent, but slope gradients of 30 to 50 percent are typical. Elevations are 1800 to about 4000 feet.The soils associated with this site are very shallow to shallow and have formed in residuum derived from granite.

This site is part of provisional site R030XB056NV.

Associated sites

R030XB057NV	**SHALLOW GRANITIC LOAM 5-7 P.Z.**
R030XB058NV	**GRANITIC FAN 5-7 P.Z.**

Similar sites

R030XB060NV	**GRANITIC NORTH SLOPE 5-7 P.Z.** More productive site
R030XB062NV	**GRANITIC SLOPE 3-5 P.Z.** AMDU2-SEAR8 -KRPA codominant shrubs
R030XB087NV	**GRANITIC SLOPE 5-7 P.Z.** AMDU2-SEAR8 dominant shrubs
R030XB018NV	**GRANITIC LOAM 3-5 P.Z.** ENFA & VIDE2 major shrubs
R030XB007NV	**GRANITIC LOAM 5-7 P.Z.** More productive site
R030XB058NV	**GRANITIC FAN 5-7 P.Z.** LATR2-AMDU2 dominant shrubs
R030XB059NV	**GRANITIC FAN 3-5 P.Z.** AMDU2-ENCEL dominant shrubs

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Eriogonum fasciculatum var. polifolium*
Herbaceous	(1) *Achnatherum speciosum* (2) *Muhlenbergia porteri*

Physiographic features

This site occurs on hill and mountain summits and sideslopes on all exposures. Slopes range from 8 to over 50 percent, but slope gradients of 30 to 50 percent are typical. Elevations are 1800 to about 4000 feet.

Table 2. Representative physiographic features

Landforms	(1) Hill (2) Mountain
Elevation	549–1,219 m
Slope	8–50%
Aspect	Aspect is not a significant factor

Climatic features

The climate of the Mojave Desert has extreme fluctuations of daily temperatures, strong seasonal winds, and clear skies. The climate is arid and is characterized with cool, moist winters and hot, dry summers. Most of the rainfall falls between November and April. Summer convection storms from July to September may contribute up to 25 percent of the annual precipitation. Average annual precipitation is 5 to 7 inches. Mean annual air temperature is 64 to 69 degrees F. The average growing season is about 240 to 300 days.

Table 3. Representative climatic features

Frost-free period (average)	300 days
Freeze-free period (average)	
Precipitation total (average)	178 mm

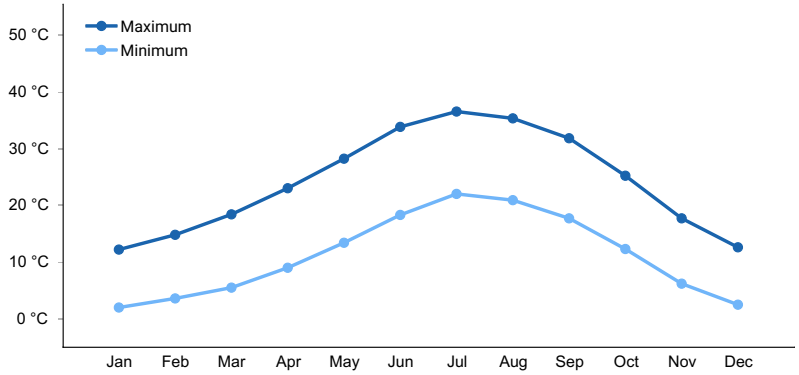


Figure 1. Monthly average minimum and maximum temperature

Influencing water features

There are no influencing water features associated with this site.

Soil features

The soils associated with this site are very shallow to shallow and have formed in residuum derived from granite. The soils are moderately to strongly alkaline. Water intake rates are moderately rapid and the soils are well drained. Available water capacity is very low and runoff is high to very high depending on slope. The soil series associated with this site include Seanna.

Table 4. Representative soil features

Parent material	(1) Residuum–granite

Surface texture	(1) Extremely gravelly sandy loam (2) Very gravelly sandy loam (3) Extremely cobbly coarse sandy loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderately rapid
Soil depth	10–36 cm
Surface fragment cover <=3"	35–85%
Surface fragment cover >3"	26–30%
Available water capacity (0-101.6cm)	1.52–2.54 cm
Calcium carbonate equivalent (0-101.6cm)	0–15%
Electrical conductivity (0-101.6cm)	0–2 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–5
Soil reaction (1:1 water) (0-101.6cm)	7.9–9.6
Subsurface fragment volume <=3" (Depth not specified)	26–76%
Subsurface fragment volume >3" (Depth not specified)	0–33%

Ecological dynamics

The described plant community may be a "burned" expression (seral stage) of the blackbrush community characterized by Shallow Granitic Slope 5-7" P.Z. (030XB056NV).

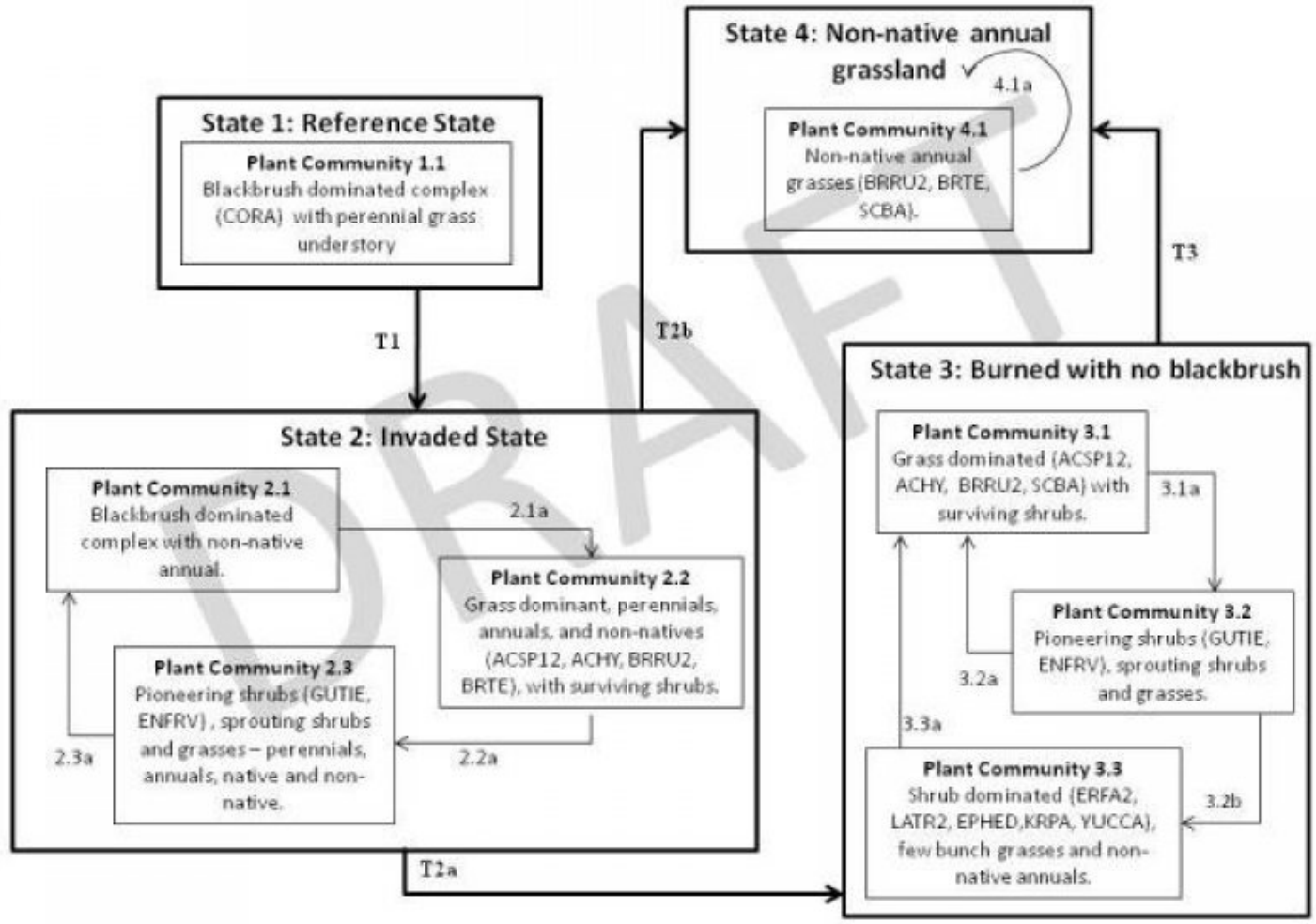
Fires in the Mojave Desert are infrequent and of low severity because production of annual and perennial herbs seldom provide a fuel load capable of sustaining fire.

Plant succession varies wildly following fire and blackbrush communities can be replaced by undesirable species, like redstem filaree, snakeweed (Gutierrezia spp), and Bromus spp. (Anderson 2001). The response of woody vegetation post-fire largely depends on site history, species present prior to the fire, as well as, fire severity and frequency (Lei 1999). Common plant species include those that are known to sprout, be fire resistant, or are prolific seed producers. Mojave buckwheat, creosotebush, Ephedra spp., Encelia spp., and white bursage are all found on burned blackbrush sites. However, it is uncommon to see blackbrush recruitment under the current climatic conditions, especially at the lower extent of its elevational range. The traits that allow established blackbrush communities to persist for centuries, even after environmental conditions have changed are now precluding seedling establishment under the current climatic regime (Pendleton and Meyer 2004).

The historic fire return interval for Mojave buckwheat stands varies from 25-50 years. Mojave buckwheat is vulnerable to hot fires. Resprout success is low and most regeneration is from seeds. Frequent fires deplete the seed bank, making populations vulnerable to extinction. Ephedra generally sprouts after fire damages aboveground vegetation. Underground regenerative structures commonly survive when aboveground vegetation is consumed by fire. However, severe fires may kill shallowly buried regenerative structures. Fire generally kills white bursage. Range ratany is top-killed by fire. Range ratany resprouts from the root crown after fire. Following fire, Virgin River encelia depends on off-site seed rather than on-site sprouts for regeneration. Desert needlegrass has persistent dead leaf bases, which make it susceptible to burning. Fire removes the accumulation; a rapid, cool fire will not burn deep into the root crown. Most perennial grasses have root crowns that can survive wildfire. Fire top-kills bush muhly. A nonrhizomatous species, bush muhly regenerates following fire from soil-stored seed. Burning causes at least short-term decline of bush muhly. Recovery time is thought to vary considerably and is probably dependent on

postfire weather and competition. When ungrazed, bush muhly's dense growth may contribute to fire spread. It may be most susceptible to fire damage when growing beneath shrubs because of increased fuels and higher temperatures as shrubs burn. Damage to big galleta from fire varies. If big galleta is dry, damage may be severe. However, when plants are green, fire will tend to be less severe and damage may be minimal, with big galleta recovering quickly.

State and transition model



State 1
Reference State

This state represents the natural range of variability under pristine conditions. The reference state is dominated by long-lived evergreen shrub communities with an understory of cool and warm season perennial bunchgrasses. Plant community phase changes are primarily driven by fire, long-term drought and insect attack. Historically, fire is rare in this system, but does impact long-term plant community dynamics.

Community 1.1
Reference Plant Community

The reference plant community is dominated by Mojave buckwheat. Desert needlegrass, bush muhly, ephedra, range ratany, and white bursage are other important species associated with this site. Potential vegetative composition is about 30% perennial and annual grasses, 10% annual and perennial forbs and 60% shrubs. Approximate ground cover (basal and crown) is 5 to 10 percent.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Shrub/Vine	67	135	202
Grass/Grasslike	34	67	101
Forb	11	22	34
Total	**112**	**224**	**337**

State 2
Invaded

Introduced annuals such as red brome, schismus and redstem stork's bill have invaded the reference plant community and have become a dominant component of the herbaceous cover. This invasion of non-natives is attributed to a combination of factors including: 1) surface disturbances, 2) changes in the kinds of animals and their grazing patterns, 3) drought, and 4) changes in fire history. These non-natives annuals are highly flammable and promote wildfires where fires historically have been infrequent. A biotic threshold has been crossed, with the introduction of no-natives that cannot be removed from the system. The presence of non-natives has reduced the ecological resilience of the site. Following a disturbance this state relies on the availability of an offsite seed source. These non-natives have the potential to significantly alter disturbance regimes from their historic range.

Community 2.1
Plant Community Phase 2.1

This plant community is compositionally similar to the Reference Plant Community with the presence of non-native species in the understory. Primary ecological processes have not been compromised at this time.

Community 2.2
Plant Community Phase 2.2

This plant community is characterized by increased annual, perennial, native and non-native grasses. Few surviving shrubs will remain on the site. This plant community is identified as “at-risk”. Continued heavy disturbance or repeated fire will exclude native vegetation and change the ecological dynamics of the site.

Community 2.3
Plant Community Phase 2.3

Shrubs have begun to regenerate. Woody species with high seed production and early establishment will be the first to return. Once large shrubs are established and begin to produce shade it will favor the establishment of additional native perennials.

Pathway 2.1a
Community 2.1 to 2.2

Anthropogenic disturbance removes shrubs and favors an increase of herbaceous vegetation and non-native species.

Pathway 2.2a
Community 2.2 to 2.3

Changes in management remove disturbance and allow woody species to regenerate. Post disturbance colonization by woody species will be limited to thoes with high growth rates, high reproductive ability and relatively short life spans (GUTIE, ENFAV, ERFA). Blackbrush will begin to reestablish provided favorable climatic conditions and available seed source.

Pathway 2.3a

Community 2.3 to 2.1

Many years with NO fire, minimal disturbance, the presence of a blackbrush seed source, ideal climatic conditions and multiple recruitment pulses blackbrush seedlings will establish and recruit into the stand.

State 3
Burned With No Blackbrush

This state is characterized by the inability of blackbrush to return to the site. An abiotic and/or biotic threshold has been crossed, due to insufficient climatic conditions and/or lack of an available seed source, respectively. In the absence of ideal conditions blackbrush will not return to the site. Shrubs with high growth rates and high reproductive capacities will persist after invasion by non-native annuals. However, other shrubs, such as blackbrush, are unsuccessful competitors in the disturbance regime created by the non-natives and can be removed from the system.

Community 3.1
Plant Community Phase 3.1

Is characterized by dominance of grasses; annual, perennial, native and non-native. Few surviving shrubs remain on the site. Non-native annuals provide a significant amount of herbaceous biomass.

Community 3.2
Plant Community Phase 3.2

This plant community is dominated by pioneering woody species tolerant of post fire conditions. Scattered shrubs consist of those with the ability to sprout from the root crown following fire. Perennial bunchgrasses and non-native annuals are common and wide spread.

Community 3.3
Plant Community Phase 3.3

This plant community is dominated by a variety of shrubs that were present in smaller quantities in the Reference State. Blackbrush continues to be excluded from this site due to the lack of seed source and ideal conditions required for recruitment and establishment.

Pathway 3.1a
Community 3.1 to 3.2

Time without disturbance pioneering shrubs germinate and establish from an offsite seed source and sprouting shrubs begin to reappear.

Pathway 3.2a
Community 3.2 to 3.1

Small scale fire of other localized disturbances remove patches of woody vegetation and encourage growth of perennial bunchgrasses and non-native annuals.

Pathway 3.2b
Community 3.2 to 3.3

Removal of disturbance and the absence of fire favors establishment of long-live native perennial vegetation.

Pathway 3.3a
Community 3.3 to 3.1

Large disturbance, like fire, removes woody vegetation and promotes growth of non-native annuals.

State 4
Non-Native Annual Grassland

This state is characterized by a fire return interval too frequent for native woody perennials to reestablish and the dominance of non-native annual grasses. A biotic threshold has been crossed removing important structural and functional groups. Ecological functions including nutrient cycling and infiltration have been severely reduced.

Community 4.1
Plant Community Phase 4.1

This plant community is characterized by monoculture of non-native annuals, mostly non-native annual grasses. Loss of perennial vegetation reduces infiltration and increases soil erosion and redistribution, which has damaging effects on the hydrologic and nutrient cycles. Frequent repeated fires exclude native vegetation, especially woody species and favor a monoculture of non-native annuals. This phase is a reoccurring cycle.

Transition 1
State 1 to 2

Introduction of non-natives due to anthropogenic disturbances, including OHV use, dry land farming, grazing, linear corridors, mining, military training operations, and settlements.

Transition 2a
State 2 to 3

Large scale high intensity fire in combination with insufficient climatic conditions for germination and establishment of blackbrush.

Transition 2b
State 2 to 4

Large scale repeated fire excludes native perennials and creates non-native annual grassland.

Transition 3
State 3 to 4

Large scale repeated fire excludes native perennials and creates non-native annual grassland.

Additional community tables

Table 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	**Primary Perennial Grasses**			49–101	
	desert needlegrass	ACSP12	*Achnatherum speciosum*	34–56	–
	bush muhly	MUPO2	*Muhlenbergia porteri*	11–34	–
	big galleta	PLRI3	*Pleuraphis rigida*	4–11	–
2	**Secondary Perennial Grasses**			1–11	
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	1–4	–
	threeawn	ARIST	*Aristida*	1–4	–
3	**Annual Grasses**			1–11	
Forb					
4	**Perennial Forbs**			4–18	
	desert marigold	BAILE	*Baileya*	1–4	–
	desert globemallow	SPAM2	*Sphaeralcea ambigua*	1–4	–
5	**Annual Forbs**			1–18	
Shrub/Vine					
6	**Primary Shrubs**			114–204	
	Eastern Mojave buckwheat	ERFAP	*Eriogonum fasciculatum var. polifolium*	90–123	–
	burrobush	AMDU2	*Ambrosia dumosa*	11–22	–
	jointfir	EPHED	*Ephedra*	4–22	–
7	**Secondary Shrubs**			11–34	
	catclaw acacia	ACGR	*Acacia greggii*	2–7	–
	brittlebush	ENFA	*Encelia farinosa*	2–7	–
	burrobrush	HYSA	*Hymenoclea salsola*	2–7	–
	creosote bush	LATR2	*Larrea tridentata*	2–7	–
	desert-thorn	LYCIU	*Lycium*	2–7	–
	pricklypear	OPUNT	*Opuntia*	2–7	–
	Fremont's dalea	PSFR	*Psorothamnus fremontii*	2–7	–
	Mojave yucca	YUSC2	*Yucca schidigera*	2–7	–

Animal community

Livestock Interpretation:
This site has limited value for livestock grazing due to low forage production, steep slopes, and stony surfaces. Grazing management should be keyed to dominant grasses or palatable shrub production. Mojave buckwheat has a browse rating of fair to poor for cattle. Ephedra is important winter range browse for domestic cattle, sheep and goats. White bursage is an important browse species. Browsing pressure on white bursage is particularly heavy during years of low precipitation, when production of winter annuals is low. White bursage is of intermediate forage value. It is fair to good forage for horses and fair to poor for cattle and sheep. However, because there is often little other forage where white bursage grows, it is often highly valuable to browsing animals. Range ratany is an important forage species for all classes of livestock. Palatability of range ratany is rated fair to good for cattle and sheep. Encelia has no forage value for domestic livestock. Young desert needlegrass is palatable to all classes of livestock. Mature herbage is moderately grazed by horses and cattle, but rarely grazed by sheep. Bush muhly is readily eaten by livestock throughout the year when available; however, it is usually not abundant enough to provide much forage. It is grazed heavily in winter when other species become scarce. Because of its branching habit, it is extremely susceptible to heavy grazing. Bush muhly is damaged when continuously grazed to a stubble height of

less than 4 inches (10 cm). Big galleta is considered a valuable forage plant for cattle and domestic sheep. Its coarse, rigid culms make it relatively resistant to heavy grazing and trampling.
Stocking rates vary over time depending upon season of use, climate 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:
Mule deer, bighorn sheep, and pronghorn browse ephedra, especially in spring and late summer when new growth is available. White bursage is an important browse species for wildlife. Range ratany is an important forage species for deer. Mule deer browse range ratany year-long with seasonal peaks. Mule deer peak use is from February to April and from August to October. Virgin River encelia is important to the desert tortoise as a source of succulent forage in periods of low moisture. Encelia is a browse species for mule deer and desert bighorn sheep. Young desert needlegrass is palatable to many species of wildlife. Desert needlegrass produces considerable basal foliage and is good forage while young. Desert bighorn sheep graze desert needlegrass. The palatability of bush muhly for wildlife species is rated fair to poor. In southern Nevada, big galleta is heavily utilized by bighorn sheep and in some blackbrush communities it is referred to as preferred habitat. Mule deer utilize trace amounts of big galleta.

Hydrological functions

Runoff is high to very high. Permeability is moderately rapid. Hydrologic soil group is D.

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 opportunties to photographers and for nature study.

Other products

Native Americans used ephedra as a tea to treat stomach and kidney ailments. White bursage is a host for sandfood, a parasitic plant with a sweet, succulent, subterranean flowerstalk. Sandfood was a valuable food supply for Native Americans.

Other information

Ephedra is useful for erosion control, and seedlings have been successfully planted onto reclaimed strip mines. Atrazine may be effective in controlling ephedra, though some plants can survive through crown sprouting. Irrigation may increase control by atrazine. White bursage may be used to revegetate disturbed sites in southwestern deserts. Big galleta's clumped growth form stabilizes blowing sand.

Type locality

Location 1: Clark County, NV	
Township/Range/Section	T32S R65E S13
UTM zone	N
UTM northing	3893223
UTM easting	711484
Latitude	35° 9′ 34″
Longitude	114° 40′ 41″
General legal description	About 8 miles west of Laughlin, south of Nevada Highway 163, Clark County, Nevada. This site also occurs in southern Lincoln county.

Other references

Fire Effects Information System (Online; http://www.fs.fed.us/database/feis/plants/).

Lei, S.A. 1999. Postfire Woody Vegetation Recovery and Soil Properties in Blackbrush (Coleogyne ramosissima Torr.) Shrubland Ecotones. J. of the Arizona-Nevada Academy of Science. 32.2: 105-115.

Pendleton, B.K. and S.E. Meyer. 2004. Habitat-correlated variation in blackbrush (Coleogyne ramosissima: Rosaceae) seed germination response. J. of Arid Environments. 59: 229-243.

USDA-NRCS Plants Database (Online; http://www.plants.usda.gov).

Contributors

HA/GKB

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)	P NOVAK-ECHENIQUE
Contact for lead author	State Rangeland Management Specialist
Date	04/08/2010
Approved by	Kendra Moseley
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** Rills are rare. A few rills can be expected on steeper slopes in areas recently subjected to summer convection storms. Rock fragments armor the surface.

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2. **Presence of water flow patterns:** Water flow patterns are rare but can be expected in areas recently subjected to summer convection storms, usually on steeper slopes.

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3. **Number and height of erosional pedestals or terracettes:** Pedestals are rare. Occurrence is usually limited to areas of 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 15-25%; surface cover of rock fragments to 85%; shrub canopy to 10%; foliar cover of perennial herbaceous plants ± 1%.

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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

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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 during intense summer convection storms or rapid snowmelt events. Persistent litter (large woody material) will remain in place except during catastrophic events.

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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.)

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Surface structure is typically weak thin platy to weak fine granular structure. Soil surface colors are brown and soils are typified by an ochric epipedon. Organic matter of the surface horizon is typically <1 percent dropping off quickly below. Organic matter content can be more or less depending on micro-topography.

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Shrub canopy and associated litter break raindrop impact.

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11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** Compacted layers are not typical.

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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 Communities: Mojave Desert shrubs

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

    Other:

    Additional:

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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; some of the mature bunchgrasses (<10%) have dead centers.

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14. **Average percent litter cover (%) and depth (in):** Between plant interspaces up to 5%.

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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 ± 200 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:** Red brome, Mediterranean grass and red-stem filaree are invaders on this site.

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17. **Perennial plant reproductive capability:** All functional groups should reproduce in average (or normal) and above average growing season years.
