Ecological site R030XB078NV
BARREN HILL 3-5 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.

Associated sites

R030XB019NV	**Eroded Fan Remnant Pavette 4-6 P.Z.**

Similar sites

R030XB019NV	**Eroded Fan Remnant Pavette 4-6 P.Z.** More productive site; AMDU2 important shrub
R030XB084NV	**ERODED SLOPE** Unstable plant community; vegetation constantly shifting with sloughing of surface soil/gravels; ratings of Similarity Index not appropriate

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Larrea tridentata*
Herbaceous	Not specified

Physiographic features

This site occurs on low hills and fan remnants. Slopes range from 8 to 15 percent, but slope gradients of 2 to 8 percent are typical. Elevations are 600 to about 1800 feet.

Table 2. Representative physiographic features

Landforms	(1) Fan remnant (2) Hill
Elevation	600–1,800 ft
Slope	8–15%

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 3 to 5 inches. Mean annual air temperature is 65 to 76 degrees F. The average growing season is about 270 to 360 days.

Table 3. Representative climatic features

Frost-free period (average)	360 days
Freeze-free period (average)	
Precipitation total (average)	5 in

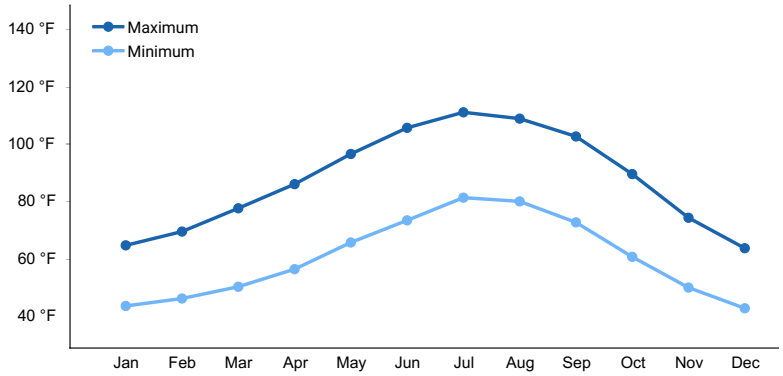


Figure 1. Monthly average minimum and maximum temperature

Influencing water features

There are no influencing water features associated with this site.

Soil features

The soil associated with this site are very deep and have formed in residuum or colluvium from sedimentary rock sources. Desert pavement is common. The soils are well drained to excessively drained, available water capacity is very low, and runoff is very low to high. The soil temperature regime is hyperthermic. The soils are classified as Typic Haplargids and Typic Torriorthents.

Table 4. Representative soil features

Surface texture	(1) Extremely gravelly loam (2) Gravelly sandy loam
Family particle size	(1) Loamy
Drainage class	Well drained to excessively drained
Permeability class	Moderately slow to rapid
Soil depth	72–84 in
Surface fragment cover <=3"	28–40%
Surface fragment cover >3"	0–2%
Available water capacity (0-40in)	1.6–5.4 in
Calcium carbonate equivalent (0-40in)	0–15%
Electrical conductivity (0-40in)	0–2 mmhos/cm
Sodium adsorption ratio (0-40in)	0–5
Soil reaction (1:1 water) (0-40in)	7.4–9
Subsurface fragment volume <=3" (Depth not specified)	13–40%

Subsurface fragment volume >3" (Depth not specified)	0–13%

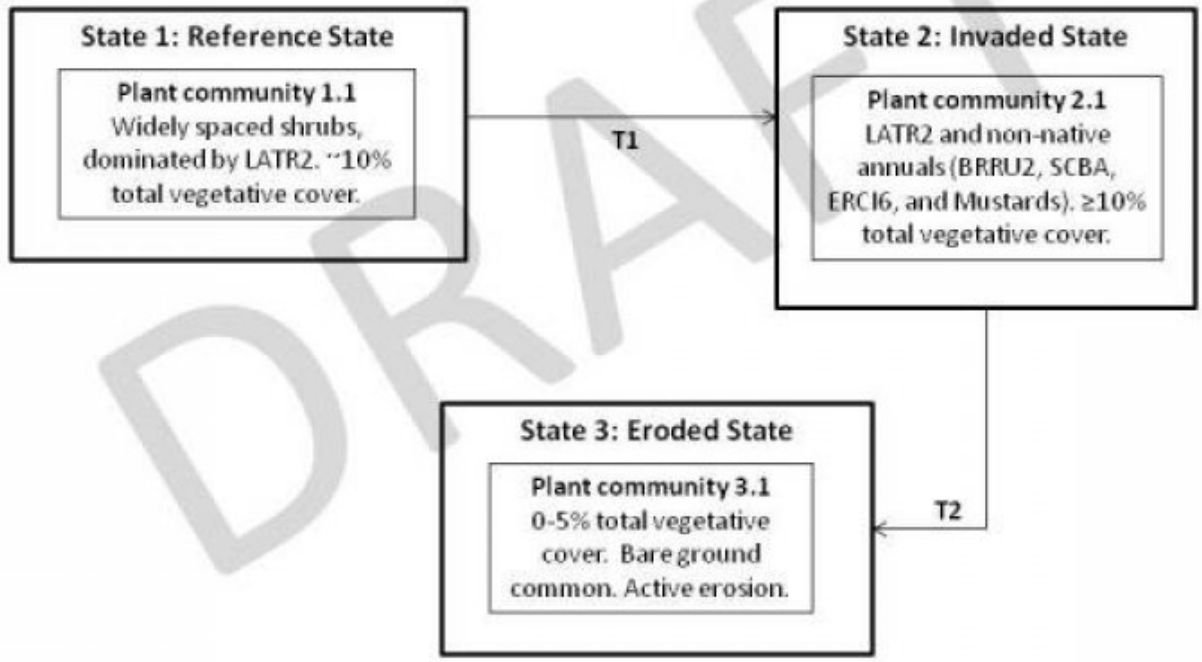
Ecological dynamics

Creosotebush scrub is a long lived, stable plant community that rarely varies in annual production. Variation in yearly production can be largely attributed to annual species. Nutrient concentrations in this shrub community are spatially variable. Nutrient resources are concentrated under shrub canopy relative to the interspaces, called islands of fertility (Kieft et al. 1998). The frost free season can last 360 days. However, vegetation is limited by nutrient availability. Limy soils found within these ecological sites generally have low organic matter, high alkalinity and a course texture.

Creosotebush, a longer-lived sclerophyllous evergreen shrub, and generally performs best in weakly developed soils of relatively young deposits. This observation is largely a function of the hydrological behavior of the soil (Hamerlynck et al. 2002). In poorly developed, course textured soils water can infiltrate and be stored deep in the soil profile. This allows deep rooted shrubs like creosotebush to extract water throughout the growing season as the upper soil profile becomes extremely dry. However, because creosotebush is dependent on soil moisture being available throughout the year it lacks the ability to become dormant during extended periods of drought (Hamerlynck et al. 2002). Extended periods of drought can cause entire branches or whole plants to die. In addition to having well developed root systems creosotebush also experiences hydraulic lift. Hydraulic lift occurs when plants absorb water from deep in the profile and transfers this moisture to the shallow roots in the dry topsoil (Yoder and Nowak 1999). This process occurs when stomata are closed and plants are not experiencing transpiration. Once the water is available to the shallow roots it remains there until stomata open and plant begins to transpire.

Historically, fires are rare on these sites and therefore have long-term impacts on the structure and composition of the community (Brown and Minnich 2006). Creosotebush is poorly adapted to fire because of its limited sprouting ability. Creosotebush survives some fires that burn patchily or are of low severity.

State and transition model



State 1
Reference State

The reference state represents the natural range of variability under pristine conditions. This plant community is stable, long lived and dominated by creosotebush. Community phase changes are primarily driven by long-term drought. Wildfire is infrequent and patchy due to low fuel loading, but can have long-term impacts on the plant community. Timing of disturbances combined with weather events determines plant community dynamics.

Community 1.1
Reference Plant Community

The reference plant community is dominated by creosotebush. This site is a hot, dry site with very little cover and very low productivity. Potential vegetative composition is about 5% annual and perennial forbs and 95% shrubs. Approximate round cover (basal and crown) is less than 6 percent.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Shrub/Vine	1	45	90
Grass/Grasslike	0	3	5
Forb	0	2	5
Total	**1**	**50**	**100**

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. LATR would persist after invasion by non-native annuals, but the other shrubs and desirable grasses may be unsuccessful in competing with the non-natives. The reference state represents the natural range of variability under pristine conditions. This plant community is stable, long lived and dominated by creosotebush. Community phase changes are primarily driven by long-term drought. Wildfire is infrequent and patchy due to low fuel loading, but can have long-term impacts on the plant community. Timing of disturbances combined with weather events determines plant community dynamics.

Community 2.1
Plant Community Phase 2.1

This plant community is compositionally similar to the reference plant community with the presence of non-natives in the understory. Total vegetative cover will increase slightly due to the presence of non-native annuals. This plant community is indentified as “at risk”. The decreased ecological resilience leaves the site susceptible to increased erosion.

State 3
Eroded State

The Eroded State is characterized by persistent and severe surface disturbance, reduced vegetative cover and increased bare ground. A biotic threshold has been crossed, with the loss of long-lived native vegetation, leading to active soil erosion.

Community 3.1
Plant Community Phase 3.1

This plant community is dominated by bare ground with few perennial shrubs remaining. Ecological processes have been greatly altered and active erosion is occurring.

Transition 1
State 1 to 2

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

Transition 2
State 2 to 3

Slow variables such as persistent heavy disturbance and loss of existing vegetation reduce soil stability. Triggers such as an intense rainfall event causing heavy overland flow and soil relocation.

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**			1–3	
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	0–2	–
	threeawn	ARIST	*Aristida*	0–2	–
	big galleta	PLRI3	*Pleuraphis rigida*	0–2	–
2	**Annual Grasses**			1–3	
Forb					
3	**Perennial forbs**			1–3	
4	**Annual forbs**			1–10	
Shrub/Vine					
5	**Primary shrubs**			36–46	
	creosote bush	LATR2	*Larrea tridentata*	35–43	–
	desertsenna	SEAR8	*Senna armata*	1–3	–
6	**Secondary shrubs**			5–13	
	shadscale saltbush	ATCO	*Atriplex confertifolia*	1–3	–
	brickellbush	BRICK	*Brickellia*	1–3	–
	brittlebush	ENFA	*Encelia farinosa*	1–3	–
	jointfir	EPHED	*Ephedra*	1–3	–
	Fremont's dalea	PSFR	*Psorothamnus fremontii*	1–3	–
	Parish's goldeneye	VIPA14	*Viguiera parishii*	1–3	–

Animal community

Livestock Interpretations:
This site has limited value for livestock grazing, due to the very low forage production. Creosotebush is unpalatable to livestock. Consumption of creosotebush may be fatal to sheep.

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:
Creosotebush is unpalatable to most browsing wildlife.

Hydrological functions

The soils are well drained to excessively drained, available water capacity is very low to moderate and runoff is very low to high.

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 to photographers and for nature study. This site is used for hiking and has potential for upland and big game hunting.

Other products

Creosotebush has been highly valued for its medicinal properties by Native Americans. It has been used to treat at least 14 illnesses. Twigs and leaves may be boiled as tea, steamed, pounded into a powder, pressed into a poultice,

or heated into an infusion.

Other information

Creosotebush may be used to rehabilitate disturbed environments in southwestern deserts. Once established, creosotebush may improve sites for annuals that grow under its canopy by trapping fine soil, organic matter, and symbiont propagules. It may also increase water infiltration and storage.

Type locality

Location 1: Clark County, NV

Other references

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

Hamerlynck, E.P., J.R. McAuliffe, E.V. McDonald and S.D. Smith. 2002. Ecological Responses of Two Mojave Desert Shrubs to Soils Horizon Development and Soil Water Dynamics. Ecology. 83.3: 768-779.

Kieft, T.L., C.S. White, S.R. Loftin, R. Aguilar, J.A. Craig and D. A. Skaar. 1998. Temporal Dynamics in Soil Carbon and Nitrogen Resources at a Grassland-Shrubland Ecotone. Ecology. 79.2: 671-683.

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

Yoder, C.K., and R.S. Nowak. 1999. Hydraulic lift among native plant species in the Mojave Desert. Plant and Soil. 215: 93-102.

Contributors

RWA

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	07/19/2010
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 rare. Rock fragments armor the soil surface against erosion.

2. **Presence of water flow patterns:** Water flow patterns are none to rare. Rock fragments armor the soils preventing water flow patterns from developing.

3. **Number and height of erosional pedestals or terracettes:** Pedestals and terracettes are none.

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare ground is variable (15-40%) depending on surface rock fragments.

5. **Number of gullies and erosion associated with gullies:** Gullies are none.

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

7. **Amount of litter movement (describe size and distance expected to travel):** Litter typically remains in place. Fine litter (foliage from grasses and annual & perennial forbs) may move the 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.

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 3 on most soil textures and varies depending on canopy cover. (To be field tested.)

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Soil surface structure is typically medium to thick platy or weak fine granular. Soil surface colors are light and the soils have 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.

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 massive or calcic sub-surface horizons are 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 grasses > annual forbs = annual grasses = perennial 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 are common and standing dead shrub canopy material may be as much as 25% of total woody canopy.

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14. **Average percent litter cover (%) and depth (in):** Between plant interspaces (trace) and depth (<¼-inch). Litter is concentrated under shrubs and generally stays in place.

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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 ~50lbs/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, red-stem filaree, mustards, and Mediterranean grass are invaders on this site.

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17. **Perennial plant reproductive capability:** All functional groups should reproduce in normal and above-normal rainfall years.
