USDA Natural Resources
Conservation Service

Ecological site R030XC044NV
ERODED SOUTH SLOPE 9-11 P.Z.

Last updated: 2/25/2025
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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 primarily on south-facing eroded fan remnants. Slopes range from 4 to 50 percent, but slope gradients of 30 to 50 percent are most typical. Elevations are 5500 to 7000 feet. The soils associated with this site are shallow to a cemented pan. They are well drained and formed in alluvium from limestone.

This site is part of group concept R030XC043NV.

Associated sites

R030XC045NV	**SHALLOW NORTH SLOPE 9-11 P.Z.** Shallow North Slope 9-11

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Coleogyne ramosissima* (2) *Atriplex confertifolia*
Herbaceous	(1) *Achnatherum hymenoides*

Physiographic features

This site occurs primarily on south-facing eroded fan remnants. Slopes range from 4 to 50 percent, but slope gradients of 30 to 50 percent are most typical. Elevations are 5500 to 7000 feet.

Table 2. Representative physiographic features

Landforms	(1) Fan remnant
Flooding frequency	None
Ponding frequency	None
Elevation	5,500–7,000 ft
Slope	4–50%
Aspect	SE, S, SW

Climatic features

The climate is semiarid with cool, moist winters and warm intermittently moist summers. Precipitation is greatest in the winter with a lesser secondary peak in the summer, typical of the Mojave Desert transitional to the Great Basin. Average annual precipitation is about 9 inches. Mean annual air temperature is about 51 to 56 degrees F. The average growing season is about 130 to 180 days.

Table 3. Representative climatic features

Frost-free period (average)	180 days
Freeze-free period (average)	
Precipitation total (average)	11 in

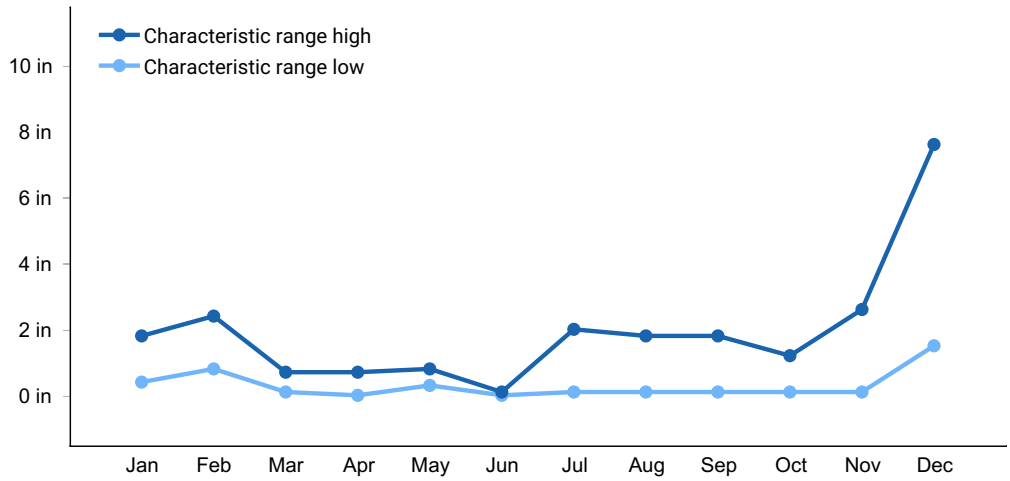


Figure 1. Monthly precipitation range

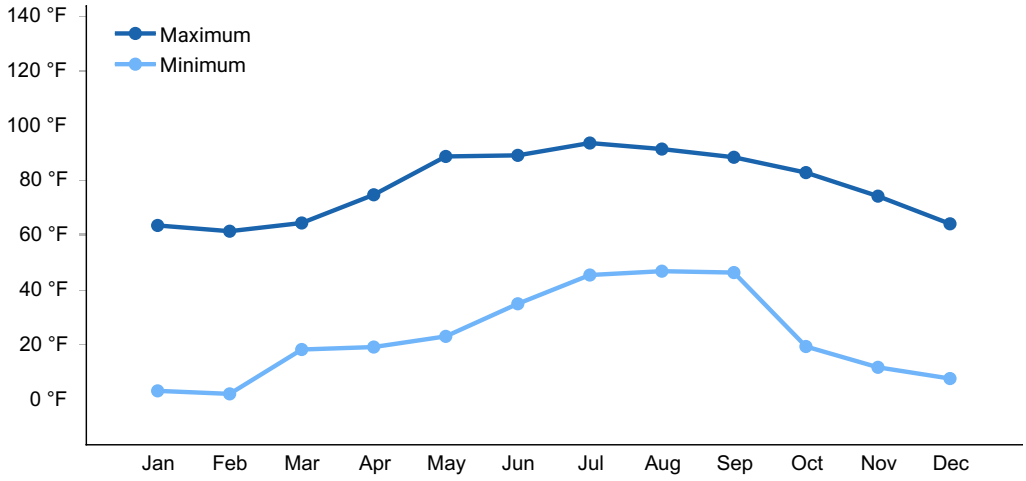


Figure 2. Monthly average minimum and maximum temperature

Influencing water features

There are no influencing water features associated with this site.

Soil features

The soils associated with this site are shallow to a cemented pan. They are well drained and formed in alluvium from limestone. The soil profile is modified by a high percentage of gravels and is characterized by a calcic horizon at 2 to 11 inches and a petrocalcic horizon at 11 to 14 inches. These soils have very high runoff and moderate permeability about the cemented pan. The soils of this site have an aridic soil moisture regime and a mesic soil temperature regime. Soil series correlated to this ecological site include Goodwater, classified as a loamy-skeletal, carbonatic, mesic shallow Calcic Petrocalcids.

Table 4. Representative soil features

Parent material	(1) Alluvium–limestone
Surface texture	(1) Very gravelly sandy loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderate
Soil depth	11–14 in
Surface fragment cover <=3"	80–90%
Surface fragment cover >3"	3–8%
Available water capacity (0-40in)	0.36–0.96 in
Calcium carbonate equivalent (0-40in)	40–55%

Electrical conductivity (0-40in)	0 mmhos/cm
Sodium adsorption ratio (0-40in)	0
Soil reaction (1:1 water) (0-40in)	7.9–8.4
Subsurface fragment volume <=3" (Depth not specified)	50–60%
Subsurface fragment volume >3" (Depth not specified)	1–8%

Ecological dynamics

Blackbrush communities are most prevalent in the transitional zone between the Mojave Desert and Great Basin. Blackbrush is a paleoendemic species as originally postulated by Stebbins and Major (1965). Blackbrush is a transitional species that occupies a boundary that has shifted in recent geologic time. Analysis of packrat middens suggests a 50–100-m downward movement of the blackbrush zone along elevational gradients in the Mojave Desert (Cole and Webb, 1985; Hunter and McAuliffe, 1994).

Blackbrush is a long-lived and generally considered a climax species. It is a non-sprouter; regeneration depends on wind pollinated seed and heavy winter precipitation, and is therefore slow to re-colonize burned areas (Anderson 2001). Blackbrush recruitment is episodic, like many shrubs in arid systems, when conditions are favorable large seed crops are produced and the rest of the time is characterized by minimal seed output (Pendleton and Meyer 2004). Blackbrush seeds are frequently cached away by rodents, until conditions are conducive for germination. Typically, germination occurs during the winter and early spring, given the proper moisture conditions and cool soil temperatures (Pendleton 2008). Seeds require cold stratification before germination and the survival of seedlings following germination is dependent on the availability of spring time moisture (Pendleton 2008).

On undisturbed sites, blackbrush dominates the landscape and species diversity is generally low. Undisturbed blackbrush communities are fairly resistant to invasion by non-natives (Brooks and Matchett 2003). Mature blackbrush plants are well adapted to persist under less than optimal conditions, and individuals’ may live as long as 400 years (Pendleton and Meyer 2004). Communities are characterized by a flammable shrub architecture allowing fire to easily spread, thus these communities experience stand replacing fire regimes. The short-lived seed of blackbrush is readily destroyed by fire. There is frequently 100 percent mortality of blackbrush following fire (Brooks and Matchett 2003).

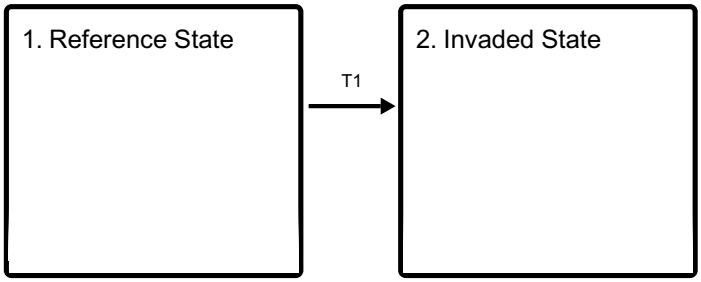
In years with increased precipitation and herbaceous biomass, these systems experience stand replacing fires. Shadscale is generally killed by fire. Nevada ephedra and Torrey's

ephedra respond similarily to fire. They are generally top-killed by fire, but underground regenerative structures commonly survive. Ephedra generally sprouts after fire damages aboveground vegetation and may increase in plant cover. Indian ricegrass can be killed by fire, depending on severity and season of burn. Indian ricegrass reestablishes on burned sites through seed dispersed from adjacent unburned areas. James galleta is a rhizomatous perennial bunchgrass which can resprout after it is top-kill by fire.

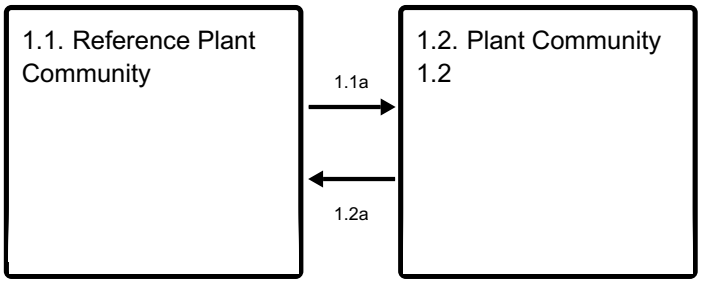
Post-fire plant communities vary, depending on use history and species present prior to the fire. Post fire sprouting shrub species such as yucca, Stansbury cliffrose and ephedra increase along with perennial grasses. Species that readily reestablish from seed such as shadscale and snakeweed also increase. Generally, non-natives increase and native species decrease post fire (Brooks and Matchett 2003). The effects of fire on blackbrush appear to be long term, it may upwards of 60 years for blackbrush to reestablish.

State and transition model

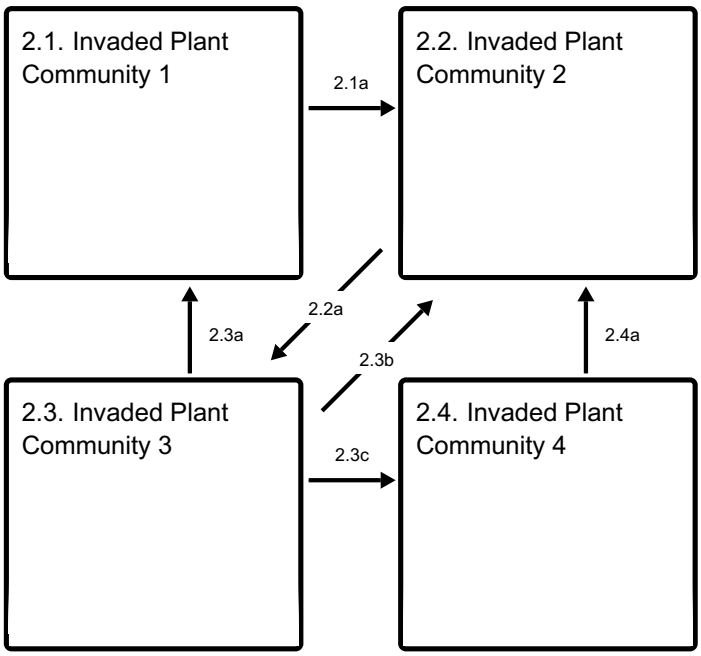
Ecosystem states



State 1 submodel, plant communities



State 2 submodel, plant communities



State 1
Reference State

The reference state is representative of the natural range for variability under pristine conditions. Historically, blackbrush associations were long-lived stable communities that rarely experienced fire. Plant community phase changes are primarily driven by long term drought. Wildfire is infrequent and patchy due to low fuel loading. Reproduction and recruitment of blackbrush is episodic, based on favorable climatic conditions (Pendleton and Meyer 2004). Very old stands of blackbrush may have established hundreds to thousands of years ago under very different climatic conditions and will take a considerable amount of time to recover following disturbances.

Community 1.1
Reference Plant Community

The reference plant community is characteristic of a mid-seral, healthy condition. It is dominated by blackbrush and Indian ricegrass. James galleta, Ephedra and shadscale saltbush are other important species associated with this site. Potential vegetative composition by weight is about 15 percent grasses, 10 percent annual and perennial forbs and 75 percent shrubs. Approximate ground cover (basal and crown) is 10 to 25 percent.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Shrub/Vine	75	150	260
Grass/Grasslike	15	30	55
Forb	10	20	35
Total	**100**	**200**	**350**

Community 1.2
Plant Community 1.2

This plant community is characteristic of an early-seral, post-disturbance plant community and is initially dominated by herbaceous vegetation. Sprouting shrubs quickly recover following disturbance and provide a favorable environment for the establishment of other shrub seedlings. Fast moving, low intensity fires result in the incomplete removal of blackbrush allowing for direct reestablishment. This plant community is ‘at-risk’ of invasion by non-native annuals, like red brome, cheatgrass and red stem filaree. Invasion by non-natives will cause this plant community to cross a biotic threshold into state 2. Composition of post-fire plant community may vary depending on season of burn. Spring or early summer fires may result in increased cover of Indian ricegrass. James galleta typically responds favorably to wildfire, returning to pre-fire cover within two years.

Pathway 1.1a
Community 1.1 to 1.2

Wildfire, prolonged drought and/or insect/disease attack.

Pathway 1.2a
Community 1.2 to 1.1

Absence from disturbance and natural regeneration over time. Regeneration of blackbrush is dependent on nearby seed source and favorable climatic conditions. Recovery of blackbrush to pre-fire conditions may take greater than 60 years.

State 2
Invaded State

The invaded state is characterized by the presence of non-native species. Ecological processes are not compromised at this time, however the presence of non-natives has reduced the ecological resilience of the site. A biotic threshold is crossed, with the introduction of non-native annuals that are difficult to remove from the system and have the potential to alter disturbance regimes significantly from their natural range of variability. These non-natives annuals are highly flammable and promote wildfires where fires historically have been infrequent.

Community 2.1
Invaded Plant Community 1

Figure 4. Invaded Plant Community with trace of red brome

This plant community is compositionally similar to the reference plant community with a trace of non-natives in the understory. Primary ecological processes have not been compromised at this time, however ecological resilience is reduced by the presence of non-natives. Management focused on reducing anthropogenic impacts and other disturbances is important for maintaining the health perennial native species.

Community 2.2
Invaded Plant Community 2

This plant community is characteristic of a post-disturbance, early-seral plant community. Initially this community phase is heavily dominated by herbaceous vegetation. Sprouting shrubs, such as Ephedra and Yucca, quickly recover and provide favorable sites of the establishment of shrub seedlings. Fast moving, low intensity fires result in the incomplete removal of blackbrush and allow for direct reestablishment. Abundance of non-native biomass varies annually depending on the weather. Post-fire plant communities may vary in response to the season of burn.

Community 2.3
Invaded Plant Community 3

This plant community is characteristic of a mid-seral plant community. Once sprouting shrubs establish they provide favorable micro-sites for the establishment of additional native perennials. Non-natives are present in the understory. Wildfire has long term effects on blackbrush communities. Natural regeneration post-fire may result in dominance by Stansbury cliffrose or shadscale saltbush, with a trace of blackbrush. Recovery of

blackbrush is highly dependent on intensity of the fire. Fast moving, low intensity fires result in incomplete removal of blackbrush, which allows for direct reestablishment. Abundance of non-native biomass varies annually depending on weather, droughty conditions favor native perennials and decrease abundance of non-natives.

Community 2.4
Invaded Plant Community 4

This plant community is dominated by shrubs that were present in smaller quantities in the reference plant community, such as Stansbury cliffrose or shadscale saltbush. Natural succession post fire may result in dominance by a variety of shrubs depending on weather conditions and disturbance regimes. Blackbrush is present in trace amounts and non-natives are present in the understory. Blackbrush establishes solely from seed and is characterized by a pulse recruitment dependent on periods of ideal climatic conditions. This plant community is representative of conditions where blackbrush has been unable to regain dominance due to changes in climatic patterns, disturbance regimes or both.

Pathway 2.1a
Community 2.1 to 2.2

Wildfire, prolonged drought and/or insect/disease attack.

Pathway 2.2a
Community 2.2 to 2.3

Absence from disturbance and natural regeneration over time.

Pathway 2.3a
Community 2.3 to 2.1

Absence from disturbance and natural regeneration over time. Recovery of blackbrush to pre-disturbance conditions may take a significant amount of time (>60years).

Pathway 2.3b
Community 2.3 to 2.2

Wildfire, prolonged drought and/or insect/disease attack.

Pathway 2.3c
Community 2.3 to 2.4

Absence from disturbance and natural regeneration over time.

Pathway 2.4a
Community 2.4 to 2.2

Wildfire, prolonged drought and/or insect/disease attack.

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.

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	**Primary Perennial Grasses**			14–30	
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	10–20	–
	James' galleta	PLJA	*Pleuraphis jamesii*	4–10	–
2	**Secondary Perennial Grasses**			4–10	
	Mormon needlegrass	ACAR14	*Achnatherum aridum*	1–4	–
	little Parish's needlegrass	ACPAD	*Achnatherum parishii var. depauperatum*	1–4	–
	desert needlegrass	ACSP12	*Achnatherum speciosum*	1–4	–
	purple threeawn	ARPU9	*Aristida purpurea*	1–4	–

	squirreltail	ELEL5	*Elymus elymoides*	1–4	–
	bush muhly	MUPO2	*Muhlenbergia porteri*	1–4	–
	Sandberg bluegrass	POSE	*Poa secunda*	1–4	–
	low woollygrass	DAPU7	*Dasyochloa pulchella*	1–2	–
Forb					
3	**Perennial**			10–20	
	King's sandwort	ARKI	*Arenaria kingii*	1–4	–
	desert marigold	BAMU	*Baileya multiradiata*	1–4	–
	smallseed sandmat	CHPO12	*Chamaesyce polycarpa*	1–4	–
	New Mexico thistle	CINE	*Cirsium neomexicanum*	1–4	–
	desert trumpet	ERIN4	*Eriogonum inflatum*	1–4	–
	desert frasera	FRAL5	*Frasera albomarginata*	1–4	–
	Cooper's rubberweed	HYCO2	*Hymenoxys cooperi*	1–4	–
	desert globemallow	SPAM2	*Sphaeralcea ambigua*	1–4	–
4	**Annual**			4–10	
	longcapsule suncup	CACH12	*Camissonia chamaenerioides*	1–4	–
	narrowstem cryptantha	CRGR3	*Cryptantha gracilis*	1–4	–
Shrub/Vine					
5	**Primary Shrubs**			110–150	
	blackbrush	CORA	*Coleogyne ramosissima*	90–110	–
	shadscale saltbush	ATCO	*Atriplex confertifolia*	10–20	–
	Nevada jointfir	EPNE	*Ephedra nevadensis*	5–10	–
	Torrey's jointfir	EPTO	*Ephedra torreyana*	5–10	–
6	**Secondary Shrubs**			10–30	
	woolly bluestar	AMTO2	*Amsonia tomentosa*	1–6	–
	Bigelow sage	ARBI3	*Artemisia bigelovii*	1–6	–
	desert almond	PRFA	*Prunus fasciculata*	1–6	–
	Stansbury cliffrose	PUST	*Purshia stansburiana*	1–6	–
	turpentinebroom	THMO	*Thamnosma montana*	1–6	–
	banana yucca	YUBA	*Yucca baccata*	1–6	–
	Joshua tree	YUBR	*Yucca brevifolia*	1–6	–
	littleleaf ratany	KRER	*Krameria erecta*	1–6	–

	spiny menodora	MESP2	*Menodora spinescens*	1–6	–
	beavertail pricklypear	OPBA2	*Opuntia basilaris*	1–3	–
	Wiggins' cholla	CYEC3	*Cylindropuntia echinocarpa*	1–3	–
	Engelmann's hedgehog cactus	ECEN	*Echinocereus engelmannii*	1–3	–
	cottontop cactus	ECPO2	*Echinocactus polycephalus*	1–3	–
	foxtail cactus	ESCOB	*Escobaria*	1–3	–
	threadleaf snakeweed	GUMI	*Gutierrezia microcephala*	1–3	–

Animal community

Livestock interpretations: This site has limited value for livestock grazing, due to low forage production and distance from adequate water resources. Grazing management should be keyed to dominant perennial grasses and palatable shrubs. Indian ricegrass benefits from moderate grazing use in winter and early spring. Inappropriate season of grazing may sharply reduce vigor of decrease overall cover. Indian ricegrass is palatable to all classes of livestock in both the green and cured condition. When actively growing, James’ galleta provides fair to excellent forage for domestic livestock. Dominant shrubs provide additional grazing resource on this ecological site. Blackbrush is economically important forage in the winter especially for domestic sheep. It is considered poor forage during the spring, summer and fall for domestic cattle, horses and sheep. Shadscale is an important source of browse for domestic sheep and goats. Domestic sheep and cattle heavily use shadscale leaves and seeds throughout the winter. The spinescense of shadscale limits use to 15 to 20 percent. Nevada ephedra is also highly important winter forage for domestic cattle, sheep and goats. It is generally heavily grazed without inducing toxicity in ewes or cows. However, palatability is generally considered to be low and consumption is limited to accessible blooms and fruits. Signs of heavy browsing by domestic livestock should be considered an indication of poor range condition.
Stocking rates vary over time depending upon season of use, climate variation, 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:
A variety of wildlife species find valuable foraging and habitat resources on this ecological site. Indian ricegrass is eaten by pronghorn when available. It is also the preferred seed of a variety of rodents and small mammals. Indian ricegrass makes up a significant portion of jackrabbit diets in the spring and summer. It also provides seed for many species of birds. Desert bighorn sheep utilize James’ galleta as forage, while it is palatable during the growing season. Although it is considered poor cover for most wildlife species, it provides fair cover for small mammals and small nongame birds. Blackbrush provides an important

winter browsing resource for several species of wildlife, including mule deer and bighorn sheep. Shadscale provides good browse for mule deer during winter, spring and fall. Bighorn sheep occasionally browse on shadscale and it primarily used by pronghorn antelope in the winter. It provides important habitat and foraging resources for small mammals such as blacktailed jackrabbit, kangaroo rat and deer mice. Raptors like the golden eagle utilize sites with shadscale to hunt their preferred prey of jackrabbits and other small mammals. Nevada ephedra is browsed by mule deer, bighorn sheep and pronghorn in the spring to late summer when new growth is available. Mule deer often seek out new growth on banana yucca, especially as it sprouts after fire. Banana yucca flower stalks are highly digestible and provide an important source of phosphorus. Bighorn sheep browse leave and fruit of banana yucca. Multiple parts of the plant are also used by small mammals, birds and insects. Joshua tree provides important habitat and food for small mammals, birds, insects and reptiles. Utilization by large wildlife is limited by the height of blossoms and fruit.

Hydrological functions

Runoff is very high and permeability is moderate. Shrubs and perennial bunchgrasses aid in infiltration and reduce runoff. Shrubs can also aid in snow capture.

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 used for hiking and has potential for upland and big game hunting.

Other products

The highly nutritious seed of Indian ricegrass was one of the staple foods of Native Americans. The seeds of shadscale were an important food source for Native Americans; generally it was made into bread or mush.
Ephedra was traditionally used a beverage and medicine. Native Americans made tea from the slender twigs and inner bark by boiling them. The beverage was used as tonic and blood purifier. However, ephedra is considered toxic and should be used with caution.
Banana yucca was used by Native Americans as a food source. Fruits were consumed raw before fully ripening. Cakes were also made by pit roasting the fruits, grinding them into a paste, and drying the resulting material. Fermented banana yucca has been used for beverages, its juices used as a preservative, its seeds dried and ground into a meal and the central leaves were incorporated into soups and meat dishes.

Other information

Indian ricegrass is well adapted to stabilization of disturbed sandy soils and is especially valuable for controlling wind erosion. It is well suited for reclamation projects in areas

receiving 8 to 14 inches annual precipitation.

Type locality

Location 1: Clark County, NV	
Township/Range/Section	T14S R60E S21
UTM zone	N
UTM northing	4063469
UTM easting	655658
Latitude	36° 42′ 15″
Longitude	115° 15′ 26″
General legal description	South of White Rock Road, near the mouth of Basin Canyon, Desert National Wildlife Refuge, Clark County, Nevada.

Other references

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

Contributors

E. Hourihan
PN-E

Approval

Sarah Quistberg, 2/25/2025

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/E.Hourihan
Contact for lead author	State Rangeland Management Specialist
Date	11/17/2011
Approved by	Sarah Quistberg
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** Rills are rare to few on steeper slopes and most frequently occur in areas subjected to summer convection storms or rapid spring snowmelt.

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2. **Presence of water flow patterns:** Water flow patterns are rare to few, usually less than 3 ft. in length, stable and not connected

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3. **Number and height of erosional pedestals or terracettes:** Plant pedestalling due to erosion is slight to few and most frequently occur in areas subjected to summer convection storms or rapid spring snowmelt.

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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 <10% depending on amount of rock fragments

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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 during intense summer storms. Persistent litter (large woody material) will remain in place except during large 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 3 to 5 on the coarse surface 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, medium, subangular blocky. Soil surface colors are browns and soils are typified by an ochric epipedon. Organic matter of the surface 2 to 3 inches is typically less than 1 percent dropping off quickly below.

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Perennial herbaceous plants (especially deep-rooted bunchgrasses [i.e., Indian ricegrass, needlegrasses] slow runoff and increase infiltration. Sparse shrub canopy and associated litter break raindrop impact and provide some opportunity for snow catch and accumulation on site.

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** None. Subsoil massive or petrocalcic horizons are not to be interpreted as compacted.

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: Evergreen shrubs (blackbrush, ephedra) >

Sub-dominant: deciduous shrubs> deep-rooted, cool-season, perennial grasses> deep-rooted, cool season, perennial forbs> warm season, perennial grasses = fibrous, shallow-rooted, cool season, annual and perennial forbs.

Other: succulents

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 30% of total woody canopy; some of the mature bunchgrasses (<20%) have dead centers.

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14. **Average percent litter cover (%) and depth (in):** Between plant interspaces and under canopy <10%, depth less than 0.25 inches

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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 (March thru May) ± 200 lbs/ac; favorable years 350 lbs/ac and unfavorable years 100 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 include red brome, Mediterranean grass and redstem filaree

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