Ecological site R030XB142NV
SHALLOW LOAM 7-9 P.Z.

Last updated: 2/26/2025
Accessed: 08/30/2026

General information

Provisional. A provisional ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model and enough information to identify the ecological site.

Ecological site concept

This site occurs on partial ballenas and fan remnants. Slope gradients of 4 to 15 percent are most typical. Elevations range from 3500 to 5800 feet. The soils associated with this site are shallow to a petrocalcic horizon, well drained and derived from limestone and dolomite. This site is part of group provisional concept R030XC034NV.

Associated sites

R030XB107NV	**COARSE GRAVELLY LOAM 5-7 P.Z.**
R030XB137NV	**GRAVELLY WASH 5-7 P.Z.**

Similar sites

R030XB107NV	**COARSE GRAVELLY LOAM 5-7 P.Z.** Occurs on inset fans, more productive.
R030XB090NV	**GRAVELLY FAN 7-9 P.Z.** More productive, BOER4 dominant.
R030XB108NV	**GRAVELLY INSET FAN 7-9 P.Z.** Occurs on inset fans, more productive.
R030XB057NV	**SHALLOW GRANITIC LOAM 5-7 P.Z.** More productive, MUPO2 co-dominant.

Table 1. Dominant plant species

Tree	Not specified

Shrub	(1) *Coleogyne ramosissima*
Herbaceous	(1) *Achnatherum hymenoides* (2) *Achnatherum speciosum*

Physiographic features

This site occurs on partial ballenas and fan remnants. Slope gradients of 4 to 15 percent are most typical. Elevations range from 3500 to 5800 feet.

Table 2. Representative physiographic features

Landforms	(1) Ballena (2) Fan remnant
Elevation	1,070 – 1,770 m
Slope	0 – 20 %
Aspect	Aspect is not a significant factor

Climatic features

The climate is hot and arid, with mild, moist winters and very hot, dry 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 9 inches. Mean annual air temperature is 56 to 64 degrees F. The average growing season is about 180 to 230 days.

Table 3 Representative climatic features

Frost-free period (average)	230 days
Freeze-free period (average)	
Precipitation total (average)	230 mm

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 petrocalcic horizon, well drained and derived from limestone and dolomite. Water intake rates are moderate, available water capacity is low and runoff is high. The soils are characterized by a calcic horizon from 9 to 15 inches and a petrocalcic horizon from 15 to 60 inches. The soil series correlated to this ecological site includes Ferrogold, classified as a loamy-skeletal, carbonatic, thermic, shallow, Calcic Petrocalcid.

Table 4. Representative soil features

Parent material	(1) Alluvium – limestone
Surface texture	(1) Gravelly very fine sandy loam (2) Very gravelly fine sandy loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderate
Soil depth	40 – 50 cm
Surface fragment cover <=3"	20 %
Surface fragment cover >3"	0 – 10 %
Available water capacity (0-101.6cm)	1.88 – 4.9 cm
Calcium carbonate equivalent (0-101.6cm)	40 – 70 %
Electrical conductivity (0-101.6cm)	Not specified
Sodium adsorption ratio (0-101.6cm)	0 – 10
Soil reaction (1:1 water) (0-101.6cm)	8.2 – 8.4
Subsurface fragment volume <=3" (Depth not specified)	20 – 60 %

Subsurface fragment volume >3" (Depth not specified)	0 – 10 %

Ecological dynamics

Blackbrush communities are most prevalent in the transitional zone between the Mojave Desert and Great Basin and are commonly associated with creosotebush. 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).

Fire Ecology:

Blackbrush stands are considered to be one of the most flammable native plant assemblages in the Mojave Desert. Fire will start and spread easily due to the close spacing nature and resinous foliage of blackbrush. During periods of high winds, low relative humidity and low fuel moisture blackbrush will experience stand replacing fires. There is frequently 100 percent mortality of mature blackbrush following fire (Brooks and Matchett 2003) and reestablishment occurs solely from seed. The short-lived seed of blackbrush is readily destroyed by fire and it may take upwards of 60 years for blackbrush to achieve pre-fire conditions. Creosotebush is poorly adapted to fire because of its limited sprouting ability. Creosotebush survives some fires that burn patchily or are of low severity. Fire generally consumes the aboveground shrub layer of banana yucca. Mortality rates of banana yucca after fire likely depend on water stress and severity of damage sustained by the plant. Live plant material is often damaged by adjacent dead plant material that burns at higher temperatures. The ability of banana yucca to sprout from rhizomes and basal stem buds below the surface likely increases its chances of survival. This feature allows it to dominate some desert plant communities after fire. Joshua tree sprouts from the root crown and/or rhizomes following fire. If the fire reaches the root crown the plant will die. Spanish dagger is top-killed by fire, but sprouts vigorously after fire. Vegetative regeneration predominates following fire; seedlings are rarely observed. Nevada 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. 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. 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.

Post-fire plant communities vary, depending on use history and species present prior to the fire. Post fire sprouting shrub species such as yucca and ephedra increase along with perennial grasses. Species that readily reestablish from seed such as salt bush 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.

State and transition model

Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
Grass/Grasslike					
1	**Primary Perennial Grasses**			28-59	
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	20-39	–
	desert needlegrass	ACSP12	*Achnatherum speciosum*	8-20	–
2	**Secondary Perennial Grasses**			8-20	
	low woollygrass	DAPU7	*Dasyochloa pulchella*	2-12	–
	squirreltail	ELEL5	*Elymus elymoides*	2-12	–

	big galleta	PLRI3	*Pleuraphis rigida*	2-12	–
Forb					
3	**Perennial Forbs**			8-31	
	desert marigold	BAMU	*Baileya multiradiata*	2-8	–
	desert trumpet	ERIN4	*Eriogonum inflatum*	2-8	–
	desert globemallow	SPAM2	*Sphaeralcea ambigua*	2-8	–
	brownplume wirelettuce	STPA4	*Stephanomeria pauciflora*	2-8	–
4	**Annual Forbs**			1-20	
	trailing windmills	ALIN	*Allionia incarnata*	2-8	–
	manybristle chinchweed	PEPA2	*Pectis papposa*	2-8	–
Shrub/Vine					
5	**Primary Shrubs**			244-355	
	blackbrush	CORA	*Coleogyne ramosissima*	196-256	–
	creosote bush	LATR2	*Larrea tridentata*	20-39	–
	burrobush	AMDU2	*Ambrosia dumosa*	8-20	–
	Nevada jointfir	EPNE	*Ephedra nevadensis*	8-20	–
	banana yucca	YUBA	*Yucca baccata*	4-7	–
	Joshua tree	YUBR	*Yucca brevifolia*	4-7	–
	Mojave yucca	YUSC2	*Yucca schidigera*	3-7	–
6	**Secondary Shrubs**			39-78	
	fourwing saltbush	ATCA2	*Atriplex canescens*	2-12	–
	Virgin River brittlebush	ENVI	*Encelia virginensis*	2-12	–
	burrobrush	HYSA	*Hymenoclea salsola*	2-12	–
	littleleaf ratany	KRER	*Krameria erecta*	2-12	–
	winterfat	KRLA2	*Krascheninnikovia lanata*	2-12	–
	water jacket	LYAN	*Lycium andersonii*	2-12	–
	spiny menodora	MESP2	*Menodora spinescens*	2-12	–
	Fremont's dalea	PSFR	*Psorothamnus fremontii*	2-12	–
	turpentinebroom	THMO	*Thamnosma montana*	2-12	–
	beavertail pricklypear	OPBA2	*Opuntia basilaris*	1-4	–
	grizzlybear pricklypear	OPPOE	*Opuntia polyacantha var. erinacea*	1-4	–

Table 6. Community 1.2 plant community composition

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

Table 7. Community 2.1 plant community composition

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

Table 8. Community 2.2 plant community composition

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

Animal community

Livestock Interpretations: This site has limited value for livestock grazing, due to the low forage production. Grazing management should be keyed to dominant grasses and palatable shrub production. Blackbrush is not preferred as forage by domestic livestock, but does provide some forage during the spring, summer and fall. Many animals bed in or under creosotebush. Domestic sheep dig shallow beds under creosotebush because it provides the only shade in the desert scrub community. Creosotebush is unpalatable to livestock. Consumption of creosotebush may be fatal to sheep. Banana yucca provides browse to a variety of livestock. In the Mojave Desert rangelands, domestic sheep and cattle do not utilize banana yucca as forage although cattle have been observed eating the leaves in

western Texas. Joshua tree use by livestock is limited to the consumption of accessible blossoms and fruits and utilization of shade. Palatability of Joshua tree is poor for cattle, domestic sheep, and horses. Spanish dagger is rarely utilized by livestock, evidence of cattle browsing is a sign of poor range condition. Nevada 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. Indian ricegrass is highly palatable to all classes of livestock in both green and cured condition. It supplies a source of green feed before most other native grasses have produced much new growth. Young desert needlegrass is palatable to all classes of livestock. Mature herbage is moderately grazed by horses and cattle, but rarely grazed by 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: Blackbrush is a valuable browse species for bighorn sheep. It may also comprise up to 25% of the mule deer winter diet. Blackbrush provides cover for upland game birds, nongame birds and small mammals. Many small mammals browse creosotebush or consume its seeds. Desert reptiles and amphibians use creosotebush as a food source and perch site and hibernate or estivate in burrows under creosotebush, avoiding predators and excessive daytime temperatures. Deer often use banana yucca as a food source searching out new leaves that sprout after fire and eating from the plant at a higher frequency than when it is not burned. Banana yucca is consumed by elk in the pinyon-juniper woodlands. Bighorn sheep browse on the leaves and fruit of banana yucca, and various parts of the plant are also utilized by small rodents, birds, and insects. Joshua tree provides important habitat and food for small mammals, birds, reptiles, insects, and spiders. Use by deer, however, is limited to the consumption of accessible blossoms and fruits and utilization of shade. Palatability of Joshua tree is poor for pronghorn, elk, mule deer, and small mammals. Spanish dagger is important to a variety of desert wildlife species. Small mammals, birds, and reptiles utilize Spanish dagger for food, nest materials, nesting sites, and habitat. Mule deer, bighorn sheep, and pronghorn browse Nevada ephedra, especially in spring and late summer when new growth is available. White bursage is an important browse species for wildlife. Indian ricegrass is eaten by pronghorn in moderate amounts whenever available. A number of heteromyid rodents inhabiting desert rangelands show preference for seed of Indian ricegrass. Indian ricegrass is an important component of jackrabbit diets in spring and summer. Indian ricegrass seed provides food for many species of birds. Doves, for example, eat large amounts of shattered Indian ricegrass seed lying on the ground. 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.

Hydrological functions

Rills are none to rare. A few waterflow patterns may occur in interspaces between shrubs, rarely connected. Deep-rooted perennial bunchgrasses and shrub canopy break raindrop impact, slow runoff, increase infiltration and provide some opportunity for snow catch on this site.

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 desert peoples. Twigs and leaves may be boiled as tea, steamed, pounded into a powder, pressed into a poultice, or heated into an infusion. Native Americans used Nevada 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. Indian ricegrass was traditionally eaten by some Native Americans. The Paiutes used the seed as a reserve food source.

Other information

Blackbrush contributes to desert fertility by 1) protecting the soil against wind erosion through retarding the movement of soil and increasing the accumulation of fine soil particles around its base; 2) protecting understory vegetation from the effects of high temperatures, thereby helping to retain surface nitrogen and adding organic matter to the soil; and 3) serving as a nitrogen reservoir through the storage of nitrogen in roots, leaves, and stems. Creosotebush and white bursage 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. Nevada ephedra is useful for erosion control, and seedlings have been successfully planted onto reclaimed strip mines.

Inventory data references

This site is of limited extent. Site documentation: 10 NRCS-ECS-1 4 other: line-pt. intercept

Type locality

Location 1: Clark County, NV	
Township/Range/Section	T17S R60E S13
UTM zone	N
UTM northing	4038348
UTM easting	659455
Latitude	36° 28′37″
Longitude	115° 13′12″
General legal description	Section 13, T17S, R60E. MDBM. Approximately 1 mile from Yucca Well in Yucca Forest, Desert National Wildlife Refuge, about 20 miles north of Las Vegas, Clark County, Nevada. In the Gass Peak 7.5 minute topographic quadrangle.

Other references

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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	06/29/2011
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** **Rills are none to rare. A few rills (<1/10 m or 30 ft) will occur, especially following summer convective storms.**

2. **Presence of water flow patterns:** **A few (<1/10 m or 30 ft) water flow patterns may occur in interspaces between shrubs, rarely connected. These should be limited to times following intense summer storms on steeper slopes or to natural drainages within the ecological site.**

3. **Number and height of erosional pedestals or terracettes:** **Few to none. Should only occur when associated with rills or water flow patterns on steeper slopes or natural drainages. Height < 0.5 inch.**

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** **Bare Ground <20%. Soil is mostly covered by gravels, vegetation and some lichens/mosses. When patches of bare ground (3 ft. diameter) occur, they should be associated with rodent burrow activity.**

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

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

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

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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 range from 1 to 3 in the interspaces and 4 to 6 under canopy.

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** A-horizon thickness 3 inches. Surface structure is typically moderate, very thick platy. Soil surface colors are very pale brown and soils are typified by an ochric epipedon. Organic matter of the surface horizon is typically less than 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:** Deep-rooted bunchgrasses and shrub canopy break raindrop impact, slow runoff, increase infiltration and provide some opportunity for snow catch on this site.

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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 none. Subsoil calcic horizons are not to be interpreted as compacted.

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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 Community: evergreen shrubs >>

    Sub-dominant: deep-rooted, cool-season, perennial bunchgrasses = deciduous shrubs > shallow-rooted cool-season perennial bunchgrasses > deep-rooted, cool-season perennial forbs > annual forbs

    Other: Other: succulents, warm-season, perennial grasses, biological soil crust

    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, especially with multi-year droughts.

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14. **Average percent litter cover (%) and depth (in):** Litter cover is concentrated under shrubs and grasses and totals 15-20%. Litter depth is <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 (through mid-June) is ± 350 lbs/ac, ranging from 200 lbs/ac in poor growth years to 500 lbs/ac in

optimal growth years.

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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 redstem filaree can invade and persist 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. Less reproduction, although, rarely none, will occur in below-average precipitation years.**
