

Ecological site R029XY077NV SHALLOW GRAVELLY LOAM 8-10 P.Z.

Last updated: 2/20/2025
Accessed: 05/21/2025

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.

MLRA notes

Major Land Resource Area (MLRA): 029X–Southern Nevada Basin and Range

The Southern Nevada Basin and Range MLRA (29) represents the transition from the Mojave Desert to the Great Basin. It is cooler and wetter than the Mojave. It is warmer and typically receives more summer precipitation than the Great Basin. This area is in Nevada (73 percent), California (25 percent), and Utah (2 percent). It makes up about 26,295 square miles (68,140 square kilometers). Numerous national forests occur in the area, including the San Bernardino, Angeles, Sequoia, Inyo, Humboldt-Toiyabe, and Dixie National Forests. Portions of Death Valley National Monument, the Nuclear Regulatory Commission's Nevada Test Site, the Hawthorne Ammunition Depot, and the Nellis Air Force Range in Nevada and the China Lake Naval Weapons Center in California also are in this MLRA. The northeast part of the Paiute Indian Reservation and the southern third of the Walker River Indian Reservation are in the part of this MLRA in Nevada, and the Lone Pine, Fort Independence, and Big Pine Indian Reservations are in the part in California.

Physiography:

The entire area is in the Great Basin Section of the Basin and Range Province of the Intermontane Plateaus. The area of broad, nearly level, aggraded desert basins and valleys between a series of mountain ranges trending north to south. The basins are bordered by sloping fans and pluvial lake terraces. The mountains are uplifted fault blocks with steep side slopes and not well dissected due to limited annual precipitation. Most of the valleys in this MLRA are closed basins or bolsons containing sinks or playa lakes.

Geology:

The mountains are dominated by Pliocene and Miocene andesite and basalt rocks, Paleozoic and Precambrian carbonate rocks prominent in some areas. Scattered outcrops of older Tertiary intrusives and very young tuffaceous sediments (Pliocene and Miocene)

are in the western and eastern thirds of this MLRA. The valleys consist mostly of alluvial fill and playa deposits at the lowest elevations in the closed basins.

Climate:

The average annual precipitation is 3 to 12 inches (75 to 305 millimeters) in most of this area. It may be as high as 29 inches (735 millimeters), on the higher mountain slopes. Most of the rainfall occurs as high-intensity, convective thunderstorms during the growing season. Summers are dry, but sporadic storms are common in July and August.

Water Resources:

Water resources are scarce. Ground water and surface water sources are limited. Streams are small and intermittent. Quality of surface water is naturally degraded as streams cross area of valley fill effected by dissolved salts. Irrigation water may raise the levels of dissolved salts and suspended sediments causing contamination.

Soils:

Dominant soil orders include Entisols and Aridisols.

Classification relationships

California Natural Diversity Database, May 2002. List of California terrestrial natural communities recognized by the California Natural Diversity Database- Blackbush High Desert Scrub.

Sawyer, J.O. and T. Keeler-Wolfe. 1995. Manual of California Vegetation - Black bush series.

Ecological site concept

The Shallow Gravelly Loam 8-10 P.Z. site is on fan remnants, lower mountain, and hill sideslopes of all exposures. Slopes range from 2 to 50 percent. Elevations are 3,600 to about 6,500 feet. The soils are shallow to moderately deep and well drained. Surface soils are medium to coarse textured. Subsoils are generally heavy textured with a high percent of gravels.

Associated sites

R029XY006NV	LOAMY 8-10 P.Z. This ecological site is on fan remnants. Soils associated with this site are well drained, shallow to a duripan, and formed in alluvium derived from volcanic parent material. The soil profile is characterized by an ochric epipedon, a cemented duripan within 50 centimeters and an argillic horizon with no abrupt textural change.
R029XY010NV	LOAMY SLOPE 8-10 P.Z. This site occurs on piedmont slopes, rock pediments, hills, and lower mountain sideslopes on all exposures. Slopes range from 4 to 75 percent, but slope gradients of 15 to 50 percent are typical. Elevations are 4,400 to about 8,200 feet. The soils are very shallow to moderately deep and are derived from a variety of parent materials. The surface may be stony, cobbly or gravelly.

R029XY019NV	SHALLOW GRAVELLY SLOPE 8-10 P.Z. This site is on fan remnants, hills, and mountains on all exposures. Slopes range from 4 to 50 percent. Elevations are 3,000 to 7,200 feet. The soils are typically shallow and are derived from mixed parent material. A duripan or bedrock limit plant rooting depth. Soil texture varies from sandy loams to loams and surfaces may be gravelly to extremely gravelly.
R029XY073NV	BOULDERY SLOPE 8-12 P.Z. This site is on very bouldery or stony mountain and hill summits and sideslopes. Slopes range from 4 to 75 percent, but slope gradients of 15 to 50 percent are typical. Elevations are 4,400 to 7,000 feet. The soils are shallow to very shallow and well drained. These soils are typically associated with very large, exfoliating, ignimbritic boulders, or rock outcrop.

Similar sites

R029XY019NV	SHALLOW GRAVELLY SLOPE 8-10 P.Z. Less productive site.
R029XY013NV	SHALLOW GRAVELLY LOAM 5-8 P.Z. Less productive site and ATCO and ARSP5 are important shrubs.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) <i>Coleogyne ramosissima</i>
Herbaceous	(1) <i>Achnatherum speciosum</i>

Physiographic features

The Shallow Gravelly Loam 8-10 P.Z. site occurs on fan remnants, lower mountain and hill sideslopes of all exposures. Slopes range from 2 to 50 percent. Elevations are 3,600 to about 6,500 feet.

Table 2. Representative physiographic features

Landforms	(1) Fan remnant (2) Mountain (3) Hill
Runoff class	Low to very high
Flooding frequency	None
Ponding frequency	None
Elevation	3,600–6,500 ft
Slope	2–50%

Water table depth	72 in
Aspect	Aspect is not a significant factor

Climatic features

This climate is arid, characterized by hot dry summers and cool somewhat moist winters. Convection storms of high intensity and usually short duration are common in July and August. These summer storms occur frequently enough to influence production and species composition of moist native plants. Average annual precipitation is 8 to about 10 (11) inches. Mean annual air temperature is 51 to 56 degrees F. The average growing season is about 150 to 190 days.

Table 3. Representative climatic features

Frost-free period (characteristic range)	132 days
Freeze-free period (characteristic range)	178 days
Precipitation total (characteristic range)	7 in
Frost-free period (actual range)	132 days
Freeze-free period (actual range)	178 days
Precipitation total (actual range)	7 in
Frost-free period (average)	132 days
Freeze-free period (average)	178 days
Precipitation total (average)	7 in

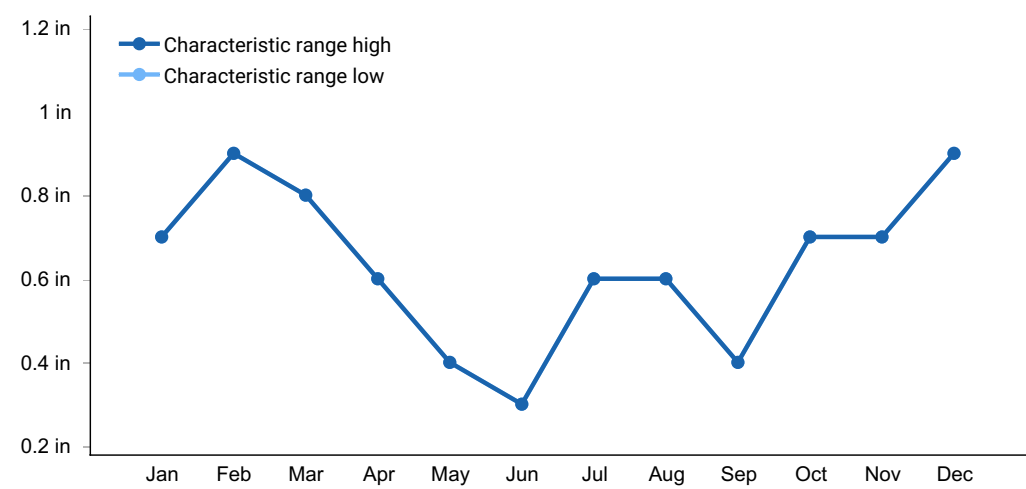


Figure 1. Monthly precipitation range

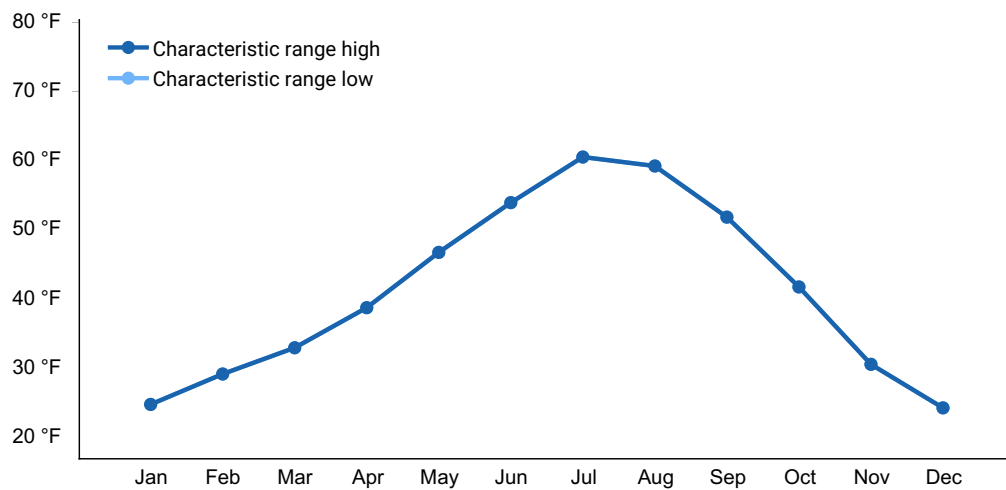


Figure 2. Monthly minimum temperature range

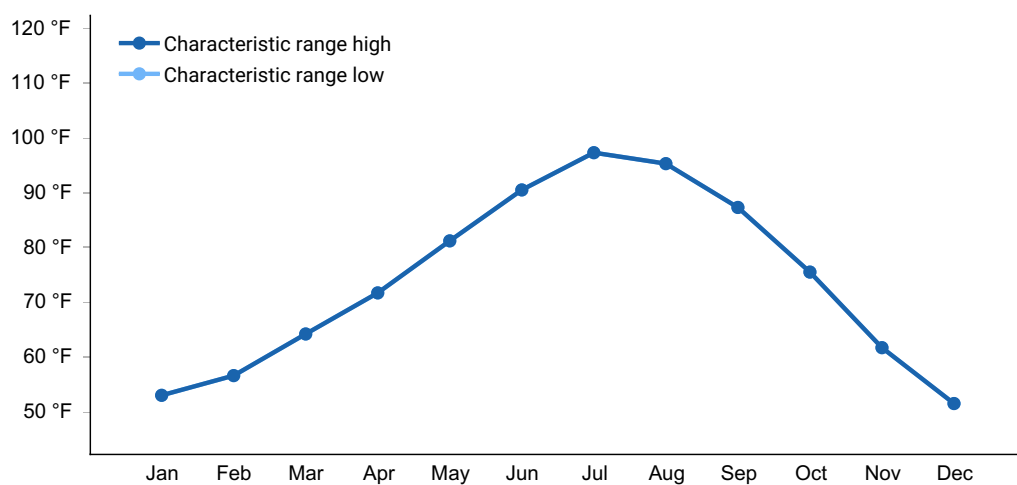


Figure 3. Monthly maximum temperature range

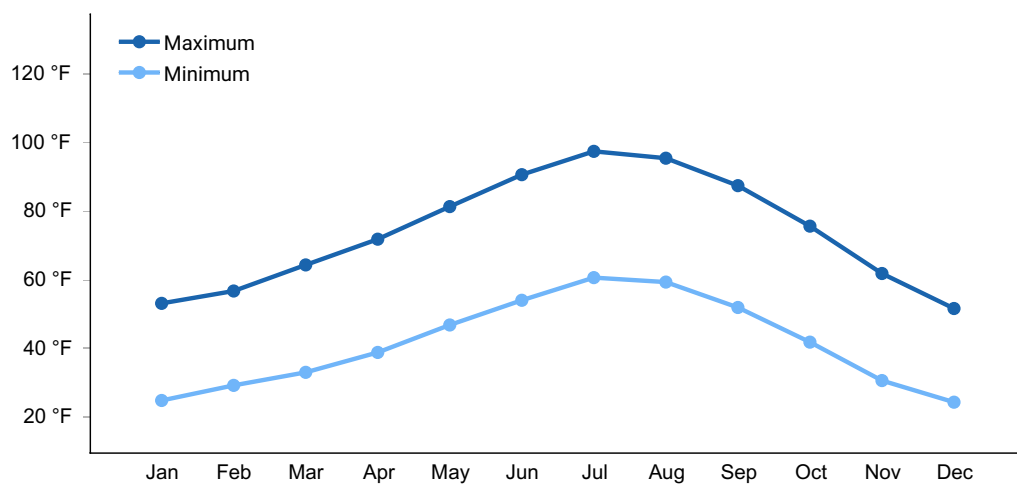


Figure 4. Monthly average minimum and maximum temperature

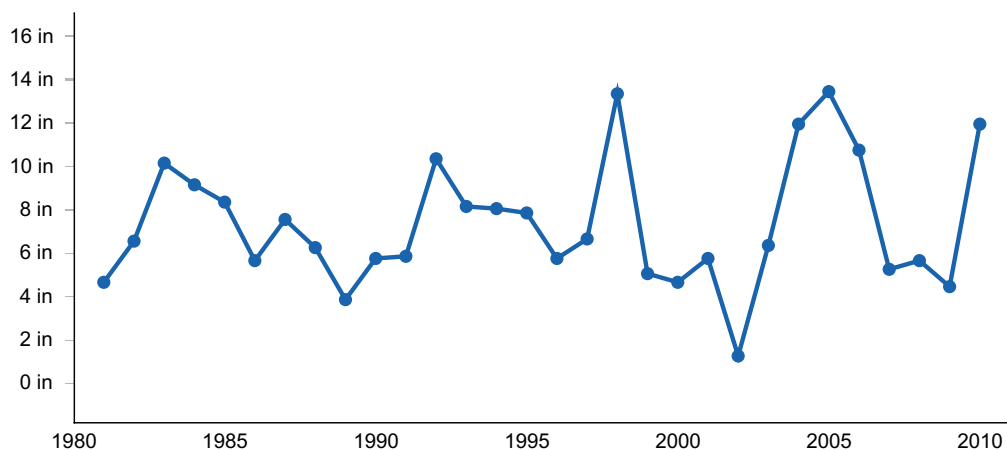


Figure 5. Annual precipitation pattern

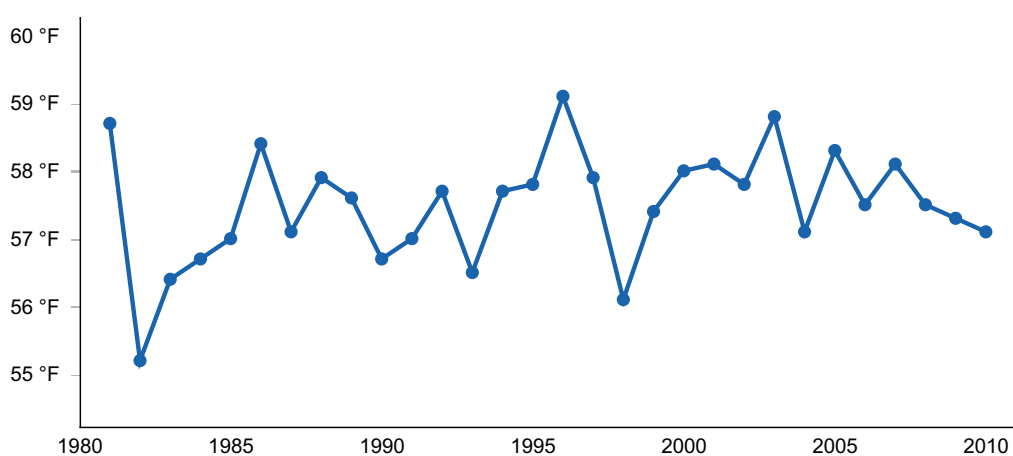


Figure 6. Annual average temperature pattern

Climate stations used

- (1) HIKO [USC00263671], Hiko, NV

Influencing water features

There are no influencing water features associated with this site.

Soil features

The soils are shallow to moderately deep and well drained. Surface soils are medium to coarse textured. Subsoils are generally heavy textured with a high percent of gravels. Runoff is rapid and the potential for gully, sheet, or rill erosion varies with slope. The soils are slowly permeable and available water capacity is very low to low. These soils are dry most of the year but are moist for short periods during the winter and early spring months and occasionally for short intermittent periods following summer convection storms. The associated soils are: Boxspring, Cruzspring, Dewrust, Hollace, Oleman, Purob, Rapado, Winklo, and Zaqua.

Table 4. Representative soil features

Parent material	(1) Alluvium–volcanic rock (2) Residuum–volcanic rock
Surface texture	(1) Very gravelly sandy loam (2) Gravelly sandy loam (3) Very gravelly loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Slow to moderate
Soil depth	10–40 in
Surface fragment cover ≤3"	5–25%
Surface fragment cover >3"	33–60%
Available water capacity (0–40in)	1.5–1.9 in
Calcium carbonate equivalent (0–40in)	0–50%
Electrical conductivity (0–40in)	0–2 mmhos/cm
Sodium adsorption ratio (0–40in)	0–5
Soil reaction (1:1 water) (0–40in)	7–8.2
Subsurface fragment volume ≤3" (Depth not specified)	20–60%
Subsurface fragment volume >3" (Depth not specified)	0–10%

Ecological dynamics

Blackbrush often occurs as nearly monospecific stands and is thought to be climax vegetation, occurring in late seral stages. Blackbrush is a long-lived dominant on older, undisturbed geologic sites. Succession occurs at a very slow rate. Increasing in cover and density, this shrub becomes more dominant over time.

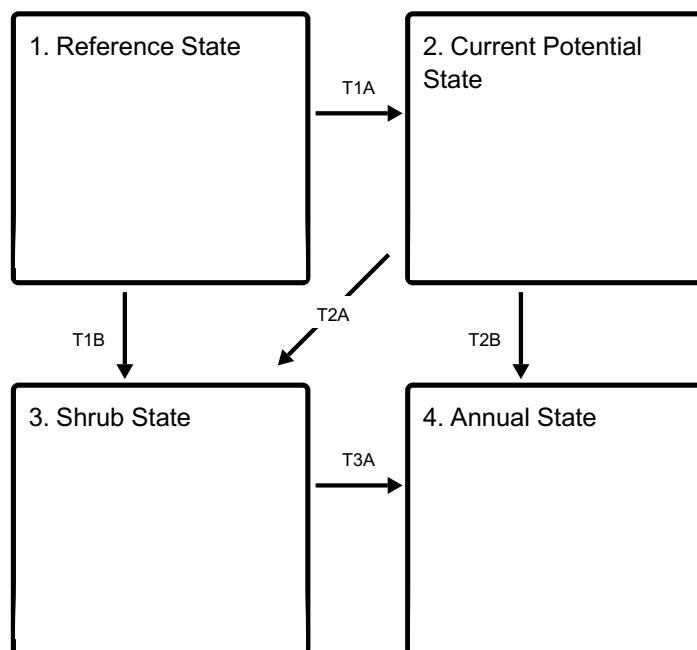
Fire ecology:

Historic fire return intervals for blackbrush communities were typically 35 to 100 years. Blackbrush stands are subject to fire, and fire will start and spread easily due to the high density and resinous foliage. In many areas, frequent large fires have eliminated blackbrush stands. These communities will burn under conditions of high temperature, high wind velocity and low relative humidity. Fire also occurs in stands with a proportion of

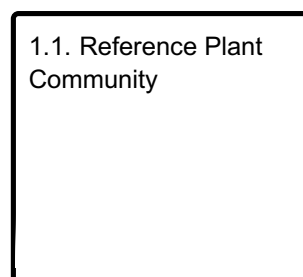
herbaceous annuals or perennials. Fire frequency increases if sites are invaded with red brome or cheatgrass. The presence of Joshua trees in blackbrush stands may also contribute to increased fire frequencies due to lightning strikes on the Joshua trees. Blackbrush is a nonsprouter and is removed by fire. Current knowledge indicates that the return of blackbrush may take many years. Succeeding communities after fire are variable and burn areas are usually dominated by annual species the first few years following fire. Desert bitterbrush is considered fire tolerant. Desert bitterbrush recovers from fire by sprouting from undamaged root crowns below the soil surface and by establishing from seeds cached by rodents. Desert bitterbrush often sprouts vigorously following fire, even in dry conditions. 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. 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.

State and transition model

Ecosystem states



State 1 submodel, plant communities



State 2 submodel, plant communities

2.1. Blackbrush/Desert
needlegrass/annual
species

State 3 submodel, plant communities

3.1. Blackbrush

State 4 submodel, plant communities

4.1. Annual Phase

**State 1
Reference State**

The Reference State plant community is dominated by blackbrush (*Coleogyne ramosissima*). There is only one plant community phase in this state.

**Community 1.1
Reference Plant Community**

The reference plant community is dominated by blackbrush. Desert bitterbrush, ephedra and desert needlegrass are important species associated with this site. Potential vegetative composition is about 15 percent grasses, 5 percent perennial and annual forbs, and 80 percent shrubs and trees. Approximate ground cover (basal and crown) is 25 to 35 percent.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Shrub/Vine	228	380	532
Grass/Grasslike	45	75	105
Forb	15	25	35
Tree	12	20	28
Total	300	500	700

Table 6. Ground cover

Tree foliar cover	0-1%
Shrub/vine/liana foliar cover	15-20%
Grass/grasslike foliar cover	1-8%
Forb foliar cover	1-14%
Non-vascular plants	0%
Biological crusts	1-2%
Litter	5-15%
Surface fragments >0.25" and <=3"	15-25%
Surface fragments >3"	15-45%
Bedrock	0%
Water	0%
Bare ground	15-25%

Table 7. Canopy structure (% cover)

Height Above Ground (Ft)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.5	—	—	—	—
>0.5 <= 1	—	—	1-5%	1-3%
>1 <= 2	—	—	5-10%	1-2%
>2 <= 4.5	—	25-30%	—	—
>4.5 <= 13	0-1%	—	—	—
>13 <= 40	—	—	—	—
>40 <= 80	—	—	—	—
>80 <= 120	—	—	—	—
>120	—	—	—	—

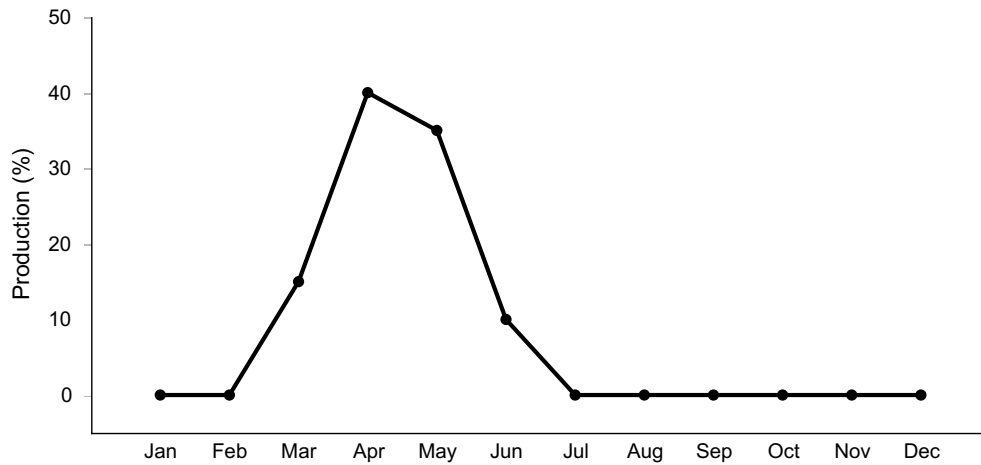


Figure 8. Plant community growth curve (percent production by month). NV2902, Blackbrush. Growth begins in March. Flowering occurs from April to May. Fruits mature by end of July. Dormancy occurs during the hot summer months..

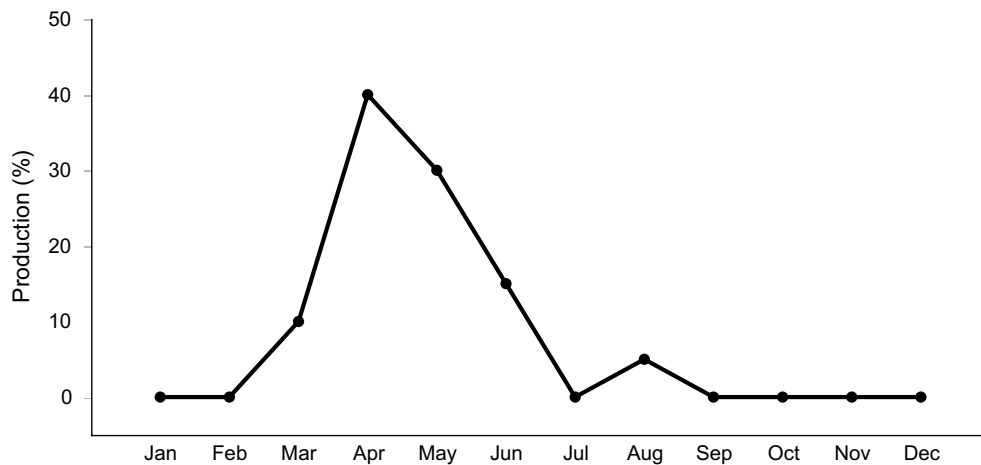


Figure 9. Plant community growth curve (percent production by month). NV2903, Desert needlegrass. Growth begins in late spring, flowering occurs in April and May. Seed production and dissemination occur from May to June. Tiller senescence begins in late summer..

State 2

Current Potential State

The Current Potential State is similar to the Reference State, except the Current Potential State has established non-native species in the plant community.

Dominant plant species

- blackbrush (*Coleogyne ramosissima*), shrub
- desert needlegrass (*Achnatherum speciosum*), grass
- Grass, annual (*Grass, annual*), grass

Community 2.1

Blackbrush/Desert needlegrass/annual species

Similar to Community Phase 1.1, but 2.1 includes non-native annual plants.

State 3

Shrub State

The plant community in the Shrub State is dominated by blackbrush with a lack of herbaceous species in the understory.

Dominant plant species

- blackbrush (*Coleogyne ramosissima*), shrub

Community 3.1

Blackbrush

Plant community dominated by blackbrush with few herbaceous species.

State 4

Annual State

The Annual State lacks many if not all of the species in the Reference State.

Dominant plant species

- Grass, annual (*Grass, annual*), grass
- Forb, annual (*Forb, annual*), other herbaceous

Community 4.1

Annual Phase

Native and non-native annual species dominate the site.

Transition T1A

State 1 to 2

Establishment of non-native annual species in the plant community.

Transition T1B

State 1 to 3

Loss of herbaceous plants.

Transition T2A

State 2 to 3

Loss of herbaceous species.

Transition T2B

State 2 to 4

Loss of native species through fire.

Transition T3A

State 3 to 4

Loss of native species through fire.

Additional community tables

Table 8. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	Primary Perennial Grasses			10–50	
	desert needlegrass	ACSP12	<i>Achnatherum speciosum</i>	10–50	–
2	Secondary Perennial Grasses			10–50	
	Indian ricegrass	ACHY	<i>Achnatherum hymenoides</i>	3–15	–
	threeawn	ARIST	<i>Aristida</i>	3–15	–
	bush muhly	MUPO2	<i>Muhlenbergia porteri</i>	3–15	–
	James' galleta	PLJA	<i>Pleuraphis jamesii</i>	3–15	–
Forb					
3	Perennial			10–25	
	globemallow	SPHAE	<i>Sphaeralcea</i>	3–10	–
	James' galleta	PLJA	<i>Pleuraphis jamesii</i>	3–7	–
4	Annual			1–25	
	low woollygrass	DAPU7	<i>Dasyochloa pulchella</i>	3–7	–
Shrub/Vine					
5	Primary Shrubs			345–440	
	blackbrush	CORA	<i>Coleogyne ramosissima</i>	325–375	–
	desert bitterbrush	PUGL2	<i>Purshia glandulosa</i>	10–40	–
	Nevada jointfir	EPNE	<i>Ephedra nevadensis</i>	10–25	–
6	Secondary Shrubs			18–53	

	fourwing saltbush	ATCA2	<i>Atriplex canescens</i>	5–15	–
	yellow rabbitbrush	CHVI8	<i>Chrysothamnus viscidiflorus</i>	5–15	–
	spiny hopsage	GRSP	<i>Grayia spinosa</i>	5–15	–
	winterfat	KRLA2	<i>Krascheninnikovia lanata</i>	5–15	–
	desert almond	PRFA	<i>Prunus fasciculata</i>	5–15	–
	Stansbury cliffrose	PUST	<i>Purshia stansburiana</i>	5–15	–
	banana yucca	YUBA	<i>Yucca baccata</i>	5–15	–
Tree					
7	Evergreen			6–20	
	Utah juniper	JUOS	<i>Juniperus osteosperma</i>	3–10	–
	Joshua tree	YUBR	<i>Yucca brevifolia</i>	3–10	–

Animal community

Livestock Interpretations:

This site is suitable for livestock grazing. Grazing management should be keyed to perennial grass production. Blackbrush is not preferred as forage by domestic livestock but does provide some forage during the spring, summer and fall. Desert bitterbrush is generally of medium palatability to domestic sheep, goats and cattle. Winter protein levels are generally higher than other forage available. Nevada ephedra is at least moderately palatable to most classes of 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.

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 percent of the mule deer winter diet. Blackbrush provides cover for upland game birds, nongame birds and small mammals. Desert bitterbrush is an important forage species for deer and pronghorn, especially in winter. Upright growth forms of desert bitterbrush provide cover for game animals. Mule deer, bighorn sheep, and pronghorn browse Nevada ephedra, especially in spring and late summer when new growth is available. 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

The soils are slowly to moderately permeable. The soils on this site are in hydrologic group D - soils having very slow infiltration rates when thoroughly wetted and consisting of shallow soils over nearly impervious material. Water flow paths are short and disrupted by cool season grasses and shrubs. Rills and gullies are not typically present. The potential for gully, sheet or rill erosion increases with slope. Pedestals and terracettes are rare. Litter (less than 2 inch diameter) typically falls in place or is moved short distances in flow paths.

Recreational uses

Occasional use by hunters, off-road vehicle users and hikers.

Other products

Native Americans traditionally roasted and ate the seeds of Nevada ephedra and also added them to bread. Nevada ephedra is occasionally cultivated as an ornamental.

Inventory data references

SCS Range-417: NV-3
NV-ECS-1: NV-4; CA-1
NV-4400-13 (BLM): NV-27
Line transects: CA-10
NASIS mapunit data

Type locality

Location 1: Lincoln County, NV	
Township/Range/Section	T9S R68E S17
General legal description	About 4 miles east of Lyman Crossing, Tule Desert, Lincoln County, Nevada

Other references

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

United States Department of Agriculture, Natural Resources Conservation Service. 2022. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture, Agriculture Handbook 296.

Contributors

BO'D/RRK

BO'D/RRK

Approval

Kendra Moseley, 2/20/2025

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	07/12/2012
Approved by	Kendra Moseley
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 due to very shallow skeletal soils and steep slopes.
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2. **Presence of water flow patterns:** None to rare. 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:** None to rare. Should only occur when associated with rills or water flow patterns on steeper slopes or natural drainages. Height less than 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 5 to 20 percent. Soil is mostly covered by gravels, vegetation and some lichens and mosses. When patches of bare ground (3 foot 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 and perennial forbs) expected to move distance of slope length (<10 feet) during intense summer convection storms or rapid snowmelt events. Persistent litter (large woody material) will remain in place except during intense summer storms.

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Soil stability values are typically 1 to 3 in the interspaces and 4 to 6 under canopy.

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** A-horizon thickness can range from 0 to 3 inches. Surface structure is typically moderate thin to medium platy. Soil surface colors are very pale brown to 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.

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Soils have moderate permeability. Deep-rooted bunchgrasses and shrub canopy break raindrop impact, slow runoff and increase infiltration. Shrub canopy and standing dead grasses 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 and petrocalcic 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: non-sprouting 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 <> succulents

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

Additional:

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Dead branches within individual shrubs common and standing dead shrub canopy material may be as much as 30 percent of total woody canopy; some of the mature bunchgrasses (<20 percent) have dead centers, especially with multi-year droughts.
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14. **Average percent litter cover (%) and depth (in):** Reference Plant Community: Litter cover is high under shrubs and grasses and is between 10 to 15 percent in plant interspaces. Litter depth, where it occurs, 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 ± 500 lbs/ac, Favorable years ± 700 lbs/ac, unfavorable years ± 300 lbs/ac

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, red-stem filaree, and cheatgrass 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.
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