USDA Natural Resources
Conservation Service

Ecological site R030XB139NV
COBBLY FAN 5-7 P.Z.

Last updated: 2/26/2025
Accessed: 05/12/2025

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.

Ecological site concept

This site occurs on fan remnants and fan aprons. Slopes range from 4 to 8 percent. Elevations range from about 2300 to 3800 feet.

The soils associated with this site are very deep, well drained, and formed in alluvium derived from limestone.

Associated sites

R030XB137NV	**GRAVELLY WASH 5-7 P.Z.**

Similar sites

R030XB004NV	**SANDY 5-7 P.Z.** PLRI3-ACHY codominant grasses, occurs on sandy soils.
R030XB019NV	**Eroded Fan Remnant Pavette 4-6 P.Z.** Less productive site;LATR2 dominant shrub.
R030XB102NV	**GRAVELLY LOAM 5-7 P.Z.** KRLA2 important shrub.
R030XB074NV	**COBBLY LOAM 5-7 P.Z.** MESP2 & AMDU2 important shrubs.
R030XB075NV	**GRAVELLY FAN 5-7 P.Z.** More productive site; PLRI3 dominant plant.
R030XB039NV	**LIMY FAN 5-7 P.Z.** Much more productive site; PLRI3 dominant plant.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Krameria grayi* (2) *Larrea tridentata*
Herbaceous	(1) *Pleuraphis rigida*

Physiographic features

This site occurs on fan remnants and fan aprons. Slopes range from 4 to 8 percent. Elevations range from about 2300 to 3800 feet.

Table 2. Representative physiographic features

Landforms	(1) Fan remnant (2) Fan apron
Flooding frequency	Very rare
Ponding frequency	None
Elevation	2,300–3,800 ft
Slope	4–8%
Aspect	Aspect is not a significant factor

Climatic features

The climate is hot and arid, with mild winters and very hot summers. Precipitation is greatest in the winter with a lesser secondary peak in summer, typical of the Mojave Desert. The average annual precipitation ranges from 5 to 7 inches with most of the moisture falling as rain during the period November through March. At least 25% of the annual precipitation occurs from July to September as a result of summer convection storms. Mean annual air temperature is 63 to 65 degrees F. The average frost-free period is 210 to 250 days.

Table 3. Representative climatic features

Frost-free period (average)	250 days
Freeze-free period (average)	
Precipitation total (average)	7 in

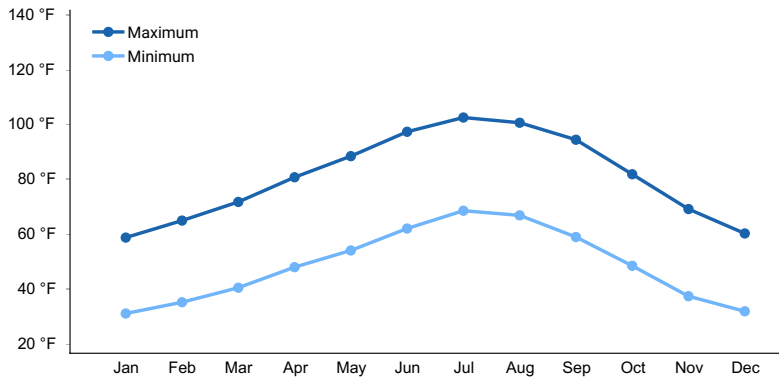


Figure 1. Monthly average minimum and maximum temperature

Influencing water features

There are no influencing water features associated with this site.

Soil features

The soils associated with this site are very deep, well drained, and formed in alluvium derived from limestone. The soil profile is modified with 40 to 70 percent gravels. The soils are rarely flooded, have moderately high saturated hydraulic conductivity, and medium runoff. The soils are usually dry and are characterized by a typic-aridic soil moisture regime. The soil series correlated to this ecological site includes Elbowcanyon, classified as a loamy-skeletal, carbonatic, thermic Typic Torriorthent.

Table 4. Representative soil features

Parent material	(1) Alluvium–limestone
Surface texture	(1) Very gravelly fine sandy loam
Family particle size	(1) Loamy
Drainage class	Well drained

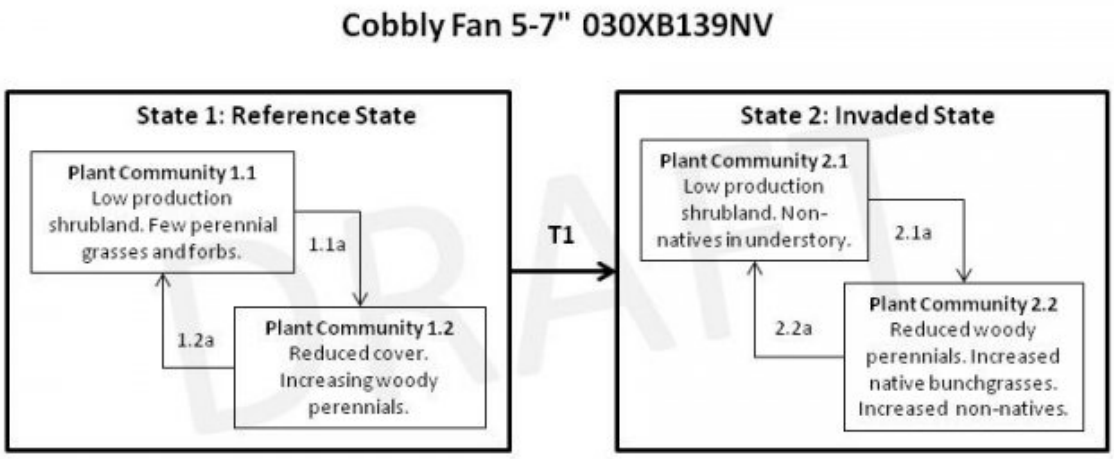
Permeability class	Moderately rapid
Soil depth	72–84 in
Surface fragment cover <=3"	75–85%
Surface fragment cover >3"	3–5%
Available water capacity (0-40in)	1.25–3.07 in
Calcium carbonate equivalent (0-40in)	30–50%
Electrical conductivity (0-40in)	0 mmhos/cm
Sodium adsorption ratio (0-40in)	0
Soil reaction (1:1 water) (0-40in)	8–8.2
Subsurface fragment volume <=3" (Depth not specified)	35–55%
Subsurface fragment volume >3" (Depth not specified)	0–30%

Ecological dynamics

The plant communities of this site are dynamic in response to changes in disturbance regimes and weather patterns. Community phase changes are primarily driven by long term drought, disease and insect attack. Historically, wildfire was infrequent and had a minimal impact. This ecological site is characterized by a widely-spaced shrub-dominated plant community. This site is characterized by low ecological resilience, due to low organic matter and relatively low available nutrients.
The dominant shrubs in this plant community are tolerant of periodic disturbances. Reproduction and recruitment of native shrubs are episodic, based on favorable environmental conditions. Desert shrubs are extensive exploiters, meaning they have extensive root systems that penetrate a large volume of soil in both shallow and deep layers (Burgess 1995). Deep-rooted shrubs use moisture year around that arrives infrequently, during the dormant season. Shrub seedlings rely on shallow moisture and are more susceptible to drought stress. Perennial grasses are able to out-compete with shrub seedlings for moisture in shallow soil layers (Burgess 1995). White ratany reproduces sexually by seed. In years with favorable soil moisture it will flower twice, once in the spring and again in the fall (Griffith 1991). Creosotebush is a long-lived shrubs capable of cloning and reproducing sexually. During periods of extreme drought old branches and roots die back, improving rates of survival (Marshall 1995). The invasion of non-native annual grasses can be particularly damaging in this system. Non-natives are able to persist in the plant community due to their annual growth form, persistent seed bank, and competitive ability.

Fire Ecology:
The invasion of non-native annuals provides a continuous bed of fine fuels that promotes wildfire where fire was historically infrequent. Historical fire return intervals are thought to be 100 years or greater. The post-fire plant community is dominated by resprouting species. Creostoebush is poorly adapted to fire, but can survive patchy, low severity fires. Fremont's dalea sprouts from the root crown following fire. Mojave yucca is a vigorous sprouter following wildfire. Spiny menodora generally survives fire due to its non-flamable foliage. Big galleta is usually top-killed by fire and sprouts from the root crown following damage. Fire damage can be severe if foliage is dry when burned. White ratany sprouts from the surviving root crown and reestablishs from off-site seed sources. However, frequent and repeated fire driven by non-native annuals will exclude native woody perennials and deteriorate ecological condition allowing non-native annual forbs and grasses to dominate the site. Species most likely to invade this site are red brome, Mediterranean grass and redstem filaree.

State and transition model



State 1
Reference State

The reference state is representative of the natural range of variability under pristine conditions. Plant communities are dynamic in response to changes in disturbance regimes and weather patterns. Plant community phase changes are primarily driven by long-term drought, disease, and insect attack. Historically, fire had little impact in this system due to low fuel loading and widely spaced shrubs.

Community 1.1
Reference Plant Community

The reference plant community is representative of a healthy climax condition. The reference plant community is dominated by white ratany, creosotebush, Fremont's dalea and big galleta. Other important species associated with this site are spiny menodora, Mojave yucca and Indian ricegrass. Potential vegetative composition is about 10 percent perennial and annual grasses, 15 percent annual and perennial forbs and 75 percent shrubs. Approximate ground cover (basal and crown) is 15 to 25 percent.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Shrub/Vine	110	190	300
Forb	20	35	55
Grass/Grasslike	20	25	45
Total	**150**	**250**	**400**

Community 1.2
Plant Community 1.2

This plant community is representative of an early-seral plant community. Mature woody vegetation has been removed, shrub seedlings are common. Initially, herbaceous biomass increases. Sprouting shrubs recover quickly and also provide microsites for the establishment of shrub seedlings. Sprouting species include ratany, spiny menodora and yucca. This plant community is at-risk of invasion by non-natives. Non-native species readily establish in post-disturbance plant communities by taking advantage of increased availability of critical resources.

Pathway 1.1a
Community 1.1 to 1.2

Prolonged drought, wildfire, disease and/or insect attack.

Pathway 1.2a
Community 1.2 to 1.1

Absence from disturbance and natural regeneration over time.

State 2
Invaded State

This state is characterized by the presence of non-natives in the understory. Introduced annuals such as red brome and redstem filaree have invaded the reference plant community and have become a component of the herbaceous cover. 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 significantly alter disturbance regimes from their historic range of variation. These non-natives annuals are highly flammable and promote wildfires where fires historically have been infrequent.

Community 2.1
Invaded Plant Community 2.1

Figure 3. Invaded Plant Community with trace of red brome

This plant community is compositionally similar to the reference plant community with the presence of non-natives in the understory. At this time ecological function had not been compromised, however, resilience is reduced by the presence of non-natives. This community phase may respond differently following a disturbance, when compared to the reference plant community. White ratany, creosotebush and Fremont dalea persist through invasion, but desirable bunchgrasses and forbs may be unsuccessful in competing with non-natives. Non-native annuals provide a continuous bed of fine fuels in the understory.

Community 2.2
Invaded Plant Community 2.2

This plant community is characterized by decreased native woody perennials and increased herbaceous biomass. Non-native plant cover may increase heavily post-disturbance. Native woody perennials capable of sprouting from the root crown recover quickly and provide favorable sites for the establishment of other shrub seedlings. This plant community is considered at-risk, due to the increased fuel loading from herbaceous biomass. Management should focus on minimizing the threat of wildfire and reducing anthropogenic impacts to protect soil and ecological resources.

Pathway 2.1a
Community 2.1 to 2.2

Surface disturbance, prolonged drought, wildfire, disease and/or insect attack.

Pathway 2.2a
Community 2.2 to 2.1

Absence from disturbance and natural regeneration over time.

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**			12–25	
	big galleta	PLRI3	*Pleuraphis rigida*	12–25	–
2	**Secondary Perennial Grasses**			1–15	
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	1–5	–
	purple threeawn	ARPU9	*Aristida purpurea*	1–5	–
	low woollygrass	DAPU7	*Dasyochloa pulchella*	1–5	–
3	**Annual Grasses**			1–5	
	sixweeks fescue	VUOC	*Vulpia octoflora*	1–5	–
Forb					
4	**Perennial Forbs**			12–25	
	trailing windmills	ALIN	*Allionia incarnata*	3–8	–
	desert marigold	BAMU	*Baileya multiradiata*	3–8	–
	desert trumpet	ERIN4	*Eriogonum inflatum*	3–8	–
	desert globemallow	SPAM2	*Sphaeralcea ambigua*	3–8	–
5	**Annual Forbs**			1–20	
	Fremont's phacelia	PHFR2	*Phacelia fremontii*	1–8	–
	desert Indianwheat	PLOV	*Plantago ovata*	1–8	–
Shrub/Vine					
6	**Primary shrubs**			103–194	
	white ratany	KRGR	*Krameria grayi*	68–90	–
	creosote bush	LATR2	*Larrea tridentata*	20–45	–
	Fremont's dalea	PSFR	*Psorothamnus fremontii*	12–35	–
	Mojave yucca	YUSC2	*Yucca schidigera*	1–12	–
	spiny menodora	MESP2	*Menodora spinescens*	1–12	–
7	**Secondary Shrubs**			12–35	
	catclaw acacia	ACGR	*Acacia greggii*	2–8	–
	burrobush	AMDU2	*Ambrosia dumosa*	2–8	–
	sweetbush	BEJU	*Bebbia juncea*	2–8	–
	Nevada jointfir	EPNE	*Ephedra nevadensis*	2–8	–
	littleleaf ratany	KRER	*Krameria erecta*	2–8	–
	whitestem paperflower	PSCO2	*Psilostrophe cooperi*	2–8	–
	turpentinebroom	THMO	*Thamnosma montana*	2–8	–
	grizzlybear pricklypear	OPPOE	*Opuntia polyacantha var. erinacea*	1–3	–
	California barrel cactus	FECY	*Ferocactus cylindraceus*	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	–

Animal community

Livestock Interpretations: this site is suitable for livestock grazing. Management should focus on palatable grass and shrub production. Big galleta is a coarse and woody bunchgrass and is considered fair forage for domestic livestock. Other grasses comprise less than ten percent of the total annual production and provide a relatively unimportant grazing resource. White ratany is important forage for all classes of livestock. White ratany will decrease in response to heavy grazing pressure. Creosotebush is unpalatable to livestock, however, it is used as bedding cover. Spiny menodora is characterized by very low palatability, but domestic livestock will use it early in the spring before spines mature. Domestic livestock will sparingly use Spanish dagger, but signs of heavy use is a sign of poor range condition.
Stocking rates vary over time depending upon season of use, climatic 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: Big galleta is heavily used by bighorn sheep and is used by mule deer to a lesser degree. White ratany is one of the most important browse species for mule deer and desert bighorn sheep. Black-tailed jackrabbits rely almost exclusively on white ratany during the winter. The seeds of white ratany comprises up to 5 percent of the diet of quail in some areas. Many species bed under creosotebush. Desert reptiles and amphibians use creosotebush as a food source, a perch site, and also burrow under the shrub to avoid high daytime temperatures. Black-tailed jackrabbits heavily depend on creosotebush for forage throughout the year. Wildlife species do not prefer spiny menodora but will browse it early in spring before spines mature. Small mammals, birds and reptiles utilize Spanish dagger for food, nest materials, nesting sites and habitat.

Hydrological functions

The runoff associated with this site is medium and permeability is moderately high. rills and waterflow patterns are none to rare. Rock fragments armor the surface. Sparse shrub canopy and associated litter provide some protection from raindrop impact. Perennial herbaceous plans slow runoff and increase infiltration.

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, photography, nature study, and has potential for upland and big game hunting.

Other products

Native Americans have used white ratany for many medicinal purposes. An infusion of the roots was used to treat skin irritations and sores. Roots were also used to produce a reddish-yellow dye. The flowers were used to treat upset stomach and diarrhea. The stems were dried and ground and applied to sores. Creosotebush is used by native people to treat many illnesses. Twigs and leaves may be boiled as tea, steamed, pounded into a powder, pressed into a poultice, or heated into an infusion.

Type locality

Location 1: Clark County, NV	
Township/Range/Section	T14S R63E S6
UTM zone	N
UTM northing	3958147
UTM easting	683047
Latitude	35° 45′ 1″
Longitude	114° 58′ 31″
General legal description	SW ¼ Section 6, T14S. R63E. MDBM. Elbow Canyon, on the west side of U.S. Highway 93, USGS Wildcat Wash SW, NV 7.5 minute quadrangle.

Other references

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Available: http://www.fs.fed.us/database/feis/

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

Contributors

C.ANDERSON/PN-E

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	06/28/2011
Approved by	Sarah Quistberg
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** Rills are none to rare. Surface rock fragments armor the surface

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2. **Presence of water flow patterns:** Water flow patterns none to rare and may be evident in areas recently subject to intense summer rainfall.

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3. **Number and height of erosional pedestals or terracettes:** Pedestals are none to rare with occurrence typically limited to areas within water flow patterns.

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare Ground up to 20%, depending on amount of surface rock fragments

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

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

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

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

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Surface structure is typically moderate, very thick platy. Soil surface colors are yellowish-brown and soils are typified by an ochric epipedon. Organic matter of the surface 2 to 3 inches is less than 1 percent.

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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 provide some protection from raindrop impact. Perennial herbaceous plants slow runoff and increase infiltration.

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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):** None. Platy or subangular blocky structure is not to be interpreted as compacted layers.

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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: Mojave Desert shrubs

    Sub-dominant: Deep-rooted, warm-season, perennial bunchgrasses > deep-rooted perennial forbs > annual forbs > annual grasses

    Other: deep-rooted, cool-season, bunchgrasses, 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 25% of total woody canopy; mature bunchgrasses commonly (<25%) have dead centers.

14. **Average percent litter cover (%) and depth (in):** Between and under canopy 15-20% and depth (<¼-inch)

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** For normal or average growing season ±250 lbs/ac. Favorable years 400 lbs/ac and unfavorable years 150 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:** Potential invaders on this site include red brome, redstem filaree, annual mustards and Mediterranean grass.

17. **Perennial plant reproductive capability:** All functional groups should reproduce in above average and normal growing season years. Less reproduction will occur in below average precipitation years. Some functional groups may not reproduce on below average years and during periods of extended drought.