Ecological site R029XY043NV
MAHOGANY SAVANNA

Last updated: 2/20/2025
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.

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 in 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.

Ecological site concept

The Mahogany Savanna site occurs on mountain summits, crests, and sideslopes. Slopes range from 15 to 50 percent. Elevations are 5800 to about 10000 feet. The soils are typically shallow to moderately deep and are well drained. There typically are high amounts of stones and/or boulders on the soil surface.

Associated sites

R029XY051NV	**LOAMY SLOPE 16+ P.Z.** This site occurs on straight to convex mountain sideslopes on all exposures. This site is restricted to northerly aspects at the lower elevations of its occurrence. Slopes range from 2 to 75 percent, but slope gradients of 15 to 75 percent are typical. Elevations are 7000 to about 10,000 feet. The soils are from residuum and colluvium derived from volcanic rocks. These soils are typically well drained.
R029XY052NV	**CLAYPAN 16+ P.Z.** This site occurs on straight to convex mountain summits, ridges, and sideslopes on all exposures. This site is restricted to northerly aspects at the lower elevations of its occurrence. Slopes range from 8 to 50 percent. Elevations range from 5800 to about 10000 feet. The soils have formed in residuum and colluvium. They are shallow to very deep with a layer restrictive to root development close to the soil surface.
R029XY080NV	**SHALLOW SANDY LOAM 5-8 P.Z.** This site occurs on fan piedmonts. Slopes range from 2 to 8 percent, but slope gradients of 4 to 8 are most typical. Elevation are 3900 to 4500 feet. The soils associated with this site are shallow over a petrocalcic and well drained. These soils have moderately rapid permeability and have very low available water capacity. The soils are moderately to strongly alkaline affected throughout the profile.

Similar sites

R029XY027NV	**MAHOGANY THICKET** Less productive understory, yet overall site productivity is greater; overstory canopy cover usually more than 50%

Table 1. Dominant plant species

Tree	(1) *Cercocarpus ledifolius*
Shrub	(1) *Artemisia tridentata ssp. vaseyana*
Herbaceous	(1) *Achnatherum* (2) *Poa fendleriana*

Physiographic features

The Mahogany Savanna site occurs on mountain summits, crests, and sideslopes. Slopes range from 15 to 50 percent. Elevations are 5800 to about 10000 feet.

Table 2. Representative physiographic features

Landforms	(1) Mountain (2) Mountain slope (3) Mesa
Runoff class	Very high
Elevation	5,800–10,000 ft
Slope	4–75%
Water table depth	72 in
Aspect	Aspect is not a significant factor

Climatic features

The climate is semiarid with cool, moist winters and warm, dry summers. Average annual precipitation is 14 to over 20 inches. Mean annual air is 40 to 50 degrees F. The average growing season is about 35 to 70 days.

Table 3. Representative climatic features

Frost-free period (characteristic range)	86 days

Freeze-free period (characteristic range)	114 days
Precipitation total (characteristic range)	11 in
Frost-free period (actual range)	86 days
Freeze-free period (actual range)	114 days
Precipitation total (actual range)	11 in
Frost-free period (average)	86 days
Freeze-free period (average)	114 days
Precipitation total (average)	11 in

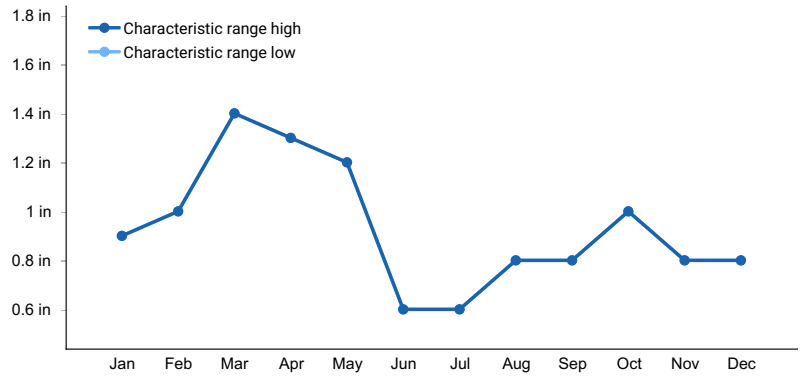


Figure 1. Monthly precipitation range

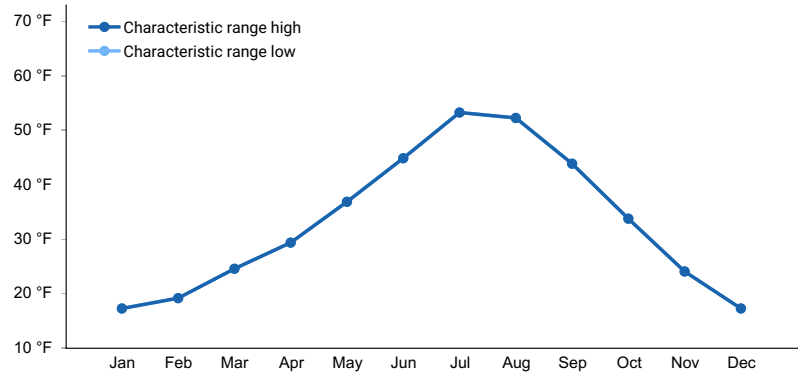


Figure 2. Monthly minimum temperature range

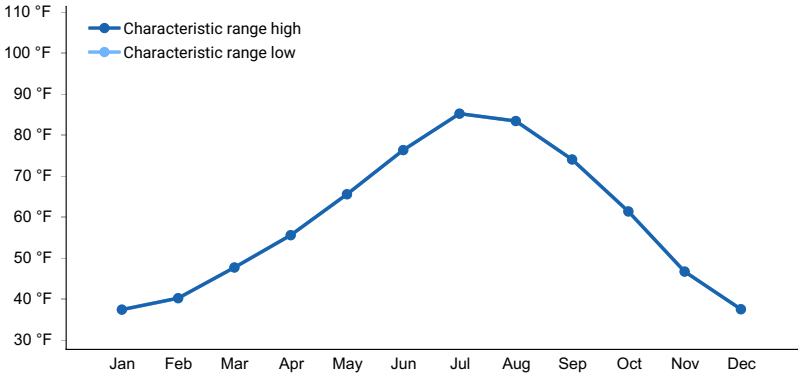


Figure 3. Monthly maximum temperature range

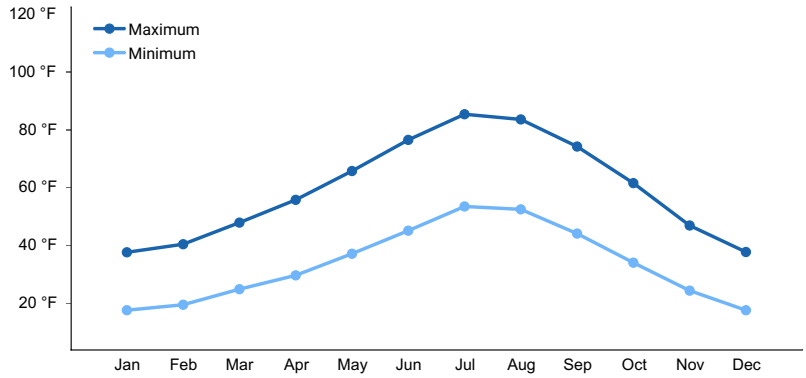


Figure 4. Monthly average minimum and maximum temperature

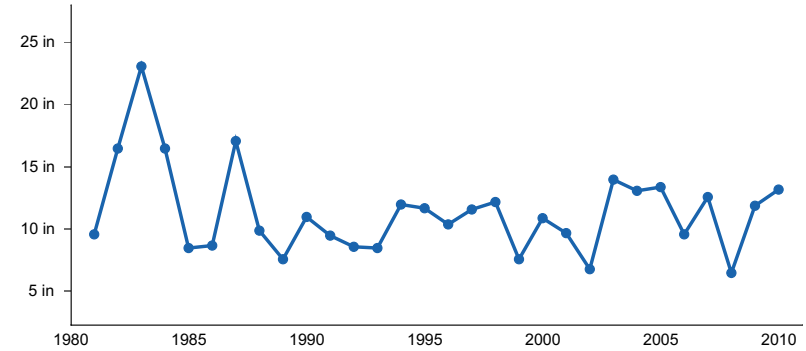


Figure 5. Annual precipitation pattern

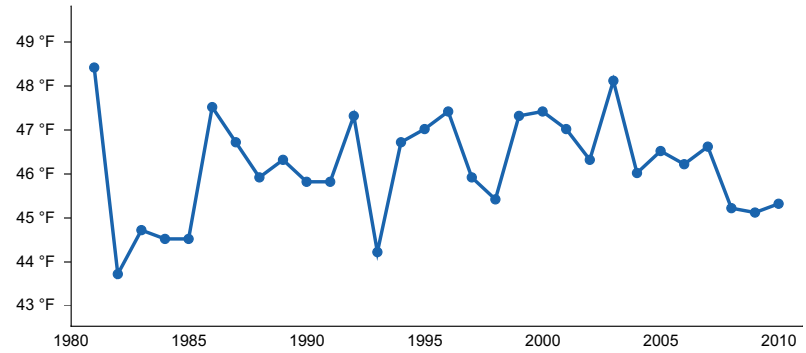


Figure 6. Annual average temperature pattern

Climate stations used

- (1) EUREKA [USC00262708], Eureka, NV

Influencing water features

There are no influencing water features associated with this site.

Soil features

The soils are typically shallow to moderately deep and are well drained. There typically are high amounts of stones and/or boulders on the soil surface. These soils have high to very high runoff and moderately slow to moderate permeability. Available water holding capacity is very low. Sheet and rill erosion potential is low. Soil series associated with this site include Labshaft, Scuffe, and Suak.

Table 4. Representative soil features

Parent material	(1) Residuum–quartzite (2) Colluvium–quartzite

Surface texture	(1) Very stony loam (2) Very cobbly loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderately slow to moderate
Soil depth	10–39 in
Surface fragment cover <=3"	15–30%
Surface fragment cover >3"	23–36%
Available water capacity (0-40in)	1.2–2.3 in
Calcium carbonate equivalent (0-40in)	0%
Electrical conductivity (0-40in)	0 mmhos/cm
Sodium adsorption ratio (0-40in)	0
Soil reaction (1:1 water) (0-40in)	6.1–7.8
Subsurface fragment volume <=3" (Depth not specified)	14–27%
Subsurface fragment volume >3" (Depth not specified)	26–28%

Ecological dynamics

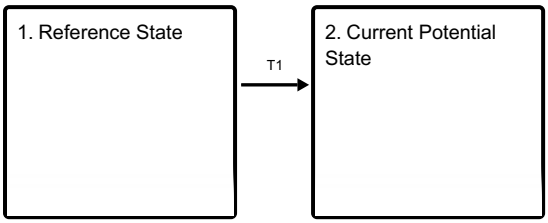
Where management results in abusive livestock and big game use, understory grasses and forbs are reduced as snowberry increases. Heavy browsing by livestock or big game animals will result in the reproduction and overall productivity of curlleaf mountain mahogany to be adversely impacted. Species likely to invade this site are annuals such as cheatgrass.

Fire Ecology
The presettlement fire regime of curlleaf mountain mahogany communities probably varied with community type and structure. The fire return interval is highly variable, ranging from 13 to 1000 years. Curlleaf mountain mahogany may depend on fire to reduce conifer competition and produce favorable soil conditions for seedling establishment. Some curlleaf mountain mahogany stands occupy sites with very low fuel levels that rarely burn. Individual curlleaf mountain mahogany are severely damaged by fire. Because many dead branches persist in the crown and leaves are slightly resinous, curlleaf mountain mahogany is probably very flammable. Curlleaf mountain mahogany is a weak sprouter after a fire. Mountain big sagebrush is highly susceptible to injury from fire. Plants are readily killed in all seasons, even light severity fires. Mountain big sagebrush plants top-killed by fire will not resprout. Common snowberry has high resistance to fire. It is a rhizomatous species with rhizomes buried 2 to 5 inches (5-12.5 cm) deep in mineral soil. After fire has killed the top of the plant, new growth sprouts from these rhizomes. This rhizomatous growth response is highly variable and depends on conditions at specific sites. Regeneration from buried seed is favored by fires of low severity and short duration that remove little of the soil organic level. Perennial needlegrasses tend to be among the least fire resistant bunchgrass due to the densely tufted stems. Western needlegrass is moderately damaged by fire. The recovery time is between 3 and 5 years. Needlegrasses are damaged by burning due to the dense plant material that can burn slowly and long, charring to the growing points. Late summer and early fall fires are the least harmful. Thurber’s needlegrass is classified as moderately resistant, but depending on season of burn, phenology, and fire severity, this perennial bunchgrass is moderately to severely damaged by fire. Early season burning is more damaging to this needlegrass than late season burning. Little specific information is available on adaptations of Letterman's needlegrass to fire. It is morphologically similar to Columbia needlegrass, which is only slightly to moderately damaged by fire. Season of burn affects the plant's ability to survive a fire. Post-fire regeneration is through seeding and tillering. Muttongrass is unharmed to slightly harmed by light-severity fall fire. Muttongrass appears to be harmed by and slow to recover from severe fire. Basin

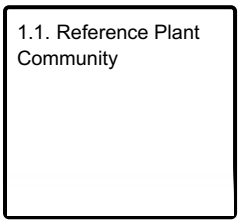
wildrye is top-killed by fire. Older basin wildrye plants with large proportions of dead material within the perennial crown can be expected to show higher mortality due to fire than younger plants having little debris. Basin wildrye is generally tolerant of fire but may be damaged by early season fire combined with dry soil conditions. Needle and thread is top-killed by fire. It may be killed if the aboveground stems are completely consumed. Needle and thread is classified as slightly to severely damaged by fire. Needle and thread sprouts from the caudex following fire, if heat has not been sufficient to kill underground parts. Recovery usually takes 2 to 10 years.

State and transition model

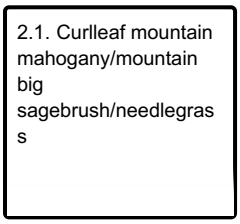
Ecosystem states



State 1 submodel, plant communities



State 2 submodel, plant communities



State 1
Reference State

The Reference State 1.0 is a representative of the natural range of variability under pristine conditions. The Reference State has two general community phases; a tree-shrub dominant phase and a shrub dominant phase. State dynamics are maintained by interactions between climatic patterns and disturbance regimes. Negative feedbacks enhance ecosystem resilience and contribute to the stability of the state. These include the presence of all structural and functional groups, low fine fuel loads, and retention of organic matter and nutrients. Plant community phase changes are primarily driven by fire, periodic drought and/or insect attack.

Community 1.1
Reference Plant Community

The reference plant community is dominated by curlleaf mountain mahogany. Other important species are mountain big sagebrush, needlegrasses, muttongrass, basin wildrye, and snowberry. Total overstory canopy cover is less than 50 percent (±35 percent). Understory vegetation comprises about 50 percent of the total site production. Potential vegetative composition for the understory is about 50 percent grasses, 10 percent forbs and 40 percent shrubs and up to 4 percent trees. Overstory trees and tree-like shrub composition is about 50 percent of the total site production.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	600	900	1250
Shrub/Vine	432	648	900
Forb	120	180	250
Tree	48	72	100
Total	**1200**	**1800**	**2500**

State 2
Current Potential State

This state is similar to the Reference State 1.0. This state has the same two general community phases. Ecological function has not changed, however the resiliency of the state has been reduced by the presence of invasive weeds. These non-natives can be highly flammable, and can promote fire where historically fire had been infrequent. Negative feedbacks enhance ecosystem resilience and contribute to the stability of the state. These include the presence of all structural and functional groups, low fine fuel loads, and retention of organic matter and nutrients. Positive feedbacks decrease ecosystem resilience and stability of the state. These include the non-natives' high seed output, persistent seed bank, rapid growth rate, ability to cross pollinate, and adaptations for seed dispersal.

Community 2.1
Curlleaf mountain mahogany/mountain big sagebrush/needlegrass

This community phase is similar to the Reference State Community Phase 1.1, with the presence of non-native species in trace amounts. This community is dominated by curlleaf mountain mahogany. Small disturbances that damage or kill individual trees open up areas in the canopy. Mountain big sagebrush and mountain snowberry make up the shrub components of the understory. Needlegrass make up the perennial bunchgrasses. Forbs and other grasses are a small component of the understory.

Transition T1
State 1 to 2

Trigger: This transition is caused by the introduction of non-native annual plants, such as cheatgrass, mustards, and thistles. Slow variables: Over time annual non-native species increase within the community. Threshold: Any amount of introduced non-native species causes an immediate decrease in the resilience of the site. Annual non-native species cannot be easily removed from the system and have the potential to significantly alter disturbance regimes from their historic range of variation.

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**			154–477	
	muttongrass	POFE	*Poa fendleriana*	45–135	–
	basin wildrye	LECI4	*Leymus cinereus*	18–72	–
	western needlegrass	ACOCO	*Achnatherum occidentale ssp. occidentale*	23–57	–
	pine needlegrass	ACPI2	*Achnatherum pinetorum*	23–56	–
	Thurber's needlegrass	ACTH7	*Achnatherum thurberianum*	22–56	–
	Letterman's needlegrass	ACLE9	*Achnatherum lettermanii*	22–56	–
	needle and thread	HECO26	*Hesperostipa comata*	1–45	–
2	**Secondary Perennial Grasses/Grasslikes**			18–72	
	Nevada needlegrass	ACNE10	*Achnatherum nevadense*	9–54	–
	Columbia needlegrass	ACNEN2	*Achnatherum nelsonii ssp. nelsonii*	9–54	–
	mountain brome	BRMA4	*Bromus marginatus*	9–54	–
	sedge	CAREX	*Carex*	9–54	–
	Sandberg bluegrass	POSE	*Poa secunda*	9–54	–
Forb					
3	**Perennial**			45–135	
	sedge	CAREX	*Carex*	9–54	–
	tapertip hawksbeard	CRAC2	*Crepis acuminata*	9–54	–
	lupine	LUPIN	*Lupinus*	9–54	–
	ragwort	SENEC	*Senecio*	9–54	–
Shrub/Vine					
4	**Primary Shrubs**			153–297	
	mountain big sagebrush	ARTRV	*Artemisia tridentata ssp. vaseyana*	135–225	–
	snowberry	SYMPH	*Symphoricarpos*	18–72	–
5	**Secondary Shrubs**			18–90	
	Utah serviceberry	AMUT	*Amelanchier utahensis*	18–90	–
	yellow rabbitbrush	CHVI8	*Chrysothamnus viscidiflorus*	18–90	–
	mormon tea	EPVI	*Ephedra viridis*	18–90	–
	antelope bitterbrush	PUTR2	*Purshia tridentata*	18–90	–
	currant	RIBES	*Ribes*	18–90	–
Tree					
6	**Deciduous**			9–54	
	quaking aspen	POTR5	*Populus tremuloides*	9–54	–
7	**Evergreen**			828–1098	
	curl-leaf mountain mahogany	CELE3	*Cercocarpus ledifolius*	810–990	–
	Utah juniper	JUOS	*Juniperus osteosperma*	9–54	–
	singleleaf pinyon	PIMO	*Pinus monophylla*	9–54	–

Animal community

Livestock Interpretations:
This site is suited to livestock grazing. Grazing management should be keyed to perennial grass production. Needlegrass species begin growth early in the year and remain green throughout a relatively long growing season. This pattern of development enables animals to use needlegrass when many other grasses are unavailable. Cattle prefer needlegrass in early spring before fruits have developed as it becomes less palatable when mature. Needlegrasses are usually grazed in the fall only if the fruits are softened by rain. Muttongrass is excellent forage for domestic livestock especially in the early spring. Muttongrass begins growth in late winter and early spring, which makes it available before many other forage plants. The early growth and abundant production of basin wildrye make it a valuable source of forage for livestock. It is important forage for cattle and is readily grazed by cattle and horses in early spring and fall. Though coarse-textured during the winter, basin wildrye may be utilized more frequently by livestock and wildlife when snow has covered low shrubs and other grasses. Needleandthread provides highly palatable forage, especially in the spring before fruits have developed. Needlegrasses are grazed in the fall only if the fruits are softened by rain. Mountain big sagebrush is eaten by domestic livestock but has long been considered to be of low palatability, and a competitor to more desirable species. Common snowberry is considered important browse for many types of livestock. It is especially important to domestic sheep and cattle. Common snowberry is highly palatable to cattle. It plays a critical role in permitting cattle to meet their protein requirements during the latter half of the growing season. Domestic sheep also utilize common snowberry for browse and it is considered fair to good forage. It is has no forage value for horses. Some livestock (domestic goats, sheep, and cattle) use curlleaf mountainmahogany in spring, fall, and/or winter but rarely in the summer.

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:
Curlleaf mountainmahogany provides food and cover for a variety of wildlife species. Curlleaf mountainmahogany is highly palatable to deer. A variety of small mammals consume curlleaf mountainmahogany seeds. Mountain big sagebrush is highly preferred and nutritious winter forage for mule deer and elk. Common snowberry is considered important browse for many types of wildlife. Bighorn sheep use common snowberry regularly during the summer. Forage value to elk is fair. Common snowberry is important as both cover and food for bird and small mammal populations. These include sharp-tailed, ruffed, and blue grouse, wild turkey and, several non-game species of bird including the kingbird, western flycatcher, and western bluebird. Among small mammals that rely on common snowberry are fox squirrels, desert cottontails, and pocket gopher. Needlegrass and muttongrass are other important forage species for several wildlife species. Basin wildrye provides winter forage for mule deer, though use is often low compared to other native grasses. Basin wildrye provides summer forage for black-tailed jackrabbits. Because basin wildrye remains green throughout early summer, it remains available for small mammal forage for longer time than other grasses. Needleandthread is moderately important spring forage for mule deer, but use declines considerably as more preferred forages become available.

Hydrological functions

Runoff is high to very high and permeability is moderately slow to moderate. Rills and waterflow patterns are rare to few. Occurrence of rills more frequent as canopy cover increases and on steeper slopes. Pedestals are rare to few. Occurrence is usually limited to areas of water flow patterns. Frost heaving of shallow rooted plants should not be considered an indicator of soil erosion. There are no gullies. Perennial herbaceous plants (especially deep-rooted bunchgrasses [i.e., western and Thurber's needlegrasses] slow runoff and increase infiltration. Curlleaf mountainmahogany and understory shrubs break raindrop impact and provide opportunity for snow catch and accumulation on 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 camping and hiking and has potential for upland and big game hunting.

Other products

Native peoples used big sagebrush leaves and branches for medicinal teas, and the leaves as a fumigant. Bark was woven into mats, bags and clothing. Common snowberry fruit fruits were eaten fresh and also dried for winter use by Native Americans. Common snowberry was also used on hair as soap, and the fruits and leaves mashed and applied to cuts or skin sores as a poultice and to soothe sore, runny eyes. Tea from the bark was used as a remedy for tuberculosis and sexually transmitted diseases. A brew made from the entire plant was used as a physic tonic. Arrowshafts and pipestems were made from the stems. Basin wildrye was used as bedding for various Native American ceremonies, providing a cool place for dancers to stand.

Other information

Curlleaf mountainmahogany may be planted to help stabilize soil in disturbed areas such as roadcuts and mine spoils. Basin wildrye is useful in mine reclamation, fire rehabilitation and stabilizing disturbed areas. Its usefulness in range seeding, however, may be limited by initially weak stand establishment. Needleandthread is useful for stabilizing eroded or degraded sites.

Inventory data references

NASIS soil component data.

Type locality

Location 1: Nye County, NV	
General legal description	This site occurs in Nye and Lincoln Counties, 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.

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

Contributors

GED

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)	GK BRACKLEY
Contact for lead author	State Rangeland Management Specialist
Date	02/21/2007
Approved by	Kendra Moseley

Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** Rills are rare to few. Occurrence of rills more frequent as canopy cover increases and on steeper slopes.

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2. **Presence of water flow patterns:** Water flow patterns are rare to few with occurrence increasing as canopy cover increases.

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3. **Number and height of erosional pedestals or terracettes:** Pedestals are rare to few. Occurrence is usually limited to areas of water flow patterns. Frost heaving of shallow rooted plants should not be considered an indicator of soil erosion.

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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 ± 20%; surface rock fragments ±35%; tree canopy 35 to 50%; shrub canopy 5 to 15%; foliar cover for perennial herbaceous plants ± 25%.

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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 during intense summer convection storms or rapid snowmelt events. Persistent litter (large woody material) will remain in place except during catastrophic events. Mat of accumulating needle litter under mature trees is very stable and shows no obvious movement.

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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 3 to 4 on most soil textures found on this site. Areas of this site occurring on soils that have a physical crust will probably have stability values less than 3. (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 thin to thick platy or massive. Soil surface colors are dark and are soils are typified by a mollic epipedon. Organic carbon of the surface 2 to 4 inches is typically 1.5 to 3 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:** Perennial herbaceous plants (especially deep-rooted bunchgrasses [i.e., western and Thurber"s needlegrasses] slow runoff and increase infiltration. Curlleaf mountainmahogany and understory

shrubs break raindrop impact and provide opportunity for snow catch and accumulation on 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 not typical. Platy or massive sub-surface horizons, subsoil argillic horizons or hardpans shallow to the surface are 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: Curlleaf mountainmahogany >> understory shrubs. By above ground production)

    Sub-dominant: deep-rooted, cool season, perennial bunchgrasses > deep-rooted, cool season, perennial forbs = shallow-rooted, cool season, perennial grasses = fibrous, shallow-rooted, cool season, perennial forbs = annual forbs. (By above ground production)

    Other:

    Additional:

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Overstory trees have little mortality. Dead branches within understory shrubs are common and standing dead shrub canopy material may be as much as 35% of total shrub canopy; mature bunchgrasses (<25%) may have dead centers.

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14. **Average percent litter cover (%) and depth (in):** Herbaceous, or non-persistent, litter within curlleaf mountainmahogany canopy interspaces (± 5%) and litter depth is ± ¼inch. Leaf litter forms a mat 1to 2 inches thick under the drip line of mature mountainmahogany. Large, persistent, litter from trees (limbs, etc.) variable to 5%.

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** For understory vegetation to 4½ feet and normal or average growing season (through May) = ±900 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:** Cheatgrass and rabbitbrush are invaders on this site. Utah juniper and singleleaf pinyon are increasers 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.
