USDA Natural Resources
Conservation Service

Ecological site R023XY073NV
GRANITIC MAHOGANY THICKET

Last updated: 4/10/2025
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General information

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

Ecological site concept

Currently there is only a draft of the initial concept for this ecological site. The initial concept for this site places it within the Mountain Slope 16-20 PZ Mahogany Site Group. To view the General STM and other information available for this ESG please go to https://edit.jornada.nmsu.edu/catalogs/esg/023X/R023XY917NV

Similar sites

R023XY073NV	**GRANITIC MAHOGANY THICKET** more understory production; more open stand of CELE3; canopy cover <45%

Table 1. Dominant plant species

Tree	(1) *Cercocarpus ledifolius*
Shrub	(1) *Artemisia tridentata var. vaseyana*
Herbaceous	(1) *Achnatherum*

Physiographic features

This site occurs on smooth to concave shoulders of mountains. Slopes range from 30 to 75 percent, but slope gradients of 30 to 50 percent are typical. Elevations are 6000 to 9000 feet.

Table 2. Representative physiographic features

Landforms	(1) Mountain

Elevation	1,829–2,743 m
Slope	30–75%
Aspect	Aspect is not a significant factor

Climatic features

The climate associated with this site is semiarid and characterized by cold, moist winters and cool, dry summers. Average annual precipitation is 16 to 20 inches. Mean annual air temperature is 38 to 41 degrees F. The average growing season is about 30 to 60 days.

Nevada's climate is predominantly arid, with large daily ranges of temperature, infrequent severe storms, heavy snowfall in the higher mountains, and great location variations with elevation. Three basic geographical factors largely influence Nevada's climate: continentality, latitude, and elevation. Continentality is the most important factor. The strong continental effect is expressed in the form of both dryness and large temperature variations. Nevada lies on the eastern, lee side of the Sierra Nevada Range, a massive mountain barrier that markedly influences the climate of the State. The prevailing winds are from the west, and as the warm moist air from the Pacific Ocean ascend the western slopes of the Sierra Range, the air cools, condensation occurs and most of the moisture falls as precipitation. As the air descends the eastern slope, it is warmed by compression, and very little precipitation occurs. The effects of this mountain barrier are felt not only in the West but throughout the state, with the result that the lowlands of Nevada are largely desert or steppes. The temperature regime is also affected by the blocking of the inland-moving maritime air. Nevada sheltered from maritime winds, has a continental climate with well-developed seasons and the terrain responds quickly to changes in solar heating. Nevada lies within the mid-latitude belt of prevailing westerly winds which occur most of the year. These winds bring frequent changes in weather during the late fall, winter and spring months, when most of the precipitation occurs. To the south of the mid-latitude westerlies, lies a zone of high pressure in subtropical latitudes, with a center over the Pacific Ocean. In the summer, this high-pressure belt shifts northward over the latitudes of Nevada, blocking storms from the ocean. The resulting weather is mostly clear and dry during the summer and early fall, with scattered thundershowers. The eastern portion of the state receives significant summer thunderstorms generated from monsoonal moisture pushed up from the Gulf of California, known as the North American monsoon. The monsoon system peaks in August and by October the monsoon high over the Western U.S. begins to weaken and the precipitation retreats southward towards the tropics (NOAA 2004).

Average annual precipitation is 16 to over 20 inches. Mean annual air temperature is 41 to 44 degrees F. The average growing season is about 50 to 70 days.

Mean annual precipitaion at the Bear Creek, Nevada SNOTEL station (170501020301) is 37.69 inches.

monthly mean precipitation is:
January 3.84; February 3.75; March 4.38; April 4.9;
May 3.99; June 2.82; July .95; August 1.66;
September 1.22; October 2.12;
November 3.67; December 4.38.

Table 3. Representative climatic features

Frost-free period (average)	45 days
Freeze-free period (average)	
Precipitation total (average)	457 mm

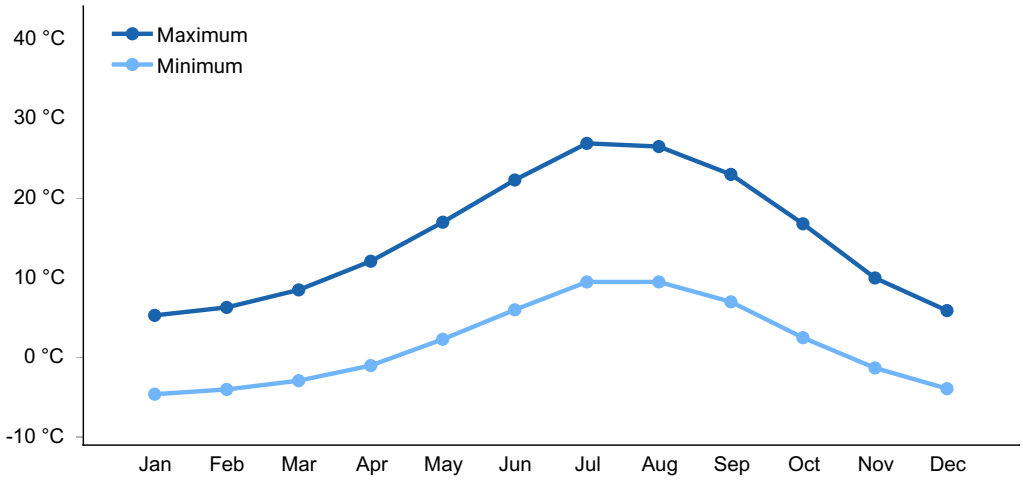

Figure 1. Monthly average minimum and maximum temperature

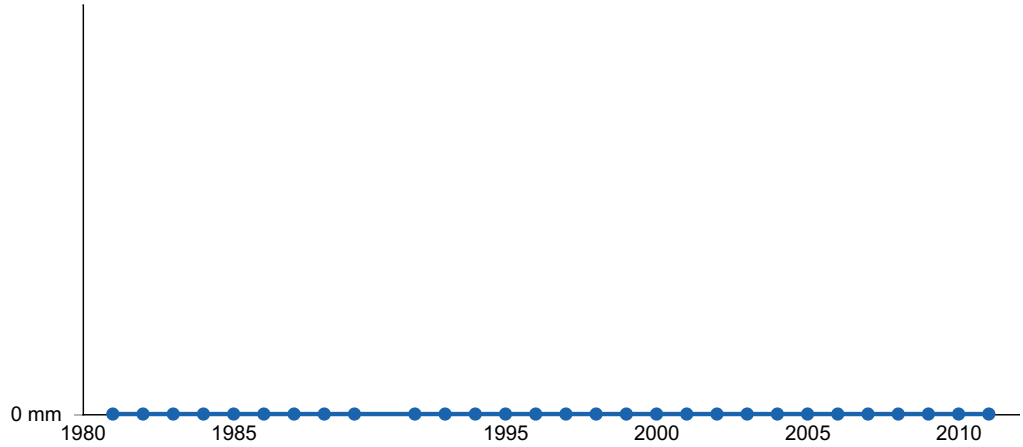

Figure 2. Annual precipitation pattern

Influencing water features

There are no influencing water features associated with this site.

Soil features

The soils associated with this site have formed in residuum from granitic rock sources. Soils are moderately deep to deep and somewhat excessively drained. Available water capacity is low. There are usually low amounts of large stones or on the surface. The soils have medium runoff and are moderately rapid permeable. These soils have a mollic epipedon. Sheet and rill erosion potential is low. The soil series associated with this site include: Alta.

Table 4. Representative soil features

Surface texture	(1) Very bouldery coarse sandy loam
Family particle size	(1) Loamy
Drainage class	Somewhat excessively drained
Permeability class	Moderately rapid
Soil depth	102–152 cm
Surface fragment cover <=3"	15–28%
Surface fragment cover >3"	26–27%
Available water capacity (0-101.6cm)	6.86–7.11 cm
Calcium carbonate equivalent (0-101.6cm)	0%
Electrical conductivity (0-101.6cm)	0 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0
Soil reaction (1:1 water) (0-101.6cm)	6.1–7.3
Subsurface fragment volume <=3" (Depth not specified)	12–18%
Subsurface fragment volume >3" (Depth not specified)	25–27%

Ecological dynamics

As ecological condition declines, native perennial understory grasses and forbs are much reduced or eliminated. Heavy browsing by livestock or big game animals will result in the reproduction and productivity of curlleaf mountainmahogany to be adversely impacted. Species likely to invade this site are annual grasses and forbs.

Fire Ecology:
The historic fire regime of curlleaf mountainmahogany communities probably varied with community type and structure. The fire return interval is highly variable, ranging from 13 to

over 100 years. Curlleaf mountain mahogany may depend on fire to reduce conifer competition and produce favorable soil conditions for seedling establishment. Some curlleaf mountainmahogany stands occupy sites with very low fuel levels that rarely burn. Individual curlleaf mountainmahogany are severely damaged by fire. Because many dead branches persist in the crown and leaves are slightly resinous, curlleaf mountainmahogany is probably very flammable. Curlleaf mountainmahogany is a weak sprouter after a fire. Mountain big sagebrush is highly susceptible to injury from fire. It is often top-killed by fire and will not resprout. 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. Western needlegrass is moderately damaged by fire. The recovery time is between 3 and 5 years. Columbia needlegrass is only slightly to moderately damaged by fire, because it has relatively few culms per clump which may help to minimize the amount of subsurface heat transfer and subsequent damage. Nevada bluegrass is generally unharmed by fire. It produces little litter, and its small bunch size and sparse litter reduces the amount of heat transferred to perennating buds in the soil. Mountain brome is likely to be top-killed by fire, although the coarse stems and broad leaves may be more fire-resistant than fine-leaved bunchgrasses. Mountain brome is most susceptible to fire damage when it is actively growing in spring and early summer. Big squirreltail is considered to be one of the most fire resistant native bunchgrasses. Older plants contain relatively low amounts of dead material when compared with other native bunchgrasses. This allows for hot, but quick burns which do not penetrate and damage the crown. However, during dry years, plants can be damaged by severe burns.

State and transition model

Ecosystem states

1. Reference Plant Community

State 1 submodel, plant communities

1.1. Reference Plant Community

State 1

Reference Plant Community

Community 1.1
Reference Plant Community

The reference plant community is dominated by curlleaf mountainmahogany. Other important species are mountain big sagebrush, needlegrassses, bluegrasses, and big squirreltail. Canopy cover of mountainmahogany exceeds 50 percent. Potential vegetative composition is about 15% grasses, 5% forbs , 15% understory shrubs, and 65% tree-like shrubs. Approximate ground cover (basal and crown) is 45 to 75 percent. Total production for all vegetation in the understory to a height of 4½ feet: Unfavorable years - 200 lbs/ac, Normal years - 300 lbs/ac, and Favorable years - 500 lbs/ac.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Tree	1676	2113	2331
Grass/Grasslike	387	488	538
Shrub/Vine	387	488	538
Forb	129	163	179
Total	**2579**	**3252**	**3586**

Additional community tables

Table 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	**Primary Perennial Grasses**			358–813	
	mountain brome	BRMA4	*Bromus marginatus*	65–163	–
	big squirreltail	ELMU3	*Elymus multisetus*	65–163	–
	Letterman's needlegrass	ACLE9	*Achnatherum lettermanii*	55–109	–
	western needlegrass	ACOCO	*Achnatherum occidentale ssp. occidentale*	54–109	–
	Columbia needlegrass	ACNEN2	*Achnatherum nelsonii ssp. nelsonii*	54–108	–
2	**Secondary Perennial Grasses/Grasslikes**			65–260	
	sedge	CAREX	*Carex*	17–65	–
	melicgrass	MELIC	*Melica*	17–65	–
	muttongrass	POFEF	*Poa fendleriana ssp.*	17–65	

	muttongrass	POFEF	*Poa fendleriana ssp. fendleriana*	17–65	–
Forb					
3	**Perennial**			65–260	
	arrowleaf balsamroot	BASA3	*Balsamorhiza sagittata*	17–65	–
	lupine	LUPIN	*Lupinus*	17–65	–
Shrub/Vine					
4	**Primary Shrubs**			163–325	
	mountain big sagebrush	ARTRV	*Artemisia tridentata ssp. vaseyana*	163–325	–
5	**Secondary Shrubs**			65–163	
	Utah serviceberry	AMUT	*Amelanchier utahensis*	33–65	–
	yellow rabbitbrush	CHVI8	*Chrysothamnus viscidiflorus*	33–65	–
	antelope bitterbrush	PUTR2	*Purshia tridentata*	33–65	–
	currant	RIBES	*Ribes*	33–65	–
	snowberry	SYMPH	*Symphoricarpos*	33–65	–
Tree					
6	**Evergreen**			1300–2113	
	curl-leaf mountain mahogany	CELE3	*Cercocarpus ledifolius*	1300–2113	–

Animal community

Livestock Interpretations:
This site has limited value for livestock grazing due to steep slopes and stony surfaces. Letterman’s needlegrass begins growth early in the year and remains green throughout the relatively long growing season, thus, making it valuable forage for livestock. Western needlegrass has a spreading and deeply penetrating root system, which makes it resistant to trampling.Columbia needlegrass provides valuable forage for all classes of livestock. Overall production is generally low in the upper sagebrush and mountain brush zones and at the limits of its range where Columbia needlegrass grows only in scattered patches. It is especially valuable to cattle and horses on summer ranges and to domestic sheep on lambing grounds. It is more often cropped closely by cattle and horses than by sheep. Columbia needlegrass is palatable to livestock throughout its range. As with most needlegrasses, it is most palatable early in the season before the foliage becomes coarse and wiry. Palatability to cows and horses is increased because large amounts of fine leafage remain green throughout the growing season. Palatability of Columbia needlegrass is described as fair to good for cattle and horses, becoming nearly

unpalatable at maturity. Nevada bluegrass is a widespread forage grass. It is one of the earliest grasses in the spring and is sought by domestic livestock and several wildlife species. Nevada bluegrass is a palatable species, but its production is closely tied to weather conditions. It produces little forage in drought years, making it a less dependable food source than other perennial bunchgrasses. Mountain brome is one of the most important forage grasses in the quaking aspen zone. Mountain brome is ranked as excellent forage for both cattle and horses and good for domestic sheep. Domestic sheep will graze mountain brome only when it is fairly succulent. Big squirreltail is considered to be fair to desirable forage for cattle, horses, and sheep in spring before seed head development and late summer to fall after seed shatter. 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. 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. Letterman's needlegrass provides valuable forage for many species of wildlife. It is consumed by mule deer and is most palatable early in the season before the foliage becomes coarse and wiry. Western needlegrass provides valuable forage for many species of wildlife. Columbia needlegrass provides valuable forage for many species of wildlife. It is also consumed by mule deer and other wildlife species throughout the growing season. Needlegrasses are a significant component in the diet of pocket gophers. Columbia needlegrass is palatable to many species of wildlife throughout its range. As with most needlegrasses, it is most palatable early in the season before the foliage becomes coarse and wiry. Palatability of Columbia needlegrass is described as fair for wildlife overall, becoming nearly unpalatable at maturity. Nevada bluegrass is desirable for mule deer in the spring and preferable in the spring, summer, and fall for elk and desirable as part of their winter range. Mountain brome seedheads and seeds provide food for many birds and small mammals. The palatability of mountain brome is excellent for deer, particularly during the late spring and early summer. Big squirreltail is an important forage species for many wildlife species.

Hydrological functions

Runoff is medium. Permeability is moderately rapid. Hydrologic soil group is B.

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 Americans used big sagebrush leaves and branches for medicinal teas, and the leaves as a fumigant. Bark was woven into mats, bags and clothing.

Other information

Curlleaf mountainmahogany may be planted to help stabilize soil in disturbed areas such as roadcuts and mine spoils. Letterman's needlegrass has been used successfully in revegetating mine spoils. This species also has good potential for erosion control. Mountain brome is an excellent native bunchgrass for seeding alone or in mixtures in disturbed areas, including depleted rangelands, burned areas, roadways, mined lands, and degraded riparian zones.

Type locality

Location 1: Humboldt County, NV	
Township/Range/Section	T45N R30E S5
UTM zone	N
UTM northing	363076
UTM easting	4629913
Latitude	41° 48′ 33″
Longitude	118° 38′ 54″
General legal description	N 1/2, North of Alta Canyon, Pine Forest Range, Humboldt County, Nevada. This site also occurs in Washoe County, Nevada.

Other references

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

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

Contributors

RWA

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)	
Contact for lead author	
Date	04/05/2026
Approved by	Kendra Moseley
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:**

   _____

2. **Presence of water flow patterns:**

   _____

3. **Number and height of erosional pedestals or terracettes:**

   _____

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):**

   _____

5. **Number of gullies and erosion associated with gullies:**

   _____

6. **Extent of wind scoured, blowouts and/or depositional areas:**

   _____

7. **Amount of litter movement (describe size and distance expected to travel):**

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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):**

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):**

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:**

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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):**

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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:

    Sub-dominant:

    Other:

    Additional:

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):**

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14. **Average percent litter cover (%) and depth (in):**

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):**

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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:**

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17. **Perennial plant reproductive capability:**
