

Ecological site R023XY048NV GRANITIC SLOPE 16+ P.Z.

Last updated: 4/10/2025
Accessed: 04/20/2026

General information

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

Ecological site concept

Currently there is only a draft of the initial concept for this ecological site. The initial concept for this site places it within the Loamy 14-18 PZ Mountain Big Sagebrush and Mountain Brome Ecological 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/R023XY908NV> This site is significantly less productive than the modal site with 1100 lbs/ac in normal years. The plant community is dominated by mountain brome with lesser amounts of basin wildrye, needlegrasses and Idaho fescue. Mountain big sagebrush is the dominant shrub. The soils of this site have formed in residuum from granitic rock sources. These soils have a shallow effective rooting zone, with depth to weathered bedrock beginning at about 8 inches. Soil textures are coarse and moderately coarse near the surface and in the subsoil. These soils have a very low available water capacity. Soil reaction ranges from slightly acidic near the surface to neutral in the subsoil. The soils are well drained, runoff is rapid to very rapid, and permeability is moderately rapid. This site has a two state model because it was never seen in a shrub state, tree state, or with significant annual grasses to warrant an annual state during field visits for the group report.

Similar sites

R023XY064NV	<p>SOUTH SLOPE 16+ P.Z.</p> <p>PSSPS dominant grass</p>
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Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) <i>Artemisia tridentata</i> var. <i>vaseyana</i>
Herbaceous	(1) <i>Bromus marginatus</i>

Physiographic features

This site occurs on straight to convex mountain backslopes on all aspects. Slopes range from 15 to 75 percent, but slope gradients of 30 to 50 percent are most typical. Elevations are 6000 to 9000 feet.

Table 2. Representative physiographic features

Landforms	(1) Mountain slope
Elevation	1,830 – 2,740 m

Slope	20 – 80 %
Aspect	Aspect is not a significant factor

Climatic features

The climate associated with this site is semiarid and characterized by cold, moist winters and warm, dry summers. Average annual precipitation is 16 to 20 inches. Mean annual air temperature is 43 to 47 degrees F. The average growing season is about 50 to 70 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 precipitation 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)	60 days
Freeze-free period (average)	
Precipitation total (average)	460 mm

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. These soils have a shallow effective rooting zone, with depth to weathered bedrock beginning at about 8 inches. Soil textures are coarse and moderately coarse near the surface and in the subsoil. These soils have a very low available water capacity. Soil reaction ranges from slightly acid near the surface to neutral in the subsoil. The soils are well drained, runoff is high, and permeability is moderately rapid. The soil series associated with this site include: Aycab.

Table 4. Representative soil features

Parent material	(1) Residuum – granite
Surface texture	(1) Bouldery loamy coarse sand
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderately rapid
Soil depth	60 – 100 cm
Surface fragment cover <=3"	20 – 30 %
Surface fragment cover >3"	10 %
Available water capacity (0-101.6cm)	Not specified
Calcium carbonate equivalent (0-101.6cm)	Not specified
Electrical conductivity (0-101.6cm)	Not specified
Sodium adsorption ratio (0-101.6cm)	Not specified
Soil reaction (1:1 water) (0-101.6cm)	6.1 – 7.3

Subsurface fragment volume ≤3" (Depth not specified)	20 %
Subsurface fragment volume >3" (Depth not specified)	0 – 10 %

Ecological dynamics

Where management results in abusive use by livestock or feral horses, mountain brome and needlegrasses decrease. Mountain big sagebrush, snowberry, and arrowleaf balsamroot increase in the overstory with increases of bluegrasses in the understory. Cheatgrass and other annuals are plants likely to invade this site.

Fire Ecology:

Presettlement fire return intervals in mountain big sagebrush communities varied from 15 to 25 years. Plants are readily killed in all seasons, even light severity fires. Mountain big sagebrush is highly susceptible to injury from fire. It is often top-killed by fire and will not resprout. Fires top-kill mountain snowberry. Although plant survival may be variable, mountain snowberry root crowns usually survive even severe fires. Mountain snowberry sprouts from basal buds at the root crown following fire. Antelope bitterbrush is considered a weak sprouter and is often killed by summer or fall fire. Antelope bitterbrush in some areas may sprout after light-severity spring fire. High fuel consumptions increase antelope bitterbrush mortality and therefore favors seedling establishment. 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. 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. 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. Idaho fescue grows in a dense, fine-leaved tuft. Fires tend to burn within the accumulated fine leaves at the base of the plant and may produce temperatures sufficient to kill some of the root crown. Mature Idaho fescue plants are commonly reported to be severely damaged by fire in all seasons. Purple oniongrass has a high fire tolerance due to the rhizomatous growth. 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. Its rapid maturation in the spring also reduces fire damage, since it is dormant when most fires occur.

State and transition model

Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
Grass/Grasslike					
1	Primary Perennial Grasses			481-863	
	mountain brome	BRMA4	<i>Bromus marginatus</i>	247-370	–
	Idaho fescue	FEID	<i>Festuca idahoensis</i>	62-123	–
	basin wildrye	LECI4	<i>Leymus cinereus</i>	62-123	–
	purple oniongrass	MESP	<i>Melica spectabilis</i>	25-62	–
	bluegrass	POA	<i>Poa</i>	25-62	–
	Letterman's needlegrass	ACLE9	<i>Achnatherum lettermanii</i>	31-62	–
	western needlegrass	ACOCO	<i>Achnatherum occidentale ssp. occidentale</i>	30-62	–
2	Secondary Perennial Grasses/Grasslikes			62-123	
	Columbia needlegrass	ACNEN2	<i>Achnatherum nelsonii ssp. nelsonii</i>	7-25	–
	sedge	CAREX	<i>Carex</i>	7-25	–
	bluebunch wheatgrass	PSSPS	<i>Pseudoroegneria spicata ssp. spicata</i>	7-25	–
Forb					
3	Perennial			123-247	

	giant hyssop	AGAST	<i>Agastache</i>	7-37	-
	arrowleaf balsamroot	BASA3	<i>Balsamorhiza sagittata</i>	7-37	-
	tapertip hawkbeard	CRAC2	<i>Crepis acuminata</i>	7-37	-
	tall mountain larkspur	DESC	<i>Delphinium scaposum</i>	7-37	-
	lupine	LUPIN	<i>Lupinus</i>	7-37	-
	Brown's peony	PABR	<i>Paeonia brownii</i>	7-37	-
	beardtongue	PENST	<i>Penstemon</i>	7-37	-
	mule-ears	WYAM	<i>Wyethia amplexicaulis</i>	7-37	-
Shrub/Vine					
4	Primary Shrubs			173-370	
	mountain big sagebrush	ARTRV	<i>Artemisia tridentata ssp. vaseyana</i>	123-247	-
	antelope bitterbrush	PUTR2	<i>Purshia tridentata</i>	25-62	-
	mountain snowberry	SYOR2	<i>Symphoricarpos oreophilus</i>	25-62	-
5	Secondary Shrubs			62-123	
	Utah serviceberry	AMUT	<i>Amelanchier utahensis</i>	12-25	-
	rockspirea	HODU	<i>Holodiscus dumosus</i>	12-25	-
	currant	RIBES	<i>Ribes</i>	12-25	-
	elderberry	SAMBU	<i>Sambucus</i>	12-25	-

Animal community

Livestock Interpretations: This site is has limited value for livestock grazing due to steep slopes. 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. 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. 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. Idaho fescue provides important forage for many types of domestic livestock. The foliage cures well and is preferred by livestock in late fall and winter. Palatability for purple oniongrass is high for grazers and medium for browsers. 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. 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 big sagebrush is eaten by domestic livestock but has long been considered to be of low palatability, and a competitor to more desirable species. Snowberry is readily eaten by all classes of livestock, particularly domestic sheep. Antelope bitterbrush is important browse for livestock. Domestic livestock and mule deer may compete for antelope bitterbrush in late summer, fall, and/or winter. Cattle prefer antelope bitterbrush from mid-May through June and again in September and October. 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: Mountain big sagebrush is highly preferred and nutritious winter forage for mule deer and elk. Sagebrush-grassland communities provide critical sage-grouse breeding and nesting habitats. Meadows surrounded by sagebrush may be used as feeding and strutting grounds. Sagebrush is a crucial component of their diet year-round, and sage-grouse select sagebrush almost exclusively for cover. Sage-grouse prefer mountain big sagebrush and Wyoming big sagebrush communities to basin big sagebrush communities. Snowberry is an important forage species for deer and elk on high elevation summer ranges. Snowberry is frequently one of the first species to leaf out, making it a highly sought after food in the early spring. Pronghorn antelope, mule deer, elk, and bighorn sheep utilize antelope bitterbrush extensively. Mule deer use of antelope bitterbrush peaks in September, when antelope bitterbrush may compose 91 percent of the diet. Winter use is greatest during periods of deep snow. Antelope bitterbrush seed is a large part of the diets of rodents, especially deer mice and kangaroo rats. Mountain brome seedheads and seeds provide food for many birds and small mammals. Pronghorn antelope will consume mountain brome primarily in the spring. The palatability of mountain brome is excellent for deer, particularly during the late spring and early summer. 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. 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. Idaho fescue provides important forage for several wildlife species. It is reported to be good forage for pronghorn, and deer in ranges of northern Nevada. Purple oniongrass is an important forage species for many wildlife species. Bluegrass is desirable for pronghorn antelope and mule deer in the spring and preferable in the spring, summer, and fall for elk and desirable as part of their winter range.

Hydrological functions

Runoff is high. Permeability is moderately rapid. Hydrologic soil group is C. Rills are none to rare. Rock fragments armor the surface. Water flow patterns are none to rare. Rock fragments armor the surface. Pedestals are none to rare. Frost heaving of shallow rooted plants should not be considered a "normal" condition. Gullies are none. Perennial herbaceous plants (especially deep-rooted bunchgrasses) slow runoff and increase infiltration. Shrub canopy and associated litter 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 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. Basin wildrye was used as bedding for various Native American ceremonies, providing a cool place for dancers to stand.

Other information

Mountain snowberry is useful for establishing cover on bare sites and has done well when planted onto roadbanks. Antelope bitterbrush has been used extensively in land reclamation. Antelope bitterbrush enhances succession by retaining soil and depositing organic material and in some habitats and with some ecotypes, by fixing nitrogen. 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. 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. Letterman's needlegrass has been used successfully in revegetating mine spoils. This species also has good potential for erosion control.

Type locality

Location 1: Humboldt County, NV	
Township/Range/Section	T46N R31E S12
UTM zone	N
UTM northing	379276
UTM easting	4637699
Latitude	41° 52' 55"
Longitude	118° 27' 18"
General legal description	NW 1/4, Wilder Creek drainage, Bilk Creek Mountains, 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>).

Great Basin Ecological Site Development Project: State and Transition Models for Major Land Resource Area 23, Nevada and portions of California (Online; <https://naes.agnt.unr.edu/PMS/Pubs/2019-4060.pdf>)

Contributors

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Approval

Kendra Moseley, 4/10/2025

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)	Patti Novak-Echenique
Contact for lead author	State Rangeland Management Specialist
Date	05/14/2010
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

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

2. **Presence of water flow patterns:** Water flow patterns are none to rare. Rock fragments armor the surface.

3. **Number and height of erosional pedestals or terracettes:** Pedestals are none to rare. Frost heaving of shallow rooted plants should not be considered a "normal" condition.

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):**
Bare Ground \pm 30-40%.

5. **Number of gullies and erosion associated with gullies:** Gullies are none.

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

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

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 6 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.)

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Surface structure is subangular blocky. Soil surface colors are very dark and soils are typified by a mollic epipedon. Organic matter of the surface 2 to 3 inches is typically 0.6 to 2.8 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:** Perennial herbaceous plants (especially deep-rooted bunchgrasses) slow runoff and increase infiltration. Shrub canopy and associated litter break raindrop impact and provide opportunity for snow catch and accumulation on site.

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. Subangular blocky or massive sub-surface horizons are not to be interpreted as compacted layers.

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: Deep-rooted, cool season, perennial bunchgrasses

Sub-dominant: Tall shrubs (mountain big sagebrush) > shallow-rooted, cool season, perennial bunchgrasses > associated shrubs > deep-rooted, cool season, perennial forbs = fibrous, shallow-rooted, cool season, perennial and annual forbs

Other:

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 25% of total woody canopy; some of the mature bunchgrasses (<20%) have dead centers.
-
- 14. Average percent litter cover (%) and depth (in):** Within plant interspaces ($\pm 20\%$) and depth of litter is $< \frac{1}{2}$ inch.
-
- 15. Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):**
For normal or average growing season (end of May) ± 1100 lbs/ac; Spring moisture significantly affects total 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: Increasesers include rabbitbrush. Invaders include cheatgrass, halogeton, Russian thistle, bassia, annual mustards, and knapweeds.**
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- 17. Perennial plant reproductive capability:** All functional groups should reproduce in average (or normal) and above average growing season years.
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