

Ecological site R023XY016NV SOUTH SLOPE 12-16 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 10-20 PZ Mountain Big Sagebrush and Bluebunch Wheatgrass 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/R023XY905NV> The South Slope 12-16" (023XY016NV) ecological site is the modal site for this group as it has the most acres mapped. This site occurs on moderately steep to steep mountain slopes having a southerly exposure. Slopes range from 15 to 75 percent, but slope gradients of 30 to 50 percent are most typical. Elevations are 6500 to 8000 feet. The soils in this site are normally deep to bedrock and well drained. Surface soils are medium to moderately coarse textured, have dark colored surface layers, and are typically more than 12 inches thick. The soils are usually gravelly throughout the profile. Water intake rates are high, but the capacity to store moisture for plant growth is reduced by the volume of gravels and cobbles within the soil profile. Because of the steep southerly exposures of this site, soils receive more sunlight and warm sooner. Thus, plant growth is initiated earlier than on adjacent landscapes, and high evapotranspiration potentials result in depletion of the available soil moisture supply sooner than on surrounding areas. The plant community is dominated by bluebunch wheatgrass and mountain big sagebrush. Annual production for a normal year is 1,200 lbs/acre.

Associated sites

R023XY006NV	LOAMY 8-10 P.Z.
R023XY017NV	CLAYPAN 14-16 P.Z.
R023XY018NV	STONY SOUTH SLOPE 12-16 P.Z.
R023XY031NV	CLAYPAN 10-14 P.Z.
R023XY039NV	LOAMY SLOPE 10-14 P.Z.
R023XY041NV	LOAMY 12-14 P.Z.
R023XY094NV	ASHY SLOPE 12-14 P.Z.

Similar sites

R023XY064NV	SOUTH SLOPE 16+ P.Z. BRMA4-PSSPS codominant; more productive site
R023XY042NV	GRANITIC SOUTH SLOPE 12-14 P.Z. different soil parent material; less productive site
R023XY015NV	STONY LOAM 12-14 P.Z. more surface stones; PUTR2 dominant shrub; less than 30% slopes
R023XY018NV	STONY SOUTH SLOPE 12-16 P.Z. more surface stones; LEC14 codominant grass; less productive site
R023XY039NV	LOAMY SLOPE 10-14 P.Z. lower elevations; less productive site

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) <i>Artemisia tridentata ssp. vaseyana</i>
Herbaceous	(1) <i>Pseudoroegneria spicata ssp. spicata</i>

Physiographic features

This site occurs on moderately steep to very steep mountain slopes and plateaus on all exposures. Slopes range from 8 to 90 percent, but slope gradients of 15 to 50 percent are most typical. Elevations are 4900 to 8500 feet.

Table 2. Representative physiographic features

Landforms	(1) Mountain slope (2) Plateau
Elevation	1,490 – 2,590 m
Slope	10 – 90 %
Aspect	Aspect is not a significant factor

Climatic features

The climate associated with this site is semiarid and characterized by cool, moist winters and warm, dry summers. Average annual precipitation is 12 to 16 inches. Mean annual air temperature is 42 to 45 degrees F. The average growing season is about 80 to 100 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)	90 days
Freeze-free period (average)	
Precipitation total (average)	360 mm

Influencing water features

There are no influencing water features associated with this site.

Soil features

The soils associated with this site are normally moderately deep to very deep and well drained. Surface soils are medium to moderately coarse textured, have dark colored surface layers, and are typically more than 12 inches thick. The soils are usually gravelly throughout the profile. Water intake rates are slow to moderately rapid, but the capacity to store moisture for plant growth is reduced by the volume of gravels and cobbles within the soil profile. High evapotranspiration potentials result in depletion of the available soil moisture supply sooner than on surrounding areas. The soil series associated with this site include: Dosie, Eaglerock, Fitzwater, Hartig, and Sumine.

Table 4. Representative soil features

Surface texture	(1) Stony loam (2) Cobbly loam (3) Gravelly loam
Family particle size	(1) Clayey
Drainage class	Well drained
Permeability class	Slow to moderately rapid
Soil depth	50 – 210 cm
Surface fragment cover <=3"	10 – 30 %
Surface fragment cover >3"	0 – 20 %
Available water capacity (0-101.6cm)	4.06 – 10.92 cm
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 – 50 %

Subsurface fragment volume >3" (Depth not specified)	0 – 30 %
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Ecological dynamics

Where management results in abusive grazing use by livestock and/or feral horses, bluebunch wheatgrass and Thurber's needlegrass decrease as sagebrush density increases. Thistle and cheatgrass are species likely to invade this site. Where this site occurs adjacent to juniper woodland communities, juniper trees readily invade the site.

Fire Ecology:

Presettlement fire return intervals in mountain big sagebrush communities varied from 15 to 25 years. Mountain big sagebrush is highly susceptible to injury from fire. It is often top-killed by fire and will not resprout. 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. Burning bluebunch wheatgrass may remove most of the aboveground biomass but does not usually result in plant mortality. Bluebunch wheatgrass is generally favored by burning. Burning stimulates flowering and seed production. However, season of burning affects mortality. Western needlegrass is moderately damaged by fire. The recovery time is between 3 and 5 years. 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. 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. 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.

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			928-1385	
	bluebunch wheatgrass	PSSPS	<i>Pseudoroegneria spicata</i> ssp. <i>spicata</i>	807-942	–
	basin wildrye	LECI4	<i>Leymus cinereus</i>	27-135	–
	Idaho fescue	FEID	<i>Festuca idahoensis</i>	27-108	–
	western needlegrass	ACOCO	<i>Achnatherum occidentale</i> ssp. <i>occidentale</i>	34-101	–
	Thurber's needlegrass	ACTH7	<i>Achnatherum thurberianum</i>	34-101	–
2	Secondary Perennial Grasses/Grasslikes			67-135	
	mountain brome	BRMA4	<i>Bromus marginatus</i>	7-40	–
	sedge	CAREX	<i>Carex</i>	7-40	–
	squirreltail	ELEL5	<i>Elymus elymoides</i>	7-40	–
	prairie Junegrass	KOMA	<i>Koeleria macrantha</i>	7-40	–
	Sandberg bluegrass	POSE	<i>Poa secunda</i>	7-40	–
Forb					
3	Perennial			67-202	
	arrowleaf balsamroot	BASA3	<i>Balsamorhiza sagittata</i>	7-40	–
	tapertip hawksbeard	CRAC2	<i>Crepis acuminata</i>	7-40	–
	buckwheat	ERIOG	<i>Eriogonum</i>	7-40	–
	phlox	PHLOX	<i>Phlox</i>	7-40	–

Shrub/Vine					
4	Primary Shrubs			161-377	
	mountain big sagebrush	ARTRV	<i>Artemisia tridentata ssp. vaseyana</i>	135-269	–
	antelope bitterbrush	PUTR2	<i>Purshia tridentata</i>	27-108	–
5	Secondary Shrubs			27-135	
	Utah serviceberry	AMUT	<i>Amelanchier utahensis</i>	13-40	–
	yellow rabbitbrush	CHVI8	<i>Chrysothamnus viscidiflorus</i>	13-40	–
	slender buckwheat	ERMI4	<i>Eriogonum microthecum</i>	13-40	–
	wild crab apple	PERA4	<i>Peraphyllum ramosissimum</i>	13-40	–
	currant	RIBES	<i>Ribes</i>	13-40	–
	mountain snowberry	SYOR2	<i>Symphoricarpos oreophilus</i>	13-40	–
	horsebrush	TETRA3	<i>Tetradymia</i>	13-40	–

Animal community

Livestock Interpretations: This site has limited value for grazing due to steep slopes and stoniness. Bluebunch wheatgrass is considered one of the most important forage grass species on western rangelands for livestock. Although bluebunch wheatgrass can be a crucial source of forage, it is not necessarily the most highly preferred species. Western needlegrass has a spreading and deeply penetrating root system, which makes it resistant to trampling. Thurber's 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 Thurber's needlegrass when many other grasses are unavailable. Cattle prefer Thurber's needlegrass in early spring before fruits have developed as it becomes less palatable when mature. Thurber's needlegrasses are grazed in the fall only if the fruits are softened by rain. 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. 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. 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. 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. 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. Bluebunch wheatgrass is considered one of the most important forage grass species on western rangelands for wildlife. Bluebunch wheatgrass does not generally provide sufficient cover for ungulates, however, mule deer are frequently found in bluebunch-dominated grasslands. Western needlegrass provides valuable forage for many species of wildlife. Thurber needlegrass is valuable forage for wildlife. 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. 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.

Hydrological functions

There are typically no rills. There may be a few, widely spaced and shallow, rills on steeper slopes (over 50% gradient). Water flow patterns, gullies and pedestals are typically non-existent but water flow patterns may rarely occur on steeper slopes in areas recently subjected to intense summer convection storms or rapid snowmelt. Perennial herbaceous plants (especially deep-rooted bunchgrasses [i.e., bluebunch wheatgrass] 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.

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

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. 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.

Type locality

Location 1: Lassen County, CA	
Township/Range/Section	T36N R16E S2
UTM zone	N
UTM northing	742209
UTM easting	4544434
Latitude	41° 0' 54"
Longitude	120° 7' 10"
General legal description	S 1/2, Approximately 2.5 miles southeast of Windy Flat, off old Tuledad Road, Lassen County, California. This site also occurs in Washoe and Humboldt 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

BH/SW

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)	G Brackley
Contact for lead author	State Rangeland Management Specialist
Date	06/20/2006
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** Typically none. There may be a few, widely spaced and shallow, rills on steeper slopes (over 50% gradient).

2. **Presence of water flow patterns:** Waterflow patterns are typically non-existent but may rarely occur on steeper slopes in areas recently subjected to intense summer convection storms or rapid snowmelt.

3. **Number and height of erosional pedestals or terracettes:** Pedestals are typically non-existent. 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 15-20%

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

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

7. **Amount of litter movement (describe size and distance expected to travel):** Fine litter (foliage from grasses and annual & 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 large rainfall 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 (with or without canopy) on most soil textures found on this site.

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Surface structure is typically platy or granular. Soil surface colors are dark and soils are typified by a mollic epipedon. Organic matter of the surface 2 to 4 inches is typically 1.25 to 3 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 [i.e., bluebunch wheatgrass] 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 none. Platy or massive sub-surface horizons and subsoil argillic 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: Deep-rooted, cool season, perennial bunchgrasses

Sub-dominant: tall shrubs (mountain big sagebrush & antelope bitterbrush) > associated shrubs = deep-rooted, cool season, perennial forbs > fibrous, shallow-rooted, cool season, perennial and annual forbs = shallow-rooted, cool season, perennial grasses

Other: grass-like plants

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 (<10%) have dead centers.

14. **Average percent litter cover (%) and depth (in):** Between interspaces and under canopy: 50-60% and litter depth is \pm 1/4 inch.

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** For normal or average growing season (through June) \pm 1200 lbs/ac; Favorable years \pm 1500 lbs/ac; Unfavorable years \pm 800 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 include cheatgrass, annual mustards, knapweeds and thistles.

17. Perennial plant reproductive capability: All functional groups should reproduce in average (or normal) and above average growing season years
