

Ecological site R023XY041NV LOAMY 12-14 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> This site is slightly more productive than the modal site with 1300 lbs/ac in normal years. Slopes typically range from 8 to 30 percent. Unlike the modal site, this site has a moderate to high available water capacity. Because of the concave or depressional relief of this site, additional moisture is received as run-in from surrounding landscapes and blowing snow tends to accumulate on this site. Basin wildrye is a dominant grass in this site, along with bluebunch wheatgrass and needlegrasses. This site is similar to the modal with a five state model.

Associated sites

R023XY007NV	LOAMY 14-16 P.Z.
R023XY015NV	STONY LOAM 12-14 P.Z.
R023XY017NV	CLAYPAN 14-16 P.Z.
R023XY020NV	LOAMY 10-12 P.Z.
R023XY031NV	CLAYPAN 10-14 P.Z.

Similar sites

R023XY007NV	LOAMY 14-16 P.Z. FEID codominant grass
R023XY018NV	STONY SOUTH SLOPE 12-16 P.Z. occurs on very steep south-facing sideslopes; soils have high amount of surface cobbles and stones

R023XY098NV	DEEP LOAMY 10-12 P.Z. PERA4 major shrub; PSSPS-ACTH7 codominant
R023XY020NV	LOAMY 10-12 P.Z. PSSPS-ACTH7 codominant; less productive site
R023XY099NV	CHANNERY HILL 8-10 P.Z. PERA4 major shrub; less productive site
R023XY050NV	STONY GRANITIC SLOPE 14+ P.Z. AMUT codominant shrub; less productive site
R023XY015NV	STONY LOAM 12-14 P.Z. PUTR2 codominant shrub; soils have high amount of surface stones

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) <i>Artemisia tridentata ssp. vaseyana</i>
Herbaceous	(1) <i>Pseudoroegneria spicata ssp. spicata</i> (2) <i>Leymus cinereus</i>

Physiographic features

This site occurs on concave backslopes of plateaus, hills, and mountains. Slopes range from 4 to 50 percent, but slope gradients of 15 to 50 percent are most typical. Elevations are 4000 to 9000 feet.

Table 2. Representative physiographic features

Landforms	(1) Mountain (2) Hill (3) Plateau
Elevation	1,220 – 2,740 m
Slope	0 – 50 %
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 14 inches. Mean annual air temperature is 44 to 47 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)	330 mm

Influencing water features

Because of the concave or depressional relief of this site, additional moisture is received as run-in from surrounding landscapes and blowing snow tends to accumulate on this site.

Soil features

The soils associated with this site have formed in residuum and colluvium derived from volcanic rocks. These soils are moderately deep to very deep, well drained, and have a low to moderate available water capacity. The soils have dark surfaces with high organic matter content. Because of the concave or depressional relief of this site, additional moisture is received as run-in from surrounding landscapes and blowing snow tends to accumulate on this site. the soil moisture regime is aridic bordering on xeric and the soil temperature regime is frigid. The soil series associated with this site include: Alyan, Burnborough, Softscrabble, and Wagore.

A representative soil series is Softscrabble a loamy-skeletal, mixed, superactive frigid Pachic Argixerolls. A mollic epipedon occurs from the soil surface to 76 cm and an argillic horizon occurs from 23 to 198 cm.

Table 4. Representative soil features

Parent material	(1) Residuum – andesite (2) Colluvium – andesite
Surface texture	(1) Very stony loam (2) Very cobbly loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Slow to moderately rapid
Soil depth	150 – 210 cm
Surface fragment cover <=3"	10 – 20 %
Surface fragment cover >3"	0 – 20 %
Available water capacity (0-101.6cm)	9.91 – 14.99 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 – 7.8
Subsurface fragment volume <=3" (Depth not specified)	10 – 50 %

Subsurface fragment volume >3" (Depth not specified)	0 – 40 %
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Ecological dynamics

As ecological condition declines, this site degrades from a bluebunch wheatgrass, basin wildrye site to a mountain big sagebrush, bitterbrush and squawapple dominated site. Snowberry is a common increaser on this site. Cheatgrass and other annual plants are likely to invade this site.

Fire Ecology:

Presettlement fire return intervals in mountain big sagebrush communities varied from 15 to over 50 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. 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. Fire effects for squawapple are unknown, but most species in the Rose family resprout after fire. 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. 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. 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. 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			539-1166	
	bluebunch wheatgrass	PSSPS	<i>Pseudoroegneria spicata</i> ssp. <i>spicata</i>	291-583	–
	basin wildrye	LECI4	<i>Leymus cinereus</i>	146-291	–
	western needlegrass	ACOCO	<i>Achnatherum occidentale</i> ssp. <i>occidentale</i>	36-110	–
	Thurber's needlegrass	ACTH7	<i>Achnatherum thurberianum</i>	37-109	–
	bluegrass	POA	<i>Poa</i>	29-73	–
2	Secondary Perennial Grasses/Grasslikes			73-146	
	sedge	CAREX	<i>Carex</i>	8-44	–
	squirreltail	ELEL5	<i>Elymus elymoides</i>	8-44	–
	Idaho fescue	FEID	<i>Festuca idahoensis</i>	8-44	–
Forb					
3	Perennial			146-291	
	arrowleaf balsamroot	BASA3	<i>Balsamorhiza sagittata</i>	8-44	–
	tapertip hawksbeard	CRAC2	<i>Crepis acuminata</i>	8-44	–
	waterleaf	HYDRO4	<i>Hydrophyllum</i>	8-44	–
	lupine	LUPIN	<i>Lupinus</i>	8-44	–
	ragwort	SENEC	<i>Senecio</i>	8-44	–

	mule-ears	WYAM	<i>Wyethia amplexicaulis</i>	8-44	-
	buckwheat	ERIOG	<i>Eriogonum</i>	8-44	-
Shrub/Vine					
4	Primary Shrubs			103-408	
	mountain big sagebrush	ARTRV	<i>Artemisia tridentata ssp. vaseyana</i>	73-219	-
	wild crab apple	PERA4	<i>Peraphyllum ramosissimum</i>	1-117	-
	antelope bitterbrush	PUTR2	<i>Purshia tridentata</i>	29-73	-
5	Secondary Shrubs			73-146	
	Utah serviceberry	AMUT	<i>Amelanchier utahensis</i>	15-44	-
	yellow rabbitbrush	CHVI8	<i>Chrysothamnus viscidiflorus</i>	15-44	-
	bitter cherry	PREM	<i>Prunus emarginata</i>	15-44	-
	chokecherry	PRVI	<i>Prunus virginiana</i>	15-44	-
	currant	RIBES	<i>Ribes</i>	15-44	-
	snowberry	SYMPH	<i>Symphoricarpos</i>	15-44	-
Tree					
6	Evergreen			8-29	
	western juniper	JUOC	<i>Juniperus occidentalis</i>	8-29	-

Animal community

Livestock Interpretations: This site is suited for livestock grazing. Grazing management should be keyed to perennial grass production. 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. 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. 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. 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. 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. Livestock will browse squawapple. 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. Wildlife will consume squawapple fruits and seeds. Deer browse squawapple lightly during the fall and winter. 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. 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. Western needlegrass and Thurber's needlegrass provide valuable forage for many species of wildlife. 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 medium to very high. Permeability is slow to moderately rapid. Hydrologic soil group is B, C, and D. There are typically no rills. There may be a few, widely spaced and shallow, rills on steeper slopes (over 20% gradient). Water flow patterns and pedestals are

typically non-existent but can rarely occur on steeper slopes in areas recently subjected to intense summer convection storms or rapid snowmelt. Frost heaving of shallow rooted plants should not be considered a "normal" condition. Perennial herbaceous plants (especially deep-rooted bunchgrasses [i.e., bluebunch wheatgrass & basin wildrye]) 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

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: Washoe County, NV	
Township/Range/Section	T35N R19E S16
UTM zone	N
UTM northing	259663
UTM easting	4533362
Latitude	40° 54' 57"
Longitude	119° 51' 14"
General legal description	SW 1/4 SE 1/4, Just off of the south side of Buckhorn Road, Washoe County, Nevada.
Location 2: Washoe County, NV	
Township/Range/Section	T34N R21E S14

UTM zone	N
UTM northing	282910
UTM easting	4532639
Latitude	40° 54' 57"
Longitude	119° 34' 40"
General legal description	About 2 miles west of Crutcher Spring, west side of Granite Range, 22 miles north of Gerlach, 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

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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)	BLAINE HALIDAY
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Date	06/20/2006
Approved by	
Approval date	

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

- 1. Number and extent of rills:** Typically none. There may be a few, widely spaced and shallow, rills on steeper slopes (over 20% gradient).

- 2. Presence of water flow patterns:** Water flow patterns are typically non-existent but can 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 \pm 30%; depending on amount of surface rock fragments.

- 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) is expected to move the 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 on most soil textures found on this site. (To be field tested.)

- 9. Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Surface structure is typically subangular blocky or granular. Soil surface colors are dark and the 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 & basin wildrye]) 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 or subsoil argillic horizons shallow to the surface 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 >> tall shrubs (mountain big sagebrush). (By above ground production)

Sub-dominant: Associated shrubs = deep-rooted, cool season, perennial forbs > fibrous, shallow-rooted, cool season, perennial and annual forbs = shallow-rooted, cool season, perennial grasses and grass-like plants. (By above ground production)

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 are common and standing dead shrub canopy material may be as much as 15% of total woody canopy; some of the mature bunchgrasses (<10%) have dead centers.

14. **Average percent litter cover (%) and depth (in):** Between plant interspaces (35-45%) and litter depth is $\pm \frac{1}{2}$ inch.

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** For normal or average growing season (through June) ± 1300 lbs/ac; Spring moisture significantly affects total production. Favorable years ± 1600 lbs/ac and unfavorable years ± 1000 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, medusahead, and thistles. Western juniper, and rabbitbrush spp. are increasers on this site. (squawapple often an aggressive increaser plant following wildfire)**

17. **Perennial plant reproductive capability:** All functional groups should reproduce in average (or normal) and above average growing season years. Little growth or reproduction occurs in drought years.
