

Ecological site R023XY039NV LOAMY SLOPE 10-14 P.Z.

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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 Clayey Mesic Plateaus 8-14 PZ Wyoming Big Sagebrush and Thurber's Needlegrass 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/R023XY909OR> This site is dominated by bluebunch wheatgrass with Thurber's needlegrass as a subdominant component. It occurs on steep sideslopes ranging from 15 to over 50%. The soils in this site are shallow to moderately deep and well drained. Surface soils are medium textured and usually more than ten inches thick to a fine textured subsoil. A mollic epipedon is typically present. There are usually high amounts of gravels, cobbles and stones on the surface. Some soils are modified with high volumes of rock fragments through the soil profile. Soils are neutral to moderately alkaline with soil reaction increasing with depth. Permeability is moderate and available water capacity is low to moderate. Runoff is medium to rapid and the potential for sheet and rill erosion is moderate but will vary with slope gradient. Production varies from 450 lb/ac to 1000 lb/ac, with 700 lb/ac in normal years. This site has a tree state (6.0).

Associated sites

R023XY006NV	LOAMY 8-10 P.Z.
R023XY031NV	CLAYPAN 10-14 P.Z.
R023XY037NV	CLAY SLOPE 8-12 P.Z.
R023XY041NV	LOAMY 12-14 P.Z.
R023XY047NV	GRAVELLY CLAY 8-10 P.Z.

Similar sites

R023XY030NV	SOUTH SLOPE 8-12 P.Z. ACSP12-PSSPS codominant
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R023XY020NV	LOAMY 10-12 P.Z. PSSPS-ACTH7 codominant; slopes less than 30%
R023XY018NV	STONY SOUTH SLOPE 12-16 P.Z. LECI4 major grass; more productive site ARTRV dominant shrub
R023XY016NV	SOUTH SLOPE 12-16 P.Z. more productive site ARTRV dominant shrub
R023XY042NV	GRANITIC SOUTH SLOPE 12-14 P.Z. granitic parent material; ARTRV dominant shrub
R023XY064NV	SOUTH SLOPE 16+ P.Z. BRMA4-PSSPS codominant; more productive site; ARTRV dominant shrub

Table 1. Dominant plant species

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

Physiographic features

This site occurs on steep sideslopes of lower mountains, hills, and plateaus on all aspects. At lower elevations this site is restricted to northerly exposures. Slopes range from 4 to 75 percent, but slope gradients of 15 to 50 percent are most typical. Elevations are 4100 to 8000 feet.

Table 2. Representative physiographic features

Landforms	(1) Mountain (2) Hill (3) Plateau
Elevation	1,250 – 2,440 m
Slope	0 – 80 %
Aspect	N

Climatic features

The climate associated with this site is semiarid and characterized by cool, moist winters and warm, dry summers. Average annual precipitation is 10 to 14 inches. Mean annual air temperature is 44 to 49 degrees F. The average growing season is about 90 to 110 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)	100 days
Freeze-free period (average)	
Precipitation total (average)	310 mm

Influencing water features

There are no influencing water features associated with this site.

Soil features

The soils associated with this site are shallow to moderately deep and well to somewhat excessively drained. Surface soils are medium textured and usually more than ten inches thick to a fine textured subsoil. A mollic epipedon is typically present. There are usually high amounts of gravels, cobbles and stones on the surface. Some soils are modified with high volumes of rock fragments through the soil profile. Soils are neutral to moderately alkaline with soil reaction increasing with depth. Permeability is slow to moderately rapid and available water capacity is very low to low. Runoff is high to very high and the potential for sheet and rill erosion is moderate but will vary with slope gradient. The soil series associated with this site include: Bucklake, Burrita, Corral, Eaglerock, Felcher, Glenbrook, Grawfels, Indiano, Ister, Longcreek, Noslo, Reywat, and Terea.

Table 4. Representative soil features

Surface texture	(1) Gravelly loam (2) Very stony loam (3) Very stony sandy loam
Family particle size	(1) Loamy
Drainage class	Well drained to somewhat excessively drained
Permeability class	Slow to moderately rapid
Soil depth	30 – 100 cm
Surface fragment cover <=3"	10 – 40 %
Surface fragment cover >3"	10 – 40 %
Available water capacity (0-101.6cm)	2.29 – 11.68 cm
Calcium carbonate equivalent (0-101.6cm)	0 – 10 %
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 – 8.4
Subsurface fragment volume <=3" (Depth not specified)	10 – 40 %

Subsurface fragment volume >3" (Depth not specified)	0 – 40 %
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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 Sandberg bluegrass, rabbitbrush and big sagebrush increase. Thistle and cheatgrass are species likely to invade this site. Where this site occurs adjacent to juniper woodland communities these trees readily invade the site.

Fire Ecology:

The fire return interval for Wyoming big sagebrush communities ranges from 10 to 70 years. Fire is the principal means of renewal for decadent stands of Wyoming big sagebrush.

Wyoming big sagebrush is killed by fire and establishes after fire from a seedbank; from seed produced by remnant plants that escaped fire; and from plants adjacent to the burn that seed in. 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. 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.

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			447-769	
	bluebunch wheatgrass	PSSPS	<i>Pseudoroegneria spicata ssp. spicata</i>	314-471	–
	Thurber's needlegrass	ACTH7	<i>Achnatherum thurberianum</i>	118-235	–
	basin wildrye	LECI4	<i>Leymus cinereus</i>	16-63	–
2	Secondary Perennial Grasses			16-63	
	Indian ricegrass	ACHY	<i>Achnatherum hymenoides</i>	4-16	–
	Webber needlegrass	ACWE3	<i>Achnatherum webberi</i>	4-16	–
	squirreltail	ELEL5	<i>Elymus elymoides</i>	4-16	–
	Idaho fescue	FEID	<i>Festuca idahoensis</i>	4-16	–
	needle and thread	HECO26	<i>Hesperostipa comata</i>	4-16	–
	prairie Junegrass	KOMA	<i>Koeleria macrantha</i>	4-16	–
	bluegrass	POA	<i>Poa</i>	4-16	–
Forb					
3	Perennial			39-118	
	arrowleaf balsamroot	BASA3	<i>Balsamorhiza sagittata</i>	4-24	–
	tapertip hawksbeard	CRAC2	<i>Crepis acuminata</i>	4-24	–
	buckwheat	ERIOG	<i>Eriogonum</i>	4-24	–
Shrub/Vine					
4	Primary Shrubs			119-235	

	Wyoming big sagebrush	ARTRW8	<i>Artemisia tridentata ssp. wyomingensis</i>	118-196	-
	antelope bitterbrush	PUTR2	<i>Purshia tridentata</i>	1-39	-
5	Secondary Shrubs			39-78	
	mountain big sagebrush	ARTRV	<i>Artemisia tridentata ssp. vaseyana</i>	8-24	-
	yellow rabbitbrush	CHVI8	<i>Chrysothamnus viscidiflorus</i>	8-24	-
	mormon tea	EPVI	<i>Ephedra viridis</i>	8-24	-
	spiny hopsage	GRSP	<i>Grayia spinosa</i>	8-24	-
	wild crab apple	PERA4	<i>Peraphyllum ramosissimum</i>	8-24	-
	currant	RIBES	<i>Ribes</i>	8-24	-
	desert snowberry	SYLO	<i>Symphoricarpos longiflorus</i>	8-24	-
Tree					
6	Evergreen			9-31	
	western juniper	JUOC	<i>Juniperus occidentalis</i>	4-16	-
	Utah juniper	JUOS	<i>Juniperus osteosperma</i>	4-16	-

Animal community

Livestock Interpretation: This site has limited value for livestock grazing due to steep slopes. 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. 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. Livestock browse Wyoming big sagebrush, but may use it only lightly when palatable herbaceous species are available. 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 Interpretation: Wyoming big sagebrush is preferred browse for wild ungulates. Pronghorn usually browse Wyoming big sagebrush heavily. 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. 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.

Hydrological functions

Runoff is high to very high. Permeability is slow to moderately rapid. Hydrologic soil group is C and D. Rills and pedestals are typically non-existent. There may be a few rills (widely spaced and shallow) on steeper slopes (over 20% gradient). Frost heaving of shallow rooted plants should not be considered a "normal" condition. Water flow patterns are typically but can rarely occur on steeper slopes in areas recently subjected to intense summer convection storms or rapid snowmelt. Gullies are non-existent. 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. This site is used for hiking and has potential for upland and big game hunting.

Other products

Native Americans made tea from big sagebrush leaves. They used the tea as a tonic, an antiseptic, for treating colds, diarrhea, and sore eyes and as a rinse to ward off ticks. Big sagebrush seeds were eaten raw or made into meal. Basin wildrye was used as bedding for various Native American ceremonies, providing a cool place for dancers to stand.

Other information

Wyoming big sagebrush is used for stabilizing slopes and gullies and for restoring degraded wildlife habitat, rangelands, mine spoils and other disturbed sites. It is particularly recommended on dry upland sites where other shrubs are difficult to establish. 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	T36N R24E S6
UTM zone	N
UTM northing	307210
UTM easting	4546026
Latitude	41° 2′ 33″
Longitude	119° 17′ 37″
General legal description	SE1/4SE1/4 Approximately 3 miles south of Chicken Spring on west side (east-facing sideslope) of Leadville Canyon Road (north of Hualapai Valley), Washoe County, Nevada. This site also occurs in 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>).

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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T Stringham (UNR under contract with BLM)

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
Contact for lead author	State Range 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 rills (widely spaced and shallow) 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. Short (< 1 m) and stable.

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 20-30% 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) 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 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 platy. Soil surface colors are dark or grayish brown 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. 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 (Wyoming big sagebrush) > 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

Other: evergreen trees

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):** Under canopy and between plant interspaces (30-45%) and litter depth is $\pm \frac{1}{4}$ 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 700 lbs/ac; Favorable years 1000 lb/ac and unfavorable years 450 lbs/ac. Spring moisture significantly affects total production

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. Junipers are increasers on this site.

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