

Ecological site R023XY015NV STONY LOAM 12-14 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 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 less productive than the modal site with only 900 lbs/ac in normal years. Slopes on this site typically range from 4 to 15 percent. Soils in this site have a loam surface layer modified with high volumes of stones and cobbles. Unlike the group modal site, the dominant shrub on this site is antelope bitterbrush with mountain big sagebrush making up only a small component of the plant community. This site is similar to the modal with a five state model.

Associated sites

R023XY007NV	LOAMY 14-16 P.Z.
R023XY017NV	CLAYPAN 14-16 P.Z.
R023XY031NV	CLAYPAN 10-14 P.Z.
R023XY041NV	LOAMY 12-14 P.Z.
R023XY066NV	ASHY LOAM 14-16 P.Z.

Similar sites

R023XY041NV	LOAMY 12-14 P.Z. PSSPS-LECI4 codominant
R023XY020NV	LOAMY 10-12 P.Z. PUTR2 minor shrub

R023XY007NV	LOAMY 14-16 P.Z. PUTR2 often prevalent, but ARTRV dominant shrub; PSSPS-FEID codominant
R023XY016NV	SOUTH SLOPE 12-16 P.Z. PUTR2 often prevalent, but ARTRV dominant shrub
R023XY066NV	ASHY LOAM 14-16 P.Z. FEID-ACHNA codominant

Table 1. Dominant plant species

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

Physiographic features

This site occurs on summits and backslopes of plateaus, hills, and mountains on all aspects. Slopes range from 4 to 50 percent, but slope gradients of 4 to 15 percent are typical. Elevations are 5000 to 7900 feet.

Table 2. Representative physiographic features

Landforms	(1) Mountain (2) Hill (3) Plateau
Elevation	1,520 – 2,410 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 42 to 45 degrees F. The average growing season is about 70 to 90 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)	80 days
Freeze-free period (average)	
Precipitation total (average)	330 mm

Influencing water features

There are no influencing water features associated with this site.

Soil features

These soils associated with this site have formed in residuum and colluvium derived from volcanic parent materials. The soils are shallow to moderately deep, well drained, and have moderate to moderately slow permeability. The soils in this site have a loam surface layer modified with high volumes of stones and cobbles. The surface cover of large rock fragments (cobbles and stones) is typically 20 percent. Subsoils are heavy clays that are normally slightly acid. Fractured bedrock is usually found at 16 to 22 inches. The subsoil hinders rooting to some degree but a significant number of roots enter fractures within the bedrock or underlying material. The soil series associated with this site include: Hart Camp, Madeline, and Sumine.

Table 4. Representative soil features

Surface texture	(1) Very stony loam (2) Gravelly loam (3) Very cobbly loam
Family particle size	(1) Clayey

Drainage class	Well drained
Permeability class	Moderately slow to moderate
Soil depth	30 – 100 cm
Surface fragment cover ≤3"	20 – 30 %
Surface fragment cover >3"	0 – 20 %
Available water capacity (0-101.6cm)	5.59 – 8.64 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 – 30 %
Subsurface fragment volume >3" (Depth not specified)	0 – 10 %

Ecological dynamics

Where management results in abusive grazing use by livestock and/or feral horses, shrub abundance and canopy increase as perennial grasses and forbs decrease. Excessive cattle use in late summer and fall will adversely affect bitterbrush production and seedling survival. Western and Utah juniper commonly invades this site in absence of fire.

Fire Ecology:

Presettlement fire return intervals for antelope bitterbrush communities range from 15 to 25 years. Season of burning and environmental conditions have a large impact on antelope bitterbrush ability to survive fire and sprout. 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 big sagebrush is highly susceptible to injury from fire. It is often top-killed by fire and will not resprout. 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. 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			373-656	
	bluebunch wheatgrass	PSSPS	<i>Pseudoroegneria spicata ssp. spicata</i>	303-404	–
	Idaho fescue	FEID	<i>Festuca idahoensis</i>	20-101	–
	western needlegrass	ACOCO	<i>Achnatherum occidentale ssp. occidentale</i>	26-76	–
	Thurber's needlegrass	ACTH7	<i>Achnatherum thurberianum</i>	25-75	–
2	Secondary Perennial Grasses			20-101	
	Indian ricegrass	ACHY	<i>Achnatherum hymenoides</i>	6-30	–
	squirreltail	ELEL5	<i>Elymus elymoides</i>	6-30	–
	needle and thread	HECO26	<i>Hesperostipa comata</i>	6-30	–
	prairie Junegrass	KOMA	<i>Koeleria macrantha</i>	6-30	–
	basin wildrye	LECI4	<i>Leymus cinereus</i>	6-30	–
	bluegrass	POA	<i>Poa</i>	6-30	–
	muttongrass	POFEF	<i>Poa fendleriana ssp. fendleriana</i>	6-30	–
	Sandberg bluegrass	POSE	<i>Poa secunda</i>	6-30	–
Forb					
3	Perennial			50-151	
	balsamroot	BALSA	<i>Balsamorhiza</i>	6-30	–
	tapertip hawksbeard	CRAC2	<i>Crepis acuminata</i>	6-30	–
	lupine	LUPIN	<i>Lupinus</i>	6-30	–
	beardtongue	PENST	<i>Penstemon</i>	6-30	–
	clover	TRIFO	<i>Trifolium</i>	6-30	–
Shrub/Vine					
4	Primary Shrubs			202-353	
	antelope bitterbrush	PUTR2	<i>Purshia tridentata</i>	151-252	–
	mountain big sagebrush	ARTRV	<i>Artemisia tridentata ssp. vaseyana</i>	50-101	–
5	Secondary Shrubs			20-101	
	Utah serviceberry	AMUT	<i>Amelanchier utahensis</i>	10-30	–
	yellow rabbitbrush	CHVI8	<i>Chrysothamnus viscidiflorus</i>	10-30	–
	wild crab apple	PERA4	<i>Peraphyllum ramosissimum</i>	10-30	–
	currant	RIBES	<i>Ribes</i>	10-30	–

	mountain snowberry	SYOR2	<i>Symphoricarpos oreophilus</i>	10-30	-
Tree					
6	Evergreen			11-40	
	western juniper	JUOC	<i>Juniperus occidentalis</i>	6-20	-
	Utah juniper	JUOS	<i>Juniperus osteosperma</i>	6-20	-

Animal community

Livestock Interpretations: This site is suitable 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. 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. 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. 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. 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. 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: 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 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. 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. 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 or pedestals. There may be a few, widely spaced and shallow, rills on steeper slopes (over 20% gradient). Frost heaving of shallow rooted plants should not be considered a "normal" condition. Water flow patterns are typically non-existent but may rarely occur on steeper slopes in areas recently subjected to intense summer convection storms or rapid snowmelt. Gullies are non-existent in areas of this site that occur on stable landforms. 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 camping and hiking and has potential for upland and big game hunting.

Other products

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

Other information

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.

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	Approximately 2.5 miles southeast of Windy Flat, Old Tuledad Road, Lassen County, California. This site also occurs in Washoe and Humboldt Counties, Nevada.
Location 2: Washoe County, NV	
Township/Range/Section	T45N R21E S10
UTM zone	N
UTM northing	283259
UTM easting	4634862
Latitude	41° 50'9"
Longitude	119° 36'37"
General legal description	NE 1/4 NE 1/4, Approximately 1.25 miles south of Nevada Route 34A (summits and shoulders of plateaus south of Last Chance Ranch), USF&WS Sheldon Antelope Refuge, 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>).

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)	Gary 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 20% gradient).

2. **Presence of water flow patterns:** Water flow 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 \pm 25%; surface rock fragments \pm 40%; shrub canopy 20 to 30%; foliar cover of perennial herbaceous plants \pm 40%.

5. **Number of gullies and erosion associated with gullies:** Gullies are non-existent in areas of this site that occur on stable landforms.

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 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. (To be field tested.)

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Surface structure is very thin to medium platy. 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 to 3 percent. 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 not typical. 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: Reference Plant Community: Deep-rooted, cool season, perennial bunchgrasses >> tall shrubs (antelope bitterbrush & mountain big sagebrush) > associated shrubs = deep-rooted, cool season, perennial forbs. (By above ground production)

Sub-dominant: Fibrous, shallow-rooted, cool season, perennial and annual forbs = shallow-rooted, cool season, perennial grasses. (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 25% of total woody canopy; some of the mature bunchgrasses (<10%) have dead centers.
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- 14. Average percent litter cover (%) and depth (in):** Between plant interspaces ($\pm 25\%$) and litter depth is $\pm \frac{1}{2}$ inch.
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- 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) ± 900 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: Rabbitbrush spp. and western juniper are increaser on this site. Cheatgrass, annual mustards, knapweeds, medusahead, and thistles are invaders on this site.**
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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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