Ecological site R028AY071NV
ALPINE SLOPE

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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.

MLRA notes

Major Land Resource Area (MLRA): 028A–Ancient Lake Bonneville

MLRA 28A occurs in Utah (82%), Nevada (16%), and Idaho (2%). It makes up about 36,775 square miles. A large area west and southwest of Great Salt Lake is a salty playa. This area is the farthest eastern extent of the Great Basin Section of the Basin and Range Province of the Intermontane Plateaus. It is an area of nearly level basins between widely separated mountain ranges trending north to south. The basins are bordered by long, gently sloping alluvial fans. The mountains are uplifted fault blocks with steep side slopes. They are not well dissected because of low rainfall in the MLRA. Most of the valleys are closed basins containing sinks or playa lakes. Elevation ranges from 3,950 to 6,560 ft. in the basins and from 6,560 to 11,150 ft. in the mountains. Most of this area has alluvial valley fill and playa lakebed deposits at the surface. Great Salt Lake is all that remains of glacial Lake Bonneville. A level line on some mountain slopes indicates the former extent of this glacial lake. Most of the mountains in the interior of this area consist of tilted blocks of marine sediments from Cambrian to Mississippian age. Scattered outcrops of Tertiary continental sediments and volcanic rocks are throughout the area. The average annual precipitation is 5 to 12 ins. in the valleys and is as much as 49 ins. in the mountains. Most of the rainfall occurs as high-intensity, convective thunderstorms during the growing season. The driest period is from midsummer to early autumn. Precipitation in winter typically occurs as snow. The average annual temperature is 39 to 53 °F. The freeze-free period averages 165 days and ranges from 110 to 215 days, decreasing in length with elevation. The dominant soil orders in this MLRA are Aridisols, Entisols, and Mollisols. The soils in the area dominantly have a mesic or frigid soil temperature regime, an aridic or xeric soil moisture regime, and mixed mineralogy. They generally are well drained, loamy or loamy-skeletal, and very deep.

Ecological site concept

This site occurs on high elevation mountain sideslopes. Slopes range from 15 to 75 percent. Elevations are over 10,500 feet to 13,000 ft and above the upper boundaries of Artemisia arbuscula communities. Average annual precipitation is over 20 inches. Mean annual air temperature is about 40 degrees F. The average growing season is about 40 days. The soils associated with this site are typically shallow to moderately deep and well drained. The soils are formed in colluvium and residuum derived from quartzite. The soil surface has high amounts of gravels or cobbles. Lack of soil depth and high volumes of coarse fragments in the soil profile result in very low available water capacity. The reference plant community is dominated by woody species such as wax currant and common juniper in association with low-growing grasses and forbs. Common grasses include slender wheatgrass, Letterman's needlegrass and bluegrasses. Ross' sedge and dunhead sedge are the most prevalent grass-like plants. Potential vegetative composition is about 45% grasses, 35% forbs and 20% shrubs and trees. Approximate ground cover (basal and crown) is 15 to 25 percent.

Associated sites

F028AY078NV	POTR5-PIEN WSG:1R1907
F028AY083NV	PIEN/RIMO2/BRMA4-ACHNA
R028AY069NV	ALPINE RIDGE

Similar sites

R028AY062NV	**MOUNTAIN RIDGE** Lower elevations; ARAR8 dominant plant
R028AY070NV	**CALCAREOUS ALPINE RIDGE** Only occurs on soils from limestone PM
R028AY069NV	**ALPINE RIDGE** Less productive site

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Ribes cereum* (2) *Juniperus communis*
Herbaceous	(1) *Poa* (2) *Elymus trachycaulus*

Physiographic features

This site occurs on high elevation mountain sideslopes. Slopes range from 15 to 75 percent. Elevations are over 10,500 feet to 13,000 ft and above the upper boundaries of Artemisia arbuscula communities.

Table 2. Representative physiographic features

Landforms	(1) Mountain slope
Elevation	3,230 − 3,960 m
Slope	20 − 80 %
Aspect	Aspect is not a significant factor

Climatic features

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 over 20 inches, mostly as snow. Mean annual air temperature is about 40 degrees F. The average growing season is 20 to 40 days.

The Mean annual precipitation at the Great Basin Natinal Park Climate Station (263340) is 13.33 inches.

Monthly mean precipitation is:
January 1.05; February 1.18; March 1.37; April 1.21; May 1.24; June .87; July .97; August 1.18; September 1.08; October .96; December .96

Table 3 Representative climatic features

Frost-free period (average)	
Freeze-free period (average)	30 days
Precipitation total (average)	530 mm

Influencing water features

There are no influencing water features associated with this site.

Soil features

The soils associated with this site are typically shallow to moderately deep and well drained. The soils are formed in colluvium and residuum derived from quartzite. The soil surface has high amounts of gravels or cobbles. Lack of soil depth and high volumes of coarse fragments in the soil profile result in very low available water capacity. The soil series associated with this site include: Wheelerpek and Windwash.

The representative soil series is Wheelerpek, a Loamy-skeletal, mixed, active, nonacid Lithic Cryorthents. Diagnostic horizons include an hric epipedon from the soil surface to 18 cm, and a Lithic contact at 33 cm to underlying hard unweathered bedrock. Clay content in the particle control section averages 12 to 18 percent. Rock fragments range from 60 to 80 percent, mainly gravel and cobbles. Reaction is Moderately acid or slightly acid. Effervescence is none. Lithology consists of quartzite.

Table 4. Representative soil features

Parent material	(1) Colluvium – quartzite (2) Residuum – limestone
Surface texture	(1) Extremely gravelly loam (2) Extremely gravelly loamy coarse sand
Family particle size	(1) Loamy

Drainage class	Well drained
Permeability class	Moderate to moderately rapid
Soil depth	30 – 60 cm
Surface fragment cover <=3"	50 %
Surface fragment cover >3"	30 %
Available water capacity (0-101.6cm)	2.29 – 3.05 cm
Calcium carbonate equivalent (0-101.6cm)	0 – 50 %
Electrical conductivity (0-101.6cm)	Not specified
Sodium adsorption ratio (0-101.6cm)	Not specified
Soil reaction (1:1 water) (0-101.6cm)	6.2 – 8.4
Subsurface fragment volume <=3" (Depth not specified)	40 – 70 %
Subsurface fragment volume >3" (Depth not specified)	10 – 30 %

Ecological dynamics

Plant community composition varies with differences in aspect, size and amount of rock fragments on the surface, and steepness of slope. Areas of snow accumulation, mostly on north facing slopes, tend to be dominated by herbaceous species. Alpine communities are sensitive to disturbance and the effects of human disturbances are more drastic and long-lasting than in other plant communities. Vegetation recovery is slow because of the cold and extreme temperatures, high winds, prolonged snow cover, and intense ultraviolet radiation. Cheatgrass has spread to high elevations in the western U.S. over the last 10 to 15 years. This range expansion may due to 1) local adaptation, 2)phenotypic plasticity of all-purpose genotypes, 3) changes in climate, 4) increased local disturbance, 5) nutrient enrichment and 6) seed dispersal, or some combination of one or more of these mechanisms.

Fire Ecology:
Fire occurs very infrequently in alpine communities and fire size is small, sometimes limited to a single tree. Wax currant regeneration is favored by short-duration, low-severity fire because soil-stored seed requires scarification to germinate. Most wax currant plants are severely damaged or killed by fire. Where common juniper is killed by fire, some seeds may survive in the soil on-site and germinate when conditions become favorable. Other seed is brought to the site by bird or, less commonly, mammal dispersers. These factors contribute to slow postfire reestablishment on many sites. 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. Muttongrass is unharmed to slightly harmed by light-severity fall fires. Muttongrass appears to be harmed by and slow to recover from severe fire. The effects of fire on slender wheatgrass are dependent on its growth form. Tall, decadent plants with many leaves sustain the most fire damage, while those with short, sparse growth form, is the least likely to sustain damage to the root system during a fire. Little specific information is available on adaptations of Letterman's needlegrass to fire. It is morphologically similar to Columbia needlegrass, which is only slightly to moderately damaged by fire. Season of burn affects the plant's ability to survive a fire. Post-fire regeneration is through seeding and tillering. Sedge is top-killed by fire, with rhizomes protected by insulating soil. The rhizomes of sedge species may be killed by high-severity fires that remove most of the soil organic layer. Reestablishment after fire occurs by seed establishment and/or rhizomatous spread. Big squirreltail is considered to be one of the most fire resistant native bunchgrasses. Older plants contain relatively low amounts of dead material when compared with other native bunchgrasses. This allows for hot, but quick burns which do not penetrate and damage the crown. However, during dry years, plants can be damaged by severe burns. Alpine 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 alpine 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**			54-142	
	muttongrass	POFE	*Poa fendleriana*	9-26	–
	Letterman's needlegrass	ACLE9	*Achnatherum lettermanii*	9-26	–
	slender wheatgrass	ELTR7	*Elymus trachycaulus*	9-26	–
	timberline bluegrass	POGLR2	*Poa glauca ssp. rupicola*	6-11	–
	Wheeler's bluegrass	POWH2	*Poa wheeleri*	6-11	–
	big squirreltail	ELMU3	*Elymus multisetus*	2-9	–
	dunhead sedge	CAPH2	*Carex phaeocephala*	2-9	–
	Ross' sedge	CARO5	*Carex rossii*	3-8	–
	alpine fescue	FEBR	*Festuca brachyphylla*	2-6	–
2	**Secondary Perennial Grasses**			2-9	
	western needlegrass	ACOCO	*Achnatherum occidentale ssp. occidentale*	1-6	–
	mat muhly	MURI	*Muhlenbergia richardsonis*	1-6	–
	spike trisetum	TRSP2	*Trisetum spicatum*	1-6	–
Forb					
3	**Perennial**			50-76	
	yarrow	ACHIL	*Achillea*	1-26	–
	pussytoes	ANTEN	*Antennaria*	1-26	–
	aster	ASTER	*Aster*	1-26	–
	fleabane	ERIGE2	*Erigeron*	1-26	–
	avens	GEUM	*Geum*	1-26	–
	clubmoss	LYCOP2	*Lycopodium*	1-26	–
	primrose	PRIMU	*Primula*	1-26	–
	dwarf clover	TRNA2	*Trifolium nanum*	1-26	–
Shrub/Vine					
4	**Primary Shrubs**			9-26	

	wax currant	RICE	*Ribes cereum*	9-26	–
5	**Secondary Shrubs**			2-11	
	whitestem goldenbush	ERDI14	*Ericameria discoidea*	2-9	–
	buckwheat	ERIOG	*Eriogonum*	2-9	–
	snowberry	SYMPH	*Symphoricarpos*	2-9	–
Tree					
6	**Evergreen**			4-17	
	common juniper	JUCO6	*Juniperus communis*	3-13	–
	Engelmann spruce	PIEN	*Picea engelmannii*	1-3	–
7	**Deciduous**			1-3	
	quaking aspen	POTR5	*Populus tremuloides*	1-3	–

Table 6. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Animal community

Livestock Interpretations: This site has limited value for livestock grazing due to steep slopes and low forage production. 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. Muttongrass is excellent forage for domestic livestock especially in the early spring. Muttongrass begins growth in late winter and early spring, which makes it available before many other forage plants. Slender wheatgrass is grazed by all classes of livestock. Letterman’s needlegrass begins growth early in the year and remains green throughout the relatively long growing season, thus, making it valuable forage for livestock. Sedge provides good to fair forage for domestic grazing. Big squirreltail is considered to be fair to desirable forage for cattle, horses, and sheep in spring before seed head development and late summer to fall after seed shatter. Alpine fescue provides important forge for many types of domestic livestock. The foliage cures well and is preferred by livestock in late fall and winter. Wax currant is fair to poor browse for livestock. Domestic livestock rarely utilize common juniper. The foliage may be poisonous to domestic goats. 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: Wax currant provides food and cover for wildlife. It is only fair to poor browse for deer, but it is important on ranges where little else is available. Wild ungulates generally eat only trace amounts of common juniper. Deer typically browse common juniper during the winter or early spring. Common juniper can be important winter mule deer food. Bluegrass is an important forage species for several wildlife species. Deer and elk make heavy use of muttongrass, especially in early spring when other green forage is scarce. Depending upon availability of other nutritious forage, deer may use muttongrass in all seasons. Muttongrass cures well and is an important fall and winter deer food in some areas. Slender wheatgrass is grazed by sage grouse, deer, elk, moose, and bighorn sheep, mountain goat, pronghorn, various rodents, and all classes of livestock. The seeds are eaten by various seed predators. Slender wheatgrass provides hiding and thermal cover for songbirds, upland game birds, waterfowl, and small mammals. Letterman's needlegrass provides valuable forage for many species of wildlife. It is consumed by mule deer and is most palatable early in the season before the foliage becomes coarse and wiry. Sedges have a high to moderate resource value for elk and a medium value for mule deer. Elk consume beaked sedge later in the growing season. Big squirreltail is an important forage species for several wildlife species. Alpine 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

Runoff is high to very high. Permeability is moderately rapid. Hydrologic soil groups are B and D.

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

The fruit of wax currant is used for making jam, jelly, or pie. Some western Indian tribes used currants for making pemmican. Wax currant is cultivated as an ornamental.

Other information

Common juniper is highly valued as an ornamental. It is widely cultivated and provides good ground cover even on stony or sandy sites. Slender wheatgrass is widely used for revegetating disturbed lands. Slender wheatgrass is a short-lived perennial with good seedling vigor. It germinates and establishes quickly when seeded making it a good choice for quick cover on disturbed sites. It persists long enough for other, slower developing species to establish. It is especially valuable for use in saline soils. It has been used for rehabilitating mine spoils, livestock ranges, and wildlife habitat and watershed areas.

Type locality

Location 1: White Pine County, NV	
Township/Range/Section	T13N R68E S10
Latitude	39° 0′19″
Longitude	114° 19′40″
General legal description	Along Summit Trail, east of Stella Lake, Great Basin National Park, Snake Range, White Pine County, Nevada.

Other references

Fire Effects Information System (Online; http://www.fs.fed.us/database/feis/plants/).

Houghton, J.G., C.M. Sakamoto, and R.O. Gifford. 1975. Nevada's Weather and Climate, Special Publication 2. Nevada Bureau of Mines and Geology, Mackay School of Mines, University of Nevada, Reno, NV.

National Oceanic and Atmospheric Administration. 2004. The North American Monsoon. Reports to the Nation. National Weather Service, Climate Prediction Center. Available online: http://www.weather.gov/

USDA-NRCS Plants Database (Online; http://www.plants.usda.gov).

Contributors

DBP/GKB

Approval

Kendra Moseley, 6/12/2025

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)	

Contact for lead author	
Date	09/25/2026
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:**

   _____

2. **Presence of water flow patterns:**

   _____

3. **Number and height of erosional pedestals or terracettes:**

   _____

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):**

   _____

5. **Number of gullies and erosion associated with gullies:**

   _____

6. **Extent of wind scoured, blowouts and/or depositional areas:**

   _____

7. **Amount of litter movement (describe size and distance expected to travel):**

   _____

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):**

   _____

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):**

   _____

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:**

    _____

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):**

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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:

    Sub-dominant:

    Other:

    Additional:

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):**

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14. **Average percent litter cover (%) and depth (in):**

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-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:**

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17. **Perennial plant reproductive capability:**
