

Ecological site R028AY129NV

ALPINE MEADOW

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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 concave mountain shoulders and summits. Slopes range from 2 to 15 percent, but slope gradients of 2 to 4 percent are typical. Elevations are 10,500 to about 11,300 feet, above the upper boundaries of *Artemisia arbuscula* communities. Average annual precipitation is greater than 20 inches. Additional moisture falls on this site in the form of drifting snow and run-on moisture. Mean annual air temperature is 32 to 37 degrees F. The climate is alpine tundra, with cold, wet winters and cool, dry summers. The frost free period is about 20 to 40 days. The soils of this site are moderately deep and well drained and are formed in residuum and colluvium derived from quartzite with minor amounts of limestone. The soil profile is modified with 40 to 70 percent rock fragments predominately gravel. The surface is covered with approximately 30 percent gravel. These soils have moderately rapid permeability and high saturated hydraulic conductivity. The reference plant community is composed of low-growing perennial grasses, grasslikes, and forbs. Common grasses and grasslikes include Wheeler's bluegrass, and Ross's and dunhead sedge. Approximate ground cover (basal and crown) is 70 to 80 percent.

Associated sites

F028AY081NV	PILO-PIFL2/RIBES-JUCO6/CARO5-POA
F028AY082NV	PILO-PIFL2/RIBES-JUCO6/CARO5-POA
R028AY069NV	ALPINE RIDGE

R028AY070NV	CALCAREOUS ALPINE RIDGE
R028AY071NV	ALPINE SLOPE

Similar sites

R028AY069NV	ALPINE RIDGE Alpine Ridge. Less productive site.
R028AY071NV	ALPINE SLOPE Alpine Slope. Steeper slopes, less productive site.
R028AY070NV	CALCAREOUS ALPINE RIDGE Calcareous Alpine Ridge. Less productive site.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) <i>Carex rossii</i> (2) <i>Poa wheeleri</i>

Physiographic features

This site occurs on concave mountain shoulders and summits. Slopes range from 2 to 15 percent, but slope gradients of 2 to 4 percent are typical. Elevations are 10,500 to about 11,300 feet, above the upper boundaries of *Artemisia arbuscula* communities.

Table 2. Representative physiographic features

Landforms	(1) Mountain
Elevation	3,200 – 3,440 m
Slope	0 – 20 %
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 greater than 20 inches. Additional moisture falls on this site in the form of drifting snow and run-on moisture. Mean annual air temperature is 32 to 37 degrees F. The climate is alpine tundra, with cold, wet winters and cool, dry summers. The frost free period is about 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)	580 mm

Influencing water features

There are no influencing water features associated with this site.

Soil features

The soils of this site are moderately deep and well drained and are formed in residuum and colluvium derived from quartzite with minor amounts of limestone. The soil profile is modified with 40 to 70 percent rock fragments predominately gravel. The surface is covered with approximately 30 percent gravel. These soils have moderately rapid permeability and high saturated hydraulic conductivity. The soils are usually moist in winter, spring, and early summer and dry for at least 45 consecutive days in July and August. The upper horizons may be intermittently moist during summer months for 10 to 20 days cumulative due to convection storms between July and September. Soil series associated with this ecological site include: Wayhigh.

Table 4. Representative soil features

Parent material	(1) Colluvium – quartzite (2) Residuum – limestone
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Surface texture	(1) Very gravelly fine sandy loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderate
Soil depth	50 – 100 cm
Surface fragment cover <=3"	30 – 40 %
Surface fragment cover >3"	0 – 10 %
Available water capacity (0-101.6cm)	7.11 – 7.37 cm
Calcium carbonate equivalent (0-101.6cm)	Not specified
Electrical conductivity (0-101.6cm)	Not specified
Sodium adsorption ratio (0-101.6cm)	Not specified
Soil reaction (1:1 water) (0-101.6cm)	6.1 – 7.3
Subsurface fragment volume <=3" (Depth not specified)	40 %
Subsurface fragment volume >3" (Depth not specified)	10 – 20 %

Ecological dynamics

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 over the last 10 to 15 years. This range expansion may be due to a combination of one or more of the follow: 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.

Fire Ecology:

Fire occurs very infrequently in alpine communities and fire size is small. Abundance of species varies by site condition, frequency, and seasonal timing of fire. 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.

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			202-247	
	dunhead sedge	CAPH2	Carex phaeocephala	78-90	–
	Ross' sedge	CARO5	Carex rossii	78-90	–
	Wheeler's bluegrass	POWH2	Poa wheeleri	45-67	–
2	Secondary Perennial Grasses			22-67	
	prairie Junegrass	KOMA	Koeleria macrantha	2-13	–
	timberline bluegrass	POGLR2	Poa glauca ssp. rupicola	2-13	–
	spike trisetum	TRSP2	Trisetum spicatum	2-13	–
Forb					
3	Primary Perennial Forbs			22-45	
	cushion phlox	PHPU5	Phlox pulvinata	22-45	–
4	Secondary Perennial Forbs			67-112	
	King's sandwort	ARKI	Arenaria kingii	2-22	–
	milkvetch	ASTRA	Astragalus	2-22	–
	snowline springparsley	CYNI3	Cymopterus nivalis	2-22	–
	Snake Range buckwheat	ERHO5	Eriogonum holmgrenii	2-22	–
	fleabane	ERIGE2	Erigeron	2-22	–
	skypilot	POEX	Polemonium eximium	2-22	–
	primrose	PRIMU	Primula	2-22	–
Shrub/Vine					
5	Secondary Perennial Shrubs			9-22	
	whitestem goldenbush	ERDI14	Ericameria discoidea	4-9	–
	gooseberry currant	RIMO2	Ribes montigenum	4-9	–

Table 6. Community 2.1 plant community composition

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

Livestock Interpretation: This site is not suitable for livestock grazing due to the high elevations and lack of water. Wildlife Interpretation: 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.

Hydrological functions

Runoff is high. Permeability is moderate. Hydrologic soil group is B.

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.

Type locality

Location 1: White Pine County, NV	
Township/Range/Section	T12N R68E S11
UTM zone	N
UTM northing	4311905
UTM easting	733759
Latitude	38° 55'29"
Longitude	114° 18'12"
General legal description	Great Basin National Park. Approximately 0.75 miles northwest of Mount Washington. White Pine County, Nevada.
Location 2: White Pine County, NV	
Township/Range/Section	T12N R68E S24
UTM zone	N
UTM northing	4307363
UTM easting	734250
Latitude	38° 53'2"
Longitude	114° 17'57"

General legal description	Great Basin National Park Approximately 0.25 miles northwest of Lincoln Peak. White Pine County, Nevada.
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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

CJA

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	09/24/2026
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):

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:

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

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

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

17. Perennial plant reproductive capability:
