USDA Natural Resources
Conservation Service

Ecological site R028AY132NV
ALPINE TABLELAND

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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 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 11,500 feet. (Wheelerpek elevation range 9400-13000)

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 39 degrees F. The climate is alpine tundra, with cold, wet winters and cool, dry summers. The frost free period is about 20 to 50 days.

The soils associated with this site are shallow, well drained soils that formed in residuum and colluvium derived from quartzite. The effective rooting depth is limited by quartzite bedrock, with some roots growing into the fractures. A typical pedon is an extremely gravelly loam, with greater than 50 percent rock fragments by volume distributed throughout the profile. The soil surface covered with approximately 75 percent rock fragments, dominated by gravels.

The Reference State is composed of low-growing perennial forbs, grasses and grasslikes. The plant community is dominated by sheep cinquefoil.
Potential vegetative composition is about 20% grasses/grasslikes, 70% forbs and 10% shrubs and trees.

Associated sites

F028AY081NV	**PILO-PIFL2/RIBES-JUCO6/CARO5-POA**
R028AY070NV	**CALCAREOUS ALPINE RIDGE**
R028AY129NV	**ALPINE MEADOW**

Similar sites

R028AY070NV	**CALCAREOUS ALPINE RIDGE**
R028AY129NV	**ALPINE MEADOW**
R028AY071NV	**ALPINE SLOPE**
R028AY069NV	**ALPINE RIDGE**

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) *Potentilla*

Physiographic features

This site occurs on mountain shoulders and summits. Slopes range from 4 to 15 percent, but slope gradients of 2 to 4 percent are typical. Elevations are 10,300 to about 11,600 feet. (Wheelerpek elevation range 9400-13000)

Table 2. Representative physiographic features

Landforms	(1) Plateau (2) Mountain slope
Elevation	3,139–3,536 m
Slope	4–15%

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 39 degrees F. The climate is alpine tundra, with cold, wet winters and cool, dry summers. The frost free period is about 20 to 50 days.

Mean Annual precipitaion at PIOCHE, NEVADA Climate Station (266252) is 13.6 inches

Monthly mean precipitation is:
January 1.55; February 1.48; March 1.59;
April 1.05; May 0.96; June 0.38; July 1;
August 1.35; September 0.91; October 1.03;
November 1.01; December 1.29.

Table 3. Representative climatic features

Frost-free period (average)	50 days
Freeze-free period (average)	
Precipitation total (average)	635 mm

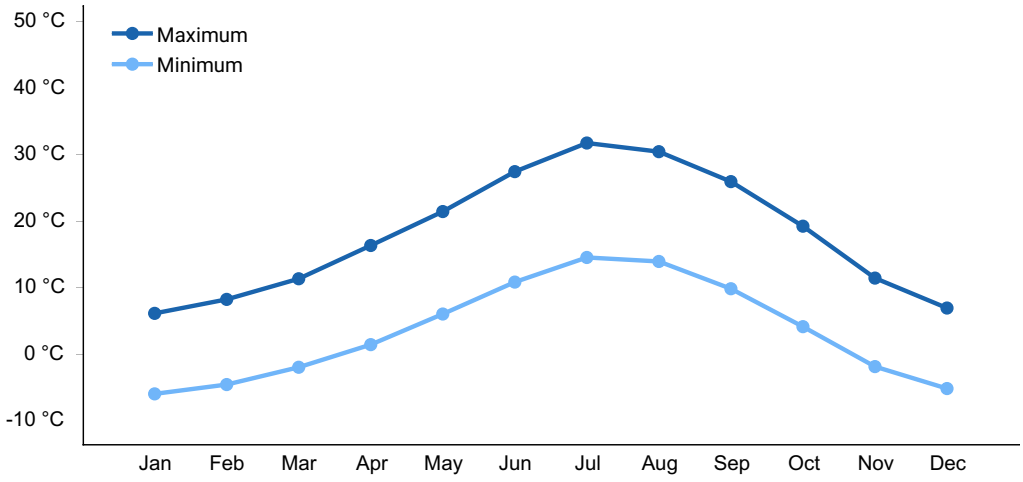


Figure 1. Monthly average minimum and maximum temperature

Influencing water features

Soil features

The soils associated with this site are shallow, well drained soils that formed in residuum and colluvium derived from quartzite. The effective rooting depth is limited by quartzite bedrock, with some roots growing into the fractures. A typical pedon is an extremely gravelly loam, with greater than 50 percent rock fragments by volume distributed throughout the profile. The soil surface covered with approximately 75 percent rock fragments, dominated by gravels. The shallow soil, high volume of rock fragments in the profile and very high surface runoff result in very low water holding capacity. Soil series

correlated to this site include Wheelerpek a loamy-skeletal, mixed, active, nonacid Lithic Cryorthent.

Table 4. Representative soil features

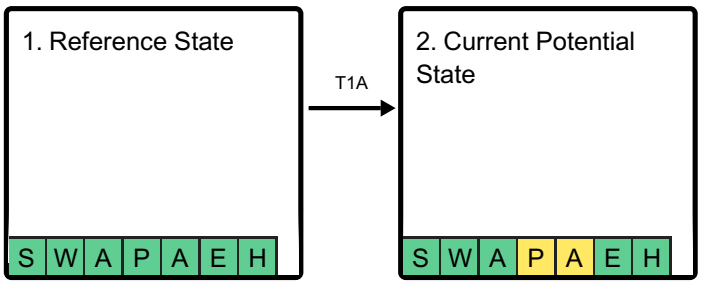
Parent material	(1) Residuum–quartzite (2) Colluvium–quartzite
Surface texture	(1) Extremely gravelly loam
Drainage class	Well drained
Depth to restrictive layer	25–51 cm
Surface fragment cover <=3"	50%
Surface fragment cover >3"	20%
Subsurface fragment volume <=3" (Depth not specified)	48%
Subsurface fragment volume >3" (Depth not specified)	22%

Ecological dynamics

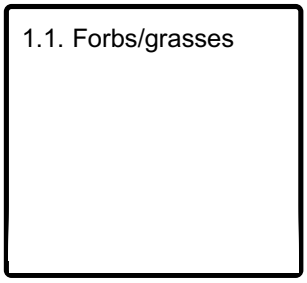
Communities of this site are dynamic in response to changes in disturbance regimes and weather patterns. Alpine communities are sensitive to disturbance and the effects of human disturbances are more drastic and long-lasting than in other plant communities. Primary natural disturbances include infrequent wildfire, disease, and insect attack, as well as, wind and snow damage. Vegetation recovery is slow because of the cold and extreme temperatures, high winds, prolonged snow cover, and intense ultraviolet radiation. Naturally occurring wildfires in alpine communities are infrequent and small in size
Plants of alpine communities are adapted to metabolizing, growing and reproducing at low tempatures. Species experience rapid shoot growth after melting of snow-cover in spring or early summer. Energy required for such growth is supplied by carbohydrates and lipids stored in roots, rhizomes or bulbs (Billings and Money 1968).
This site is susceptible to invasion by non-native annuals. Cheatgrass has spread to high elevations in recent years. This range expansion may be due to a combination of one or more of the following: 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.

State and transition model

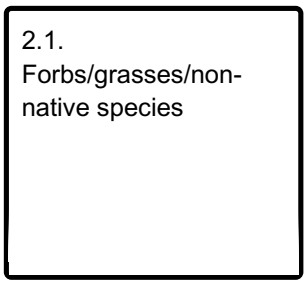
Ecosystem states



State 1 submodel, plant communities



State 2 submodel, plant communities



State 1
Reference State

The Reference State is composed of low-growing perennial forbs, grasses and grasslikes. The plant community is dominated by sheep cinquefoil. Potential vegetative composition is about 20% grasses/grasslikes, 70% forbs and 10% shrubs and trees.

Community 1.1
Forbs/grasses

The Reference plant community is composed of low-growing perennial forbs, grasses and grasslikes. The plant community is dominated by sheep cinquefoil. Potential vegetative composition is about 20% grasses/grasslikes, 70% forbs and 10% shrubs and trees.

State 2
Current Potential State

The Current Potential State is composed of low-growing perennial forbs, grasses and grasslikes. This state also includes non-native species, such as cheatgrass. The plant community is dominated by sheep cinquefoil. Potential vegetative composition is about

20% grasses/grasslikes, 70% forbs and 10% shrubs and trees.

Community 2.1
Forbs/grasses/non-native species

Community phase 2.1 is composed of low-growing perennial forbs, grasses and grasslikes. This state also includes non-native species, such as cheatgrass. The plant community is dominated by sheep cinquefoil. Potential vegetative composition is about 20% grasses/grasslikes, 70% forbs and 10% shrubs and trees.

Transition T1A
State 1 to 2

Establishment of non-native species.

Additional community tables

Type locality

Location 1: White Pine County, NV	
Township/Range/Section	T16N R69E S3
UTM zone	N
UTM northing	4352197
UTM easting	742310
Latitude	39° 17′ 7″
Longitude	144° 11′ 26″
General legal description	The Table, approximately .75 miles north of the peak of Mount Moriah. Mount Moriah 7.5 minute topographic quadrangle, Snake Range, White Pine County, Nevada.

Other references

Billings, W.D. and Mooney, H.A. 1968. The ecology of artic and alpine plants. Bio. Rev. 43:481-529.

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/

Contributors

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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	03/14/2026
Approved by	Kendra Moseley
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:**

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

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

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

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

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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:**
