

Ecological site R003XY011OR

Ashy Alpine Desert

50-70 PZ

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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.

Associated sites

R003XY013OR	Ashy Alpine Swale 50-70 PZ Occurs with this site as complexes or inclusions in alpine fell areas.
R003XY012OR	Ashy Alpine Meadow 50-70 PZ Occurs with this site as complexes in alpine fell areas.

Similar sites

R003XY010OR	Pumice Desert 40-60 PZ (Depressional)
R003XY013OR	Ashy Alpine Swale 50-70 PZ
R003XY012OR	Ashy Alpine Meadow 50-70 PZ

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	Not specified

Physiographic features

The site occurs on alpine fell areas of high elevation volcanic cones and peaks in the Cascades range. The type location is on the northwest portion of Mt. Mazama in Crater Lake National Park.

Table 2. Representative physiographic features

Landforms	(1) Mountain slope (2) Ash flow (3) Mountain valley
Flooding frequency	None
Ponding frequency	None
Elevation	1,830 – 2,290 m
Slope	0 – 50 %
Ponding depth	0 cm
Water table depth	150 cm
Aspect	S, SW, W

Climatic features

Precipitation comes mostly as snow. Winters are snowy and very cold; summers are cool and dry. Summer thunderstorms sometimes occur, providing small amounts of growing season precipitation.

The site occupies areas that are collection areas for localized cold air drainage. The site has a severe climatic regime characterized by wide day and nighttime temperatures.

Table 3 Representative climatic features

Frost-free period (average)	50 days
Freeze-free period (average)	90 days
Precipitation total (average)	1,520 mm

Influencing water features

Accumulates snowmelt early in the year. Some poorly defined channels are modified by background wind erosion later in the season. The snowpack can linger in some concave protected areas, delaying the advent of the growing season and adding soil water later in the season.

Soil features

These sites occur in alpine and sub-alpine meadows. The soils are very deep, excessively drained, very gravelly ashy loamy coarse sand over ashy sand and ashy coarse sand derived from ash, andesite, and pumice fragments.

Increases in stability of both surface and subsurface samples reflect increased soil erosion resistance and resilience. Surface stability is correlated with current erosion resistance, while subsurface stability is correlated with resistance following soil disturbance. Sites with average values of 5.5 or above generally are very resistant to erosion, particularly if there is little bare ground and there are few large gaps. Maximum possible soil stability values may be less than 6 for very coarse sandy soils. High values usually reflect good hydrologic function. This is because stable soils are less likely to disperse and clog soil pores during rainstorms. High stability values also are strongly correlated with soil biotic integrity. Soil organisms make the “glue” that holds soil particles together. In most ecosystems, soil stability values decline first in areas without cover (Veg = NC). In more highly degraded systems, Veg = Canopy values also decline.

The following soil aggregate stabilities are typical of the reference plant community. Aggregate stability is not very different between samples taken under forb cover compared to unprotected samples. Significant rock cover may account for the slightly better stability in unprotected samples.

Type location Average Stability:

All samples taken = 1.3

Protected samples = 1.0

Unprotected samples = 1.4

Type location Average Stability by Vegetation Class:

No cover = 1.4

Grass/Grasslikes = N/A

Forbs = 1.0

Shtubs = N/A

Trees = N/A

Table 4. Representative soil features

Surface texture	(1) Gravelly sandy loam (2) Ashy loamy sand
Family particle size	(1) Sandy
Drainage class	Excessively drained
Permeability class	Rapid to moderately rapid
Soil depth	150 cm
Surface fragment cover <=3"	20 – 30 %
Surface fragment cover >3"	Not specified
Available water capacity (0-101.6cm)	14.73 – 16.51 cm
Calcium carbonate equivalent (0-101.6cm)	Not specified

Electrical conductivity (0-101.6cm)	10 – 20 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	Not specified
Subsurface fragment volume <=3" (Depth not specified)	10 %
Subsurface fragment volume >3" (Depth not specified)	Not specified

Ecological dynamics

Conditions on the Ashy Alpine Desert ecological site are harsh. There is a very short growing season between snowmelt and late summer hard freezes. Only a few species of plants can complete their life cycles and thrive. Wind erosion is a major influence on the site. The ashy/coarse soil materials move readily across the expanses of the site, affecting individual plants. Only those plants that can withstand the shifting soil materials can survive on the site. There is usually adequate plant available water in the soils throughout the summer but it moves below the rooting zone of the small statured plant community later in the season. The site has the ability to accumulate moisture like summer fallowed grain fields.

The Ashy Alpine Desert site is at higher elevations and is usually associated with Mountain Hemlock (*Tsuga mertensiana*), Whitebark Pine (*Pinus albicaulis*), and with Ashy Alpine Meadow and Swale sites. The sites can be extensive on north and northwest aspect slopes. This site also has very sparse vegetation due to rock fragments on the thin surface, an extremely wide range of diurnal temperatures, and low soil fertility (as with Pumice Desert sites).

These sites occur on slopes where the snowpack stays well into the summer most years further limiting germination and plant establishment.

These park-like areas are surrounded by Mountain Hemlock (*Tsuga mertensiana*) and Whitebark Pine (*Pinus albicaulis*) forest sites. These sites are strongly correlated to soil types and are thought to be relatively permanent although plant community structure may have been different historically (Lynch, 1998).

In areas where mature Mountain Hemlock has had a stand-replacing fire, Lodgepole Pine can pioneer the site for up to 200 years. Lodgepole Pine can invade the site over time (usually several decades) resulting in a slightly modified plant community that is essentially the reference plant community with a sparse overstory of multi-stemmed Lodgepole Pines. Areas encroached by the pines can eventually be converted to forest sites (crossing a biotic and abiotic threshold) with the continued absence of fire (fire frequency in Lodgepole stands is 20 years).

Boundaries between forest and rangeland are generally abrupt and rarely are there significant intrusions of tree species into the sites. There has historically been a large amount of time between catastrophic fires at these elevations (400-800 years). Local Indian tribes, who used the area frequently in the summers, may have set fires to freshen vegetation to attract more big game to the area.

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 (%)
Forb					
1	Dominant Perennial forbs			280-616	

	Davis' knotweed	PODA	<i>Polygonum davisiae</i>	112-392	–
	Shasta knotweed	POSH	<i>Polygonum shastense</i>	28-168	–
	ballhead sandwort	ARCO5	<i>Arenaria congesta</i>	11-168	–
2	Sub-dominant Perennial Forbs			56-168	
	marumleaf buckwheat	ERMA4	<i>Eriogonum marifolium</i>	11-39	–
	Shasta buckwheat	ERP2	<i>Eriogonum pyrolifolium</i>	11-28	–
	dwarf mountain lupine	LULYL	<i>Lupinus lyallii ssp. lyallii</i>	11-28	–
	spreading phlox	PHDI3	<i>Phlox diffusa</i>	11-28	–
	sulphur-flower buckwheat	ERUM	<i>Eriogonum umbellatum</i>	11-22	–
	cobwebby Indian paintbrush	CAAR11	<i>Castilleja arachnoidea</i>	11-17	–
	largeleaf avens	GEMA4	<i>Geum macrophyllum</i>	6-11	–
Grass/Grasslike					
3	Perennial Grasses			11-22	
	squirreltail	ELELE	<i>Elymus elymoides ssp. elymoides</i>	11-22	–

Animal community

Wildlife extensively use range and forest areas for food and cover. The survey area has excellent forage resources for summer and fall grazing. The alpine meadows surrounding the rim and Union peak are dominated by Western Needlegrass (*Achnatherum occidentale* ssp. *californicum*) with Hall's Sedge (*Carex halliana*) and Brewer's Sedge (*Carex Breweri*) subdominant. In some places Bottlebrush Squirreltail (*Elymus elymoides* ssp. *elymoides*) is present also. These species all have nutritive value for grazing ungulates from green-up in June and July through September and early October. Deep snow cover and very cold temperatures in the winter and spring make grazing these sites impractical. These alpine meadows and swells have excellent interspersions of forested sites providing hiding and thermal cover as well as transportation corridors for wildlife.

Recreational uses

Significant source of open space in a forest environment. Late spring - early summer wild flowers offer aesthetic value. Unsuitable for camping or hiking - heavy traffic will permanently alter the site.

Wood products

None

Type locality

Location 1: Klamath County, OR	
Township/Range/Section	T29S R5E S12
UTM zone	N
UTM northing	568230
UTM easting	4759113
General legal description	One mile west of park road 1/2 mile from east rim road turn off.

Other references

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Contributors

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Approval

Kirt Walstad, 1/29/2025

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	01/29/2025
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:
