USDA Natural Resources Conservation Service

Ecological site R003XY011OR
Ashy Alpine Desert 50-70 PZ

Accessed: 05/05/2024

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.

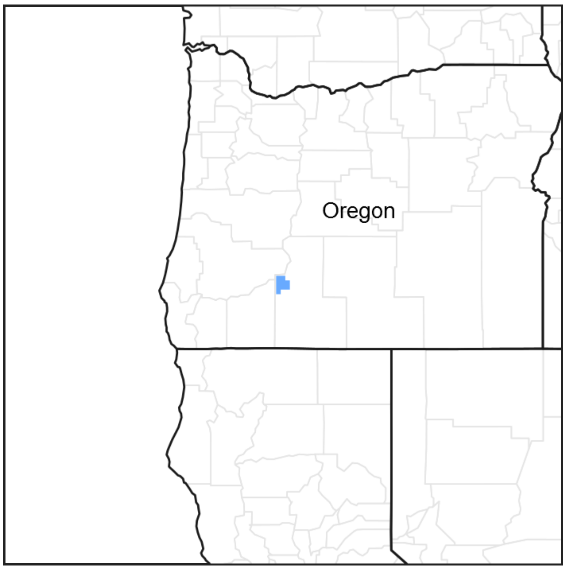


Figure 1. Mapped extent

Areas shown in blue indicate the maximum mapped extent of this ecological site. Other ecological sites likely occur within the highlighted areas. It is also possible for this ecological site to occur outside of highlighted areas if detailed soil survey has not been completed or recently updated.

Associated sites

R003XY012OR	**Ashy Alpine Meadow 50-70 PZ** Occurs with this site as complexes in alpine fell areas.
R003XY013OR	**Ashy Alpine Swale 50-70 PZ** Occurs with this site as complexes or inclusions 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	1,829–2,286 m
Slope	0–45%
Ponding depth	0 cm
Water table depth	152 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)	45 days
Freeze-free period (average)	90 days
Precipitation total (average)	1,524 mm

Influencing water features

Accumulates snowment early in the year. Some poorly defined channels are modified by background wind ersoion 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	152 cm
Surface fragment cover <=3"	15–25%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	14.73–16.51 cm
Calcium carbonate equivalent (0-101.6cm)	0%
Electrical conductivity (0-101.6cm)	10–20 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0
Subsurface fragment volume <=3" (Depth not specified)	5–10%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

Conditions on the Ashy Alpine Desert ecological site are harsh. There is a very short growing season between snowment 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).

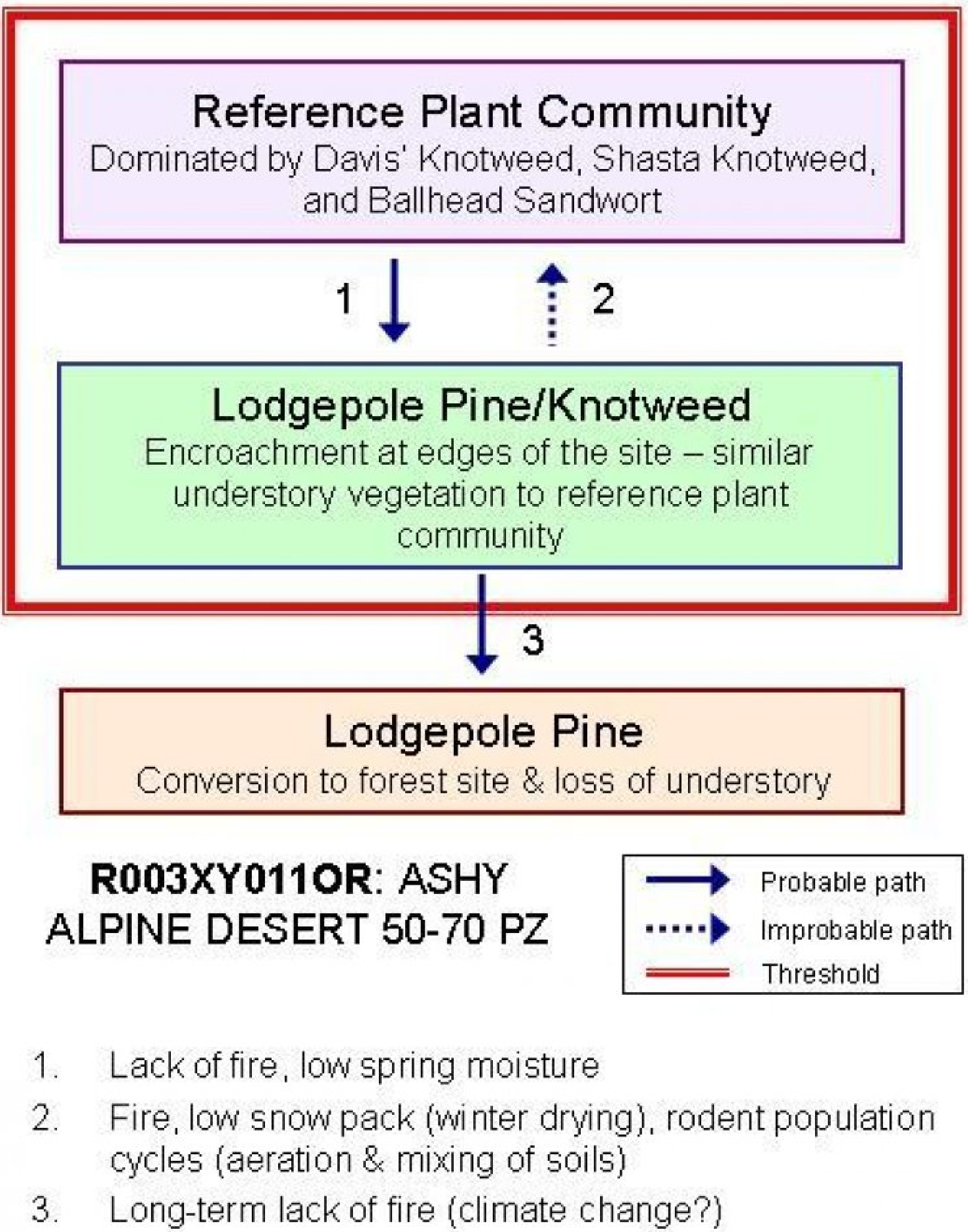
These sites occur on slopes where the snowpack stays well into the summer most years further limiting germination and plant establishment.

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



State 1
Reference Plant Community

Community 1.1
Reference Plant Community

The site is characterized by very sparse vegetative cover and large (65%+) cover of rock fragments and bare ground (25%). The plant community varies from areas of grasses, grasslikes, and forbs to areas of mostly forbs with a few grass plants. There are drastic differences in nighttime and daytime soil temperatures (reaching over 100 degrees F in the summer) that limits plant establishment. Pocket gophers also have had a role in mixing soils and grazing on plant roots. The Lodgepole Pine forest that surrounds the area is slowly pioneering the edges of the site. Wind erosion moves soils to the pine fringe and increased shading may ameliorate the diurnal swings in soil temperatures. No fire frequency is known for this site (except at edges of forest sites). Since there is little vegetation or litter, it is doubtful that fire has played an important part in the formation of this plant community. Wind erosion, snow pack, cold temperatures (including summer freezes), grazing, and a very brief growing season have influenced the desert character of this site. The dominant plant species are Shasta Buckwheat (Erigonium pyrolifolium) and Newberry Knotweed (*Polygonum davisiae*) which lends it's distinctive late season red color to the slopes. Increases in the proportion of canopy gaps are related to increased risk of wind erosion and invasive “weed” species establishment. For example, wind velocities in most areas of the western United States are capable of moving disturbed soil in 20-in gaps in grasslands. Disturbed soil in gaps 3-6 ft in diameter is nearly as susceptible to erosion as that with no vegetation. Minimum gap size required to cause wind erosion increases with vegetation height. Increases in the proportion of the line covered by large basal gaps reflect increased susceptibility to water erosion and runoff. Plant bases slow water movement down slopes. As basal gaps increase, there are fewer obstacles to water flow, so runoff and erosion increase. Increases in large basal gaps have a greater effect where rock and litter cover are low, because they are the only obstacles to water flow and erosion. The following canopy and basal gaps are typical of the reference plant community. The paucity of vegetation results in a large percentage of canopy gaps. Plant bases are widely spaced and resulting basal gaps are overwhelmingly large. Type Location Canopy Gaps (%): 1.0-2.0 ft. = 21.9 2.1-3.0 ft. = 17.0 3.1-6.0 ft. = 17.1 > 6.0 ft. = 9.7 Type Location Basal Gaps (%): 1.0-2.0 ft. = 2.1 2.1-3.0 ft. = 0 3.1-6.0 ft. = 3.1 > 6.0 ft. = 74.4

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Forb	280	448	616
Grass/Grasslike	–	6	11
Total	**280**	**454**	**627**

Table 6. Ground cover

Tree foliar cover	0%
Shrub/vine/liana foliar cover	0%
Grass/grasslike foliar cover	0-1%
Forb foliar cover	10-20%
Non-vascular plants	0%
Biological crusts	0%
Litter	5-10%
Surface fragments >0.25" and <=3"	25-35%
Surface fragments >3"	5-15%
Bedrock	0%
Water	0%
Bare ground	50-70%

Table 7. Canopy structure (% cover)

Height Above Ground (M)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.15	–	–	0-1%	5-10%
>0.15 <= 0.3	–	–	0-1%	5-10%
>0.3 <= 0.6	–	–	–	0-5%
>0.6 <= 1.4	–	–	–	–
>1.4 <= 4	–	–	–	–
>4 <= 12	–	–	–	–
>12 <= 24	–	–	–	–
>24 <= 37	–	–	–	–
>37	–	–	–	–

Figure 5. Plant community growth curve (percent production by month). OR1252, A3 Ashy Alpine Desert. 011.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	0	15	30	30	20	5	0	0	0

Additional community tables

Table 8. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Forb					
1	**Dominant Perennial forbs**			280–616	
	Davis' knotweed	PODA	*Polygonum davisiae*	112–392	–
	Shasta knotweed	POSH	*Polygonum shastense*	28–168	–
	ballhead sandwort	ARCO5	*Arenaria congesta*	11–168	–
2	**Sub-dominant Perennial Forbs**			56–168	
	marumleaf buckwheat	ERMA4	*Eriogonum marifolium*	11–39	–
	Shasta buckwheat	ERPY2	*Eriogonum pyrolifolium*	11–28	–
	dwarf mountain lupine	LULYL	*Lupinus lyallii ssp. lyallii*	11–28	–
	spreading phlox	PHDI3	*Phlox diffusa*	11–28	–
	sulphur-flower buckwheat	ERUM	*Eriogonum umbellatum*	11–22	–
	cobwebby Indian paintbrush	CAAR11	*Castilleja arachnoidea*	11–17	–
	largeleaf avens	GEMA4	*Geum macrophyllum*	6–11	–
Grass/Grasslike					
3	**Perennial Grasses**			11–22	
	squirreltail	ELELE	*Elymus elymoides ssp. elymoides*	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 interspersion 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 aesthic 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	568230.000
UTM easting	4759113.00
General legal description	One mile west of park road 1/2 mile from east rim road turn off.

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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	
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):**

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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:**
