USDA Natural Resources Conservation Service

Ecological site R003XY013OR
Ashy Alpine Swale 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.

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

R003XY011OR	**Ashy Alpine Desert 50-70 PZ** Occurs adjacent to and in complexes with this site.
R003XY012OR	**Ashy Alpine Meadow 50-70 PZ** Occurs adjacent to and in complexes with this site.

Similar sites

R003XY011OR	**Ashy Alpine Desert 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

Generally very small ponded or run-in areas with the longest-lasting snowfields in the alpine fell area.

Table 2. Representative physiographic features

Landforms	(1) Swale (2) Depression (3) Valley floor
Flooding frequency	None
Ponding duration	Very brief (4 to 48 hours)
Ponding frequency	None to rare
Elevation	1,829–2,286 m
Slope	2–20%
Ponding depth	0–3 cm
Water table depth	74–152 cm
Aspect	Aspect is not a significant factor

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

Seasonally ponded areas and drainageways.

Soil features

Soils are exc;usively in swales and mountain slopes that hold snow fields long into the eraly summer. Soils are very deep, moderately well drained very gravelly ashy loamy sand over ashy loamy coarse sand.

The water table rises to 2.5 feet early in the growing season and is within 3.7 - 5.2 feet of the surface for the remainder of the growing season.

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 stability results are typical of the reference plant community. Soil agregate stability is

generally good under all types of cover; unprotected areas are only slightly more prone to wind and water erosion.

Type location Average Stability:
All samples taken = 4.4
Protected samples = 4.7
Unprotected samples = 2.8

Type location Average Stability by Vegetation Class:
No cover = 3.8
Grass/Grasslikes = 4.7
Forbs = N/A
Shtubs = N/A
Trees = N/A

Table 4. Representative soil features

Surface texture	(1) Very gravelly loamy sand (2) Ashy
Family particle size	(1) Sandy
Drainage class	Well drained to moderately well drained
Permeability class	Moderately rapid to rapid
Soil depth	152 cm
Surface fragment cover <=3"	5–15%
Surface fragment cover >3"	3–5%
Available water capacity (0-101.6cm)	19.81–21.59 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)	2–5%
Subsurface fragment volume >3" (Depth not specified)	5–10%

Ecological dynamics

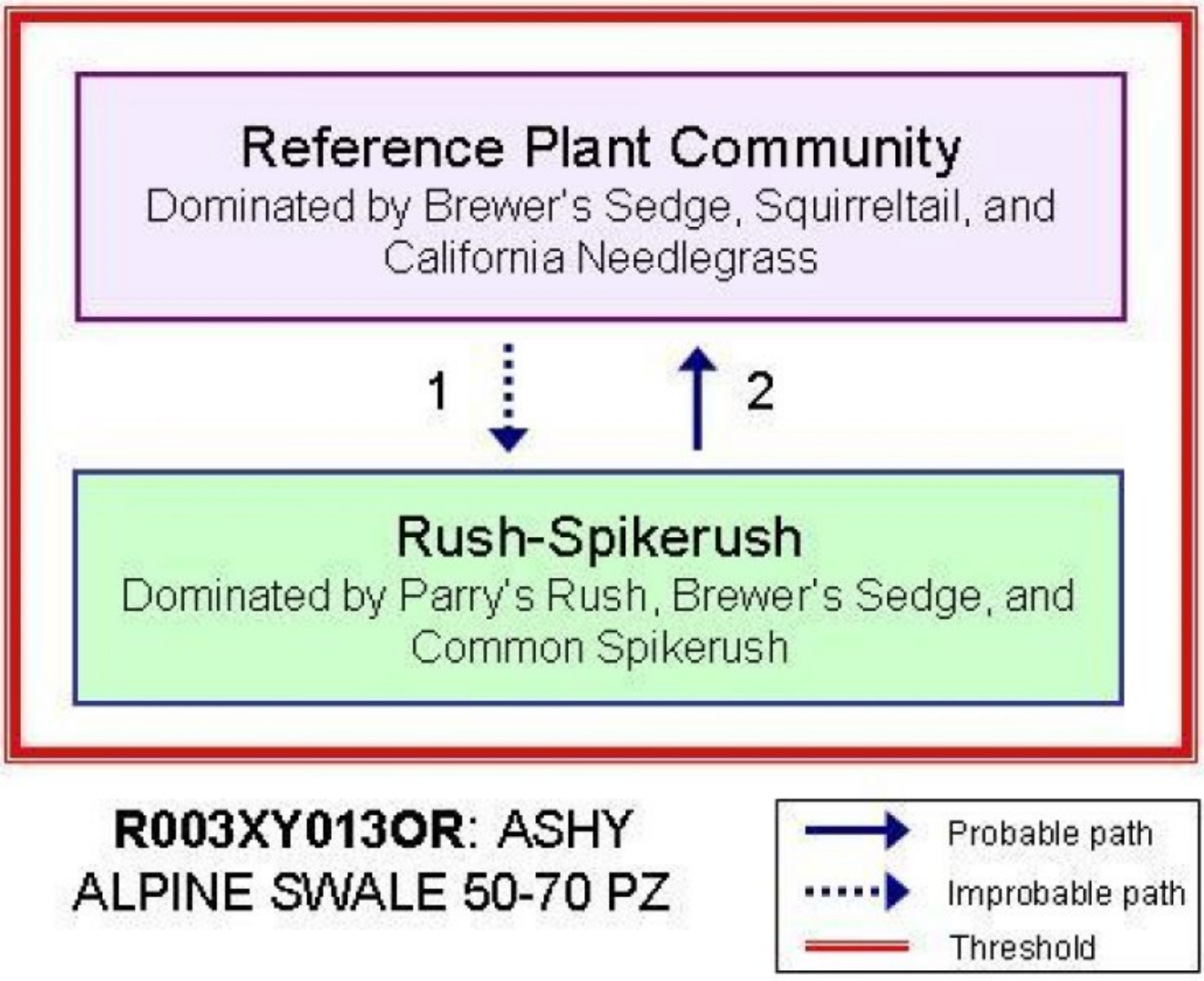
The Ashy Alpine Swale site occurs around the rim in association with primarily Ashy Alpine Meadow and Ashy Alpine Desert ecological sites. These sites are found in small depressions and flat terraces in the rim area that have slightly impermeable subsoils and tend to collect and hold snowpack and snowmelt.

The rate of decrease in the water table influences the herbaceous plant community. These sites are generally small in area and community floristic expression occurs after the last snows of the winter are gone. Consequently, sites with aspect/locations that have low, short-lived snow fields will exhibit a plant community of more adapted species (Brewer's Sedge, California Needlegrass, and Squirreltail). Sites with more rapid permeability and better drainage will express these plants as well.

Sites that have aspect/locations that have deep, long-lived snow fields will exhibit a plant community of more adapted species to that regime (Parry's Rush, Brewer's Sedge, Common Spikerush). These sites will have less rapid permeability and poorer drainage as well. Changes in the depth and rate of decline in the water table over time can shift the plant community from the wetter expression to the drier.

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). 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).

State and transition model



1. Increased duration and depth of snow pack, increased early-season ponding, changes in water table depth
2. low snow pack, decreased early-season ponding (climate change?)

State 1
Reference Plant Community-Sedge-Grass

Community 1.1
Reference Plant Community-Sedge-Grass

The site is patchy and is dominated by Brewer's Sedge (Carex Breweri); Western Needlegrass (Needlegrass

(*Achnatherum occidentale* ssp. californicum) and Squirreltail (*Elymus elymoides* ssp. elymoides) are minor components. Brewer's Sedge and Parry's Rush can occur together or separately depending on the length of time the snowpack stays on the surface. Colder, wetter conditions with a longer ponding period tend to favor Parry's Rush and sites that dry out quicker contain Brewer's Sedge. The plant community photo shows a site that is dominated by Brewer's Sedge but has significant quantities of Parry's Rush, Common Spikerush, and California Needlegrass as well. 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. A relatively dense plant community limits larger canopy and basal gaps; most gaps are small and do not occupy much of the area. Most gaps (basal & canopy) occur in intermittent stream channel or from slight bank sloughing. Type Location Canopy Gaps (%): 1.0-2.0 ft. = 2.3 2.1-3.0 ft. = 0.8 3.1-6.0 ft. = 1.1 > 6.0 ft. = 0 Type Location Basal Gaps (%): 1.0-2.0 ft. = 7.9 2.1-3.0 ft. = 3.4 3.1-6.0 ft. = 2.4 > 6.0 ft. = 0

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	785	897	1009
Forb	34	67	101
Total	**819**	**964**	**1110**

Table 6. Ground cover

Tree foliar cover	0-1%
Shrub/vine/liana foliar cover	0%
Grass/grasslike foliar cover	60-70%
Forb foliar cover	1-2%
Non-vascular plants	10-15%
Biological crusts	0%
Litter	60-80%
Surface fragments >0.25" and <=3"	10-20%
Surface fragments >3"	1-3%
Bedrock	0%
Water	0%
Bare ground	0-5%

Table 7. Canopy structure (% cover)

Height Above Ground (M)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.15	–	–	40-50%	1-2%
>0.15 <= 0.3	–	–	15-20%	–
>0.3 <= 0.6	–	–	5-10%	–
>0.6 <= 1.4	–	–	–	–
>1.4 <= 4	–	–	–	–
>4 <= 12	–	–	–	–
>12 <= 24	–	–	–	–
>24 <= 37	–	–	–	–
>37	–	–	–	–

Figure 5. Plant community growth curve (percent production by month). OR1254, A3 Ashy Alpine Swale. 013 - use for both plant communities.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	0	5	30	40	20	5	0	0	0

State 2
Reference Plant Community-Rush-Sedge

Community 2.1
Reference Plant Community-Rush-Sedge

The site is patchy and is dominated by Parry's Rush)*Juncus parryi*); Brewer's Sedge (Carex Breweri) and Common Spikerush (*Eleocharis palustris*) are minor components. Brewer's Sedge and Parry's Rush can occur together or separately depending on the length of time the snowpack stays on the surface. Colder, wetter conditions with a longer ponding period tend to favor Parry's Rush and sites that dry out quicker contain Brewer's Sedge. The plant community photo shows a site that is dominated by Parry's Rush adjacent to Ashy Alpine Meadow and Whitebark Pine sites. Canopy and basal gaps are similar to reference plant community #1.

Table 8. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	560	673	785
Forb	45	67	90
Total	**605**	**740**	**875**

Table 9. Ground cover

Tree foliar cover	0-1%
Shrub/vine/liana foliar cover	0%
Grass/grasslike foliar cover	50-60%
Forb foliar cover	1-2%
Non-vascular plants	5-10%
Biological crusts	0%
Litter	20-40%
Surface fragments >0.25" and <=3"	40-50%
Surface fragments >3"	0%
Bedrock	0%

Water	0%
Bare ground	5-10%

Table 10. Canopy structure (% cover)

Height Above Ground (M)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.15	–	–	40-50%	1-2%
>0.15 <= 0.3	–	–	10-20%	–
>0.3 <= 0.6	–	–	5-10%	–
>0.6 <= 1.4	–	–	–	–
>1.4 <= 4	–	–	–	–
>4 <= 12	–	–	–	–
>12 <= 24	–	–	–	–
>24 <= 37	–	–	–	–
>37	–	–	–	–

Figure 7. Plant community growth curve (percent production by month). OR1254, A3 Ashy Alpine Swale. 013 - use for both plant communities.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	0	5	30	40	20	5	0	0	0

Additional community tables

Table 11. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	**Perennial Grasses & Sedges**			785–1009	
	Brewer's sedge	CABR12	*Carex breweri*	673–1009	–
	squirreltail	ELELE	*Elymus elymoides ssp. elymoides*	112–224	–
	California needlegrass	ACOCC	*Achnatherum occidentale ssp. californicum*	17–67	–
	Cusick's bluegrass	POCU3	*Poa cusickii*	6–17	–
Forb					
2	**Perennial Forbs**			67–101	
	Davis' knotweed	PODA	*Polygonum davisiae*	17–34	–
	Mt. Hood pussypaws	CIUM	*Cistanthe umbellata*	17–34	–
	Shasta buckwheat	ERPY2	*Eriogonum pyrolifolium*	17–34	–
	dwarf mountain lupine	LULYL	*Lupinus lyallii ssp. lyallii*	17–34	–
	ballhead sandwort	ARCO5	*Arenaria congesta*	11–28	–
	Lemmon's rockcress	ARLE	*Arabis lemmonii*	6–17	–
	nakedstem hawksbeard	CRPL	*Crepis pleurocarpa*	11–17	–
	spreading phlox	PHDI3	*Phlox diffusa*	6–17	–
	cobwebby Indian paintbrush	CAAR11	*Castilleja arachnoidea*	6–11	–
	marumleaf buckwheat	ERMA4	*Eriogonum marifolium*	1–6	–
	cascade desertparsley	LOMA5	*Lomatium martindalei*	1–6	–

Table 12. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	**Perennial Rush, Sedge, & Grass**			560–785	
	Parry's rush	JUPA	*Juncus parryi*	560–673	–
	California needlegrass	ACOCC	*Achnatherum occidentale ssp. californicum*	67–90	–
	Brewer's sedge	CABR12	*Carex breweri*	34–67	–
	squirreltail	ELELE	*Elymus elymoides ssp. elymoides*	34–67	–
Forb					
2	**Perennial Forbs**			45–90	
	Rocky Mountain pussytoes	ANME2	*Antennaria media*	11–22	–
	Mt. Hood pussypaws	CIUM	*Cistanthe umbellata*	11–22	–
	nakedstem hawksbeard	CRPL	*Crepis pleurocarpa*	11–22	–
	Davis' knotweed	PODA	*Polygonum davisiae*	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

Few - part of alpine park complex with desirable aesthetics and views. Unsuitable for camping or hiking trails.

Wood products

None

Type locality

Location 1: Klamath County, OR	
Township/Range/Section	T30S R5 E S17
UTM zone	N
UTM northing	568943.000
UTM easting	4758770.00
General legal description	West of park road about 100 yards downhill from turnout that is 1/2 mile below (north) of east rim drive intersection.

Other references

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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:**
