

Ecological site R003XN603WA

High Mountain Unforested Wetlands

Last updated: 1/29/2025
Accessed: 09/25/2026

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.

Classification relationships

This ecological site is related to the following National Park Service Plant Alliance: *Kalmia microphylla* Dwarf-shrubland.

Associated sites

F003XN925WA	High Cryic/Udic Coniferous Can be found adjacent to this ecological site.
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Similar sites

R003XN613WA	Low Mountain Unforested Wetlands Similar concept, different elevational range.
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Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	Not specified

Physiographic features

This native plant community is generally found in depressions and flat or gently sloping landscape positions at higher elevations of the North Cascades. This site occupies the high cryic/udic soil temperature/moisture regime and are typically wet sites with very low-velocity surface and subsurface flows. This site may also occur on sub-irrigated sites with slopes up to 15%.

This ecological site has only been mapped within the boundary of the North Cascades National Park Complex.

Table 2. Representative physiographic features

Landforms	(1) Depression (2) Flood plain (3) Terrace
Flooding duration	Very brief (4 to 48 hours) to brief (2 to 7 days)
Flooding frequency	None to occasional
Ponding duration	Brief (2 to 7 days) to long (7 to 30 days)
Ponding frequency	None to frequent
Elevation	610 – 1,400 m
Slope	0 – 20 %
Ponding depth	0 – 10 cm
Water table depth	0 – 80 cm
Aspect	Aspect is not a significant factor

Climatic features

This ecological site receives most of its annual precipitation from October to April in the form of snow that will commonly persist into early summer. The mean annual precipitation ranges from 60 to 115 inches (1524 to 2921 mm) and the mean annual temperature ranges from 31 to 47 degrees Fahrenheit (-0.6 to 8.3 degrees C). Generally this site occupies areas with cool dry summers and cold wet winters.

Precipitation and temperature data in the tables below was extracted from: PRISM Climate Group, Oregon State University, <http://prism.oregonstate.edu>, created February 2004. Information from the Ross Dam weather station was used by the PRISM Climate Group to generate climate data for the North Cascades region.

Table 3 Representative climatic features

Frost-free period (average)	100 days
Freeze-free period (average)	160 days
Precipitation total (average)	2,920 mm

Influencing water features

These general kinds of bog and fen wetlands are distinguished by pH, nutrient availability and hydrologic dynamics. Fens have groundwater within the rooting zone of vascular plants, while bogs have built up peat above the influence of groundwater. The vegetation in true bogs is limited by the water available from precipitation and are only found in areas of high precipitation. This site supports vegetation that tolerates occasional flooding of the site and periodic saturation within the soil profile. As such, seasonally high water tables are common and soils typically display some evidence of anaerobic conditions (redoximorphic features) and periodic flooding by nearby streams.

Soil features

Applicable Soils: Bacon, Beaverpass, and Purple

The soils that support this native plant community occur in the cryic soil temperature regime and aquic soil moisture regime. These soils are very poorly drained and soil depth is very deep. Generally these soils have a mantle of decomposing organic material overlying alluvium. Under seasonally high water tables, decomposition rates for the organic material are slowed considerably, allowing for an accumulation of these materials over time. Soils show typical hydric soil characteristics, including high organic content and/or low chroma and redoximorphic features. The Beaverpass classifies as a Histosol, a soil order typified by thick accumulations of decomposing organic materials. The Bacon and Purple soil series are Inceptisols with varying thicknesses of decomposing organic material at the surface.

Table 4. Representative soil features

Surface texture	(1) Fine sandy loam (2) Mucky loam
Family particle size	(1) Loamy
Drainage class	Very poorly drained
Permeability class	Moderate to very rapid
Soil depth	150 cm
Surface fragment cover <=3"	0 – 10 %
Surface fragment cover >3"	0 – 10 %
Available water capacity (0-101.6cm)	4.32 – 40.61 cm
Soil reaction (1:1 water) (0-101.6cm)	0 – 10
Subsurface fragment volume <=3" (Depth not specified)	0 – 50 %

Subsurface fragment volume >3" (Depth not specified)	0 – 40 %
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Ecological dynamics

The High Mountain Unforested Wetland plant communities (usually including areas with bog and/or fen characteristics) are patch communities throughout the subalpine parklands. The plant communities are a complex mosaic that varies with soil characteristics and water regime. Disturbances that affect the water regime drive changes in the dominant plant community.

These sites occur in the forested and non-forested areas of the mid- and high elevation vegetated zones of the Cascade Mountains. These wetlands are found in depressional areas, on slopes, surrounding lakes or ponds, or associated with flat floodplains or ponded landslide surfaces. Often, these areas are shaded for at least a portion of the day because of their landscape position, and snow remains on the site longer into the late spring and early summer than on nearby more exposed sites, shortening the growing season on the site. Also, due to the landscape position, water tables are often at or near the surface for much of the growing season, and the water that collects is typically cold because most of it results from snowmelt. Decomposition of organic materials on top of the soil surface is slow because the natural agents of organic matter breakdown operate slowly under site conditions including high watertable, low soil temperature and low pH. Well-developed hummocks are common, and species common to better-drained soils thrive there. Occasionally this site is found in complex with mounded areas of Subalpine Parkland. Common plants found in these wetlands include bluejoint (*Calamagrostis canadensis*), water sedge (*Carex aquatilis*), white marsh marigold (*Caltha leptosepala*), black alpine sedge (*Carex nigricans*), tufted hairgrass (*Deschampsia caespitosa*), Drummond's rush (*Juncus drummondii*), mountain sedge (*Carex scopulorum*) and Northwest Territory sedge (*Carex utriculata*). The hummock-forming peat-mosses *Sphagnum fuscum* and *S. capillifolium* are dominant in the moss layer but a diversity of other mosses also occur. Typical species of better-drained hummocks, mounds or raised edges include subalpine lupine (*Lupinus arcticus* ssp. *subalpinus*), false hellebore (*Veratrum viride*), Sitka valerian (*Valeriana sitchensis*), showy sedge (*Carex spectabilis*), American bistort (*Polygonum bistortoides*), partridgefoot (*Luetkea pectinata*), white avalanche lily (*Erythronium montanum*), woolly pussytoes (*Antennaria lanata*), Sitka mountain-ash (*Sorbus sitchensis*), black huckleberry (*Vaccinium membranaceum*), pink mountainheather (*Phyllodoce empetrifomis*), white mountain-heather (*Cassiope mertensiana*), Cascade huckleberry (*Vaccinium deliciosum*), subalpine spirea (*Spiraea splendens* var. *splendens*) and willow (*Salix* spp.). Species will be present in varying amounts depending on the Community Phase and degree of recent disturbance.

State and transition model

Figure 3. 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				0	
	water sedge	CAAQ	<i>Carex aquatilis</i>	0	0
	bluejoint	CACA4	<i>Calamagrostis canadensis</i>	0	0
	black alpine sedge	CANI2	<i>Carex nigricans</i>	0	0
	mountain sedge	CASC12	<i>Carex scopulorum</i>	0	0
	Northwest Territory sedge	CAUT	<i>Carex utriculata</i>	0	0
	tufted hairgrass	DECE	<i>Deschampsia caespitosa</i>	0	0
	Drummond's rush	JUDR	<i>Juncus drummondii</i>	0	0
Moss					
2				0	
	sphagnum	SPCA70	<i>Sphagnum capillifolium</i>	0	0
	sphagnum	SPFU70	<i>Sphagnum fuscum</i>	0	0
Forb					
3				0	
	white marsh marigold	CALE4	<i>Caltha leptosepala</i>	0	0

Table 6. Community 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Inventory data references

Type Locality Plot ID: 05-TMR-043

Type locality

Location 1: Skagit County, WA	
Township/Range/Section	T35N R14E S9
UTM zone	N
UTM northing	5376912.87
UTM easting	648418.153
Latitude	48° 31'40"
Longitude	120° 59'22"

Other references

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Canaday, B.B. and Fonda, R.W. 1974. The Influence of Subalpine Snowbanks on Vegetation Pattern, Production, and Phenology. *Bulletin of the Torrey Botanical Club*, Vol. 101, No. 6 (Nov. - Dec., 1974), pp. 340-350

Crawford, R. C., C. B. Chappell, C. C. Thompson, and F. J. Rocchio. 2009. Vegetation classification of Mount Rainier, North Cascades, and Olympic National Parks. Natural Resource Technical Report NPS/NCCN/NRTR—2009/211. National Park Service, Fort Collins, Colorado. 58 pages.

Douglas, G.W. and Bliss L.C. 1977. Alpine and High Subalpine Plant Communities of the North Cascades Range, Washington and British Columbia. *Ecological Monographs*, Vol. 47, No. 2 (Spring, 1977), pp. 113-150.

Kuramoto, R.T. and Bliss L.C. 1970. Ecology of Subalpine Meadows in the Olympic Mountains, Washington. *Ecological Monographs*, Vol. 40, No. 3 (Summer, 1970), pp. 317-347.

Contributors

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Approval

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:
