USDA Natural Resources
Conservation Service

Ecological site AX001X01X203
Cryic Aquic Shrubland

Last updated: 5/15/2025
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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): 001X–Northern Pacific Coast Range, Foothills, and Valleys

This area consists of a long and narrow range of mountains with associated foothills and valleys that parallels the Pacific Ocean. This area is entirely within the Pacific Border Province of the Pacific Mountain System in Oregon and Washington. MLRA 1 is bounded on the north by the highest elevations of the Olympic Mountains and the strait of Juan de Fuca, and by the Klamath Mountains on the south. The Washington portion of this MLRA is primarily composed of young Tertiary sedimentary rocks (siltstone and sandstone) mixed with some volcanic rocks of the same age. Glacial till and outwash deposits are also found in the northern half of this area in Washington. Much of this area is accreted terrane formed by tectonic processes. The average annual precipitation ranges from 60 to 200 inches (1,525 to 5,580 millimeters), increasing with elevation. Most of the precipitation in this area occurs during low-intensity, Pacific frontal storms and is evenly distributed throughout fall, winter, and spring.

The dominant soil orders in this MLRA are Andisols, Inceptisols, and Ultisols. Soil depths broadly range from shallow to very deep. Soils are primarily well drained, however poorly drained soils may be found in depressional areas and on alluvial floodplains. Surface textures are typically medial and loamy or clayey. Soils in this area dominantly have a mesic or frigid temperature regime and a udic moisture regime. Soils with aquic moisture regimes and cryic temperature regimes also occur.

Ecological site concept

Cryic Aquic Shrubland sites occur on seeps, depressions, and drains on valley walls,

colluvial aprons, and structural benches above 900 meters. These sites are generally located adjacent to moving water. These sites are characterized by an association of shrubs and forbs. Soils on this site are poorly drained and are subject to occasional, brief duration ponding during the growing season. Undergreen willow (*Salix commutata*) and Sitka alder (*Alnus viridis* ssp. sinuata) are the most common shrubs on this site. Common forbs include American bistort (*Polygonum bistortoides*), white marsh marigold (*Caltha leptosepala*), Sitka valerian (*Valeriana sitchensis*), common cowparsnip (*Heracleum maximum*), elephanthead lousewort (*Pedicularis groenlandica*), green false hellebore (*Veratrum viride*), and black alpine sedge (*Carex nigricans*).

Associated sites

AX001X01X306	**Cryic Aquic Subalpine Wet Meadow** Cryic Aquic Subalpine Wet Meadow sites may be found on depressions and seeps adjacent to or surrounded by Cryic Aquic Shrublands. Cryic Aquic Subalpine Wet Meadows are more poorly drained and subject to more frequent ponding for greater duration. Cryic Aquic Subalpine Wet Meadow sites have much lower shrub cover relative to forbs and sedges.
AX001X01X305	**Cryic Udic Wet Subalpine Meadow** Cryic Udic Wet Subalpine Meadow sites may be found adjacent to Cryic Aquic Shrublands. Cryic Udic Wet Subalpine Meadow sites are less likely to occur adjacent to running water. Cryic Udic Wet Subalpine Meadow sites are not subject to ponding.

Similar sites

AX001X01X001	**Temperate Flood Plain Shrubland** Temperate Floodplain Shrubland sites are found at lower elevations and will not support subalpine fir (Abies lasiocarpa).

Table 1. Dominant plant species

Tree	(1) *Abies lasiocarpa* (2) *Callitropsis nootkatensis*
Shrub	(1) *Salix commutata* (2) *Alnus viridis ssp. sinuata*
Herbaceous	(1) *Caltha leptosepala* (2) *Carex nigricans*

Legacy ID

F001XA203WA

Physiographic features

This site primarily occurs on glacial valley walls, colluvial aprons, and structural benches on mountains. Cryic Aquic Shrubland sites are typically located adjacent to streams. These sites receive a significant amount of additional moisture via both run-on and lateral flow.

Table 2. Representative physiographic features

Landforms	(1) Mountains (2) Glacial-valley wall (3) Colluvial apron (4) Structural bench
Flooding frequency	None
Ponding duration	Brief (2 to 7 days)
Ponding frequency	Occasional
Elevation	900–1,900 m
Slope	0–5%
Water table depth	150 cm
Aspect	W, NW, N, NE, E, SE, S, SW

Climatic features

This site occurs in a cryic temperature and aquic moisture regime. Precipitation arrives mostly via low-intensity, Pacific frontal storms. Precipitation is unevenly distributed, with the lowest amounts on the leeward side of the Coast Range mountains. Precipitation falls largely as snow in higher elevations. Precipitation is evenly distributed throughout the fall, winter, and spring, while summers are dry. Air temperatures vary significantly along the elevation gradient.

Table 3. Representative climatic features

Frost-free period (characteristic range)	30-90 days
Freeze-free period (characteristic range)	
Precipitation total (characteristic range)	1,499-3,988 mm

Influencing water features

Cryic Aquic Shrubland sites are subject to occasional ponding for brief duration. These sites are frequently found adjacent to streams and creeks. Dominant shrub species are tolerant of saturation and frequent surface disturbance from water erosion.

Soil features

The soils that support this ecological site occur in the cryic soil temperature regime and aquic soil moisture regime. Lakedilly soils are poorly drained, very deep, formed from colluvium from metasedimentary rock, and occur on seeps and depressions on colluvial aprons and glacial valley walls. They have a high or very high saturated hydraulic conductivity. These soils have a seasonally high water table that is within zero to 10 inches of the surface during the growing season, and occasional ponding potential. Lakedilly has greater than 35 percent rock fragments in the control section. Ponding frequency is the limiting factor for plant growth on these soils. Although representative of this site, these soils may exist across multiple ecological sites because of naturally variable slope, texture, rock fragments, and pH. An on-site soil pit and the most current ecological site key are necessary to classify a site.

Table 4. Representative soil features

Parent material	(1) Colluvium–metasedimentary rock
Surface texture	(1) Loam (2) Sandy loam
Drainage class	Poorly drained
Soil depth	152 cm
Surface fragment cover <=3"	0–5%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	8.64–12.7 cm
Soil reaction (1:1 water) (0-25.4cm)	4.5–5.5
Subsurface fragment volume <=3" (0-50.8cm)	0–30%
Subsurface fragment volume >3" (0-50.8cm)	0–15%

Ecological dynamics

The Cryic Aquic Shrubland site is found at mid-to-high elevations in the park where snowpack persists long into the spring and summer. Long-duration snowpack cover significantly reduces growing degree days on site. These sites are typically located adjacent to running water, frequently being found between streams and upland cryic forest or moist meadow sites. Soils on this site are poorly-drained and are subject to occasional, brief-duration ponding. Alpine snowmelt generates large amounts of water and may result in high-intensity floods capable of scouring the soil surface to bare gravels, creating a nutrient-poor substrate. Undergreen willow (*Salix commutata*) and Sitka alder (*Alnus*

viridis ssp. sinuata) are the most common shrubs on this site. Common forbs include American bistort (*Polygonum bistortoides*), white marsh marigold (*Caltha leptosepala*), Sitka valerian (*Valeriana sitchensis*), common cowparsnip (*Heracleum maximum*), elephanthead lousewort (*Pedicularis groenlandica*), green false hellebore (*Veratrum viride*), and black alpine sedge (*Carex nigricans*).

In the immediate aftermath of a surface-scouring flooding event, undergreen willow (*Salix commutata*) is generally the first shrub to begin regenerating. While undergreen willow regenerates as the top canopy stratum, fireweed (*Chamerion angustifolium*) and field horsetail (*Equisetum arvense*) establish in the understory. Within a few years, Sitka alder (*Alnus viridis* ssp. sinuata) recruits have begun to establish. Given enough time without significant disturbance, Alaska cedar (*Callitropsis nootkatensis*) and subalpine fir (*Abies lasiocarpa*) may begin to establish on-site. The timing of tree establishment on-site may vary depending on seed source availability. At this point, additional forb species regenerate in the understory. If the time without disturbance is very long, subalpine fir will gradually become more dominant on site due to its higher tolerance of shade, but frequent disturbance from high-intensity floods generally precludes subalpine fir dominance on site.

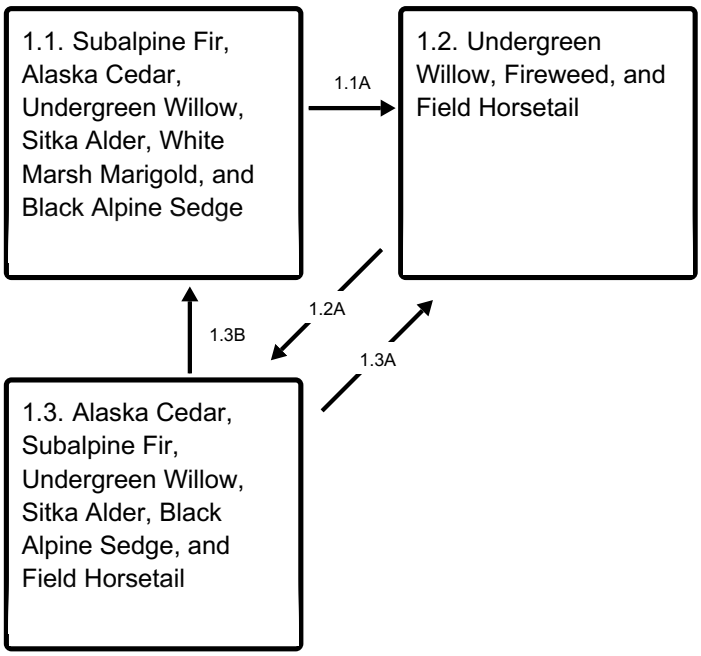
Windthrow events are a potential source of disturbance on this site. Blowdown events may impact individual trees or entire stands, depending on severity. Blown-down logs trap sediment, accelerating the accumulation of fine particulate matter. High soil moisture and poor fuel conditions generally inhibit fires on this site. If this site does burn, it certainly experiences a very high fire-return interval, greater than 200 years (FEIS, 2012). Wildfire occurrence may be limited to prolonged periods of drought. If they occur, fires are typically mixed to high intensity, often stand-replacing. Stand-replacing wildfires open the canopy and favor the establishment of pioneering, shade-intolerant species. Wildfire events tend not to produce enduring effects on this site due to the much higher frequency of flooding events.

State and transition model

Ecosystem states

1. Reference

State 1 submodel, plant communities



1.1A - High-intensity disturbance

1.2A - Time without disturbance

1.3B - Time without disturbance

1.3A - High-intensity disturbance

State 1
Reference

The Reference state is comprised of three communities is varying stages of regeneration. Communities in the Reference state range from a sparse, emergent understory of shrubs and forbs that is found in the early aftermath of disturbance, to mature stands of conifers and shrubs.

Dominant plant species

- subalpine fir (*Abies lasiocarpa*), tree
- Alaska cedar (*Callitropsis nootkatensis*), tree
- Sitka alder (*Alnus viridis ssp. sinuata*), shrub
- undergreen willow (*Salix commutata*), shrub
- white marsh marigold (*Caltha leptosepala*), other herbaceous
- American bistort (*Polygonum bistortoides*), other herbaceous
- common cowparsnip (*Heracleum maximum*), other herbaceous
- green false hellebore (*Veratrum viride*), other herbaceous
- black alpine sedge (*Carex nigricans*), other herbaceous
- field horsetail (*Equisetum arvense*), other herbaceous
- elephanthead lousewort (*Pedicularis groenlandica*), other herbaceous
- fireweed (*Chamerion angustifolium*), other herbaceous

Community 1.1
Subalpine Fir, Alaska Cedar, Undergreen Willow, Sitka Alder, White Marsh Marigold, and Black Alpine Sedge

Structure: deciduous forest with a mix of shrubs, forbs, and grasses, with conifer regeneration in the understory This community is characterized by a diverse composition of shrubs, forbs, and graminoids. Common reference community plants include undergreen willow (*Salix commutata*), Sitka alder (*Alnus viridis* ssp. sinuata), white marsh marigold (*Caltha leptosepala*), American bistort (*Polygonum bistortoides*), common cowparsnip (*Heracleum maximum*), false hellebore (*Veratrum viride*), black alpine sedge (*Carex nigricans*), field horsetail (*Equisetum arvense*), and elephanthead lousewort (*Pedicularis groenlandica*).

Community 1.2
Undergreen Willow, Fireweed, and Field Horsetail

Structure: sparse understory of emergent shrubs and forbs This community is found in the aftermath of a severe flooding event that removes much of the vegetation from site and scours the mineral soil surface. Undergreen willow (*Salix commutata*) is the first shrub to establish on site. Fireweed (*Chamerion angustifolium*) and field horsetail (*Equisetum arvense*) are frequently the first forbs to reestablish.

Community 1.3
Alaska Cedar, Subalpine Fir, Undergreen Willow, Sitka Alder, Black Alpine Sedge, and Field Horsetail

Structure: shrubby single story with scattered understory of trees, shrubs, forbs, and graminoids This community is an intermediate seral stage where scattered trees have likely begun to establish on site. Alaska cedar is the first tree to establish, with subalpine fir lagging. As trees begin to establish, Sitka alder (*Alnus viridis* ssp. sinuata) may be found.

Pathway 1.1A
Community 1.1 to 1.2

High-intensity disturbance. Severe flooding event that removes existing vegetation and scours the mineral soil surface.

Pathway 1.2A
Community 1.2 to 1.3

Time without disturbance allows regeneration, growth, and progression to a later seral stage.

Pathway 1.3B
Community 1.3 to 1.1

Time without disturbance allows regeneration, growth, and progression to a later seral stage.

Pathway 1.3A
Community 1.3 to 1.2

High-intensity disturbance. Severe flooding event that removes existing vegetation and scours the mineral soil surface.

Additional community tables

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Approval

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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	05/21/2025
Approved by	Grant Petersen
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:**

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2. **Presence of water flow patterns:**

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3. **Number and height of erosional pedestals or terracettes:**

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):**

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5. **Number of gullies and erosion associated with gullies:**

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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):**

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:**