USDA Natural Resources
Conservation Service

Ecological site AX001X01X304
Cryic Udic Moist Subalpine Meadow

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 Udic Moist Subalpine Meadow sites occur on toe slope positions on cirques and

glacial valley walls above 900 meters. These sites are characterized by a community of forbs and graminoids. Tree establishment is generally precluded by high snowpack and low temperatures; however, tree islands may occasionally develop on site. Due to their relatively stable toe slope positions, these sites receive additional run-on water from less stable sites uphill. Higher effective precipitation promotes productivity on Moist Subalpine Meadow sites.

Associated sites

AX001X01X303	**Cryic Udic Subalpine Meadow** Cryic Udic Subalpine Meadow sites may be found on less stable slopes adjacent to Cryic Udic Moist Subalpine Meadows. Cryic Udic Subalpine Meadow sites have lower effective precipitation, and productivity is diminished on those sites.
AX001X01X302	**Cryic Udic Dry Subalpine Meadow** Cryic Udic Dry Subalpine Meadow sites may be found on less stable slopes adjacent to Cryic Udic Moist Subalpine Meadows. Cryic Udic Dry Subalpine Meadow sites have lower effective precipitation, and productivity is diminished on those sites.
AX001X01X301	**Cryic Udic Shallow Subalpine Meadow** Cryic Udic Shallow Subalpine Meadow sites may be found on less stable slopes adjacent to Cryic Udic Moist Subalpine Meadows. Cryic Udic Shallow Subalpine Meadow sites have lower effective precipitation, and productivity is diminished on those sites.
AX001X01X306	**Cryic Aquic Subalpine Wet Meadow** Cryic Aquic Subalpine Meadow sites may be found on seeps and depressions. Cryic Aquic Subalpine Wet Meadow sites are subject to frequent ponding.

Similar sites

AX001X01X305	**Cryic Udic Wet Subalpine Meadow** Cryic Udic Wet Subalpine Meadow sites have seasonally high water tables within 50 centimeters of the surface.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Spiraea douglasii*
Herbaceous	(1) *Heracleum maximum* (2) *Carex spectabilis*

Legacy ID

R001XA304WA

Physiographic features

This site primarily occurs on glacial valley walls and colluvial aprons on mountains. Cryic Udic Moist Subalpine Meadow sites occur on intermediate slopes between Cryic Udic Subalpine Meadow or Cryic Udic Dry Subalpine Meadow sites and Cryic Udic Wet Subalpine Meadow or Cryic Aquic Subalpine Wet Meadow sites. Cryic Udic Moist Subalpine Meadow sites receive a moderate amount of additional moisture via run-on from less stable upslope sites.

Table 2. Representative physiographic features

Landforms	(1) Mountains (2) Colluvial apron (3) Glacial-valley wall
Flooding frequency	None
Ponding frequency	None
Elevation	900–1,900 m
Water table depth	150 cm
Aspect	W, NW, N, NE, E, SE, S, SW

Climatic features

This site occurs in a cryic temperature and udic 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 Udic Moist Subalpine Meadow sites are neither ponded nor flooded at any time of year. Capture of run-on moisture increases the effective precipitation of the site relative to Cryic Udic Subalpine Meadows.

Soil features

The soils that support this ecological site occur in the cryic soil temperature regime and the udic soil moisture regime. Marmotpass soils are very deep, formed from colluvium from metasedimentary rock, and occur on cirques and structural benches. These soils are all well drained and have high or very high saturated hydraulic conductivity. They have a rock fragment content of greater than 35 percent in the control section, and a relatively high organic carbon content in the surface horizons. 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) Gravelly silt loam (2) Gravelly loam (3) Gravelly sandy loam
Drainage class	Well drained
Soil depth	150 cm
Surface fragment cover <=3"	0–5%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	10.41–14.22 cm
Soil reaction (1:1 water) (0-25.4cm)	6.1–7.8
Subsurface fragment volume <=3" (0-50.8cm)	20–50%
Subsurface fragment volume >3" (0-50.8cm)	0–15%

Ecological dynamics

The Cryic Udic Moist Subalpine Meadow 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 receive additional run-on moisture from upslope sites. High effective precipitation favors moisture-preferring species such as common cowparsnip (*Heracleum maximum*), edible thistle (*Cirsium edule*), and showy sedge (*Carex spectabilis*).

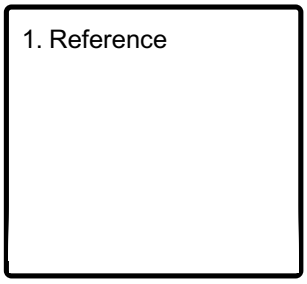
Cryic Udic Subalpine Moist Meadows are subject to severe disturbance from wildfire, avalanches, and mass-movement events. The fire regime of this site likely resembles that

of adjacent and lower forested sites that are characterized by high-intensity burns with a long return interval of greater than 200 years (FEIS). Historical fires would likely begin in lower-elevation forests and move upslope to these meadow sites. When fire does occur, burns are often patchy and low-extent due to discontinuous fuels and moist site conditions during most of the growing season. Cryic Udic Subalpine Moist Meadow sites are susceptible to avalanches and mass-movement events. Powerful avalanches may remove trees and hard-stemmed shrubs from the site and create early seral conditions favorable for the establishment of graminoids and forbs. Mass movement can occur on unstable slopes and remove all or nearly all vegetation from the site.

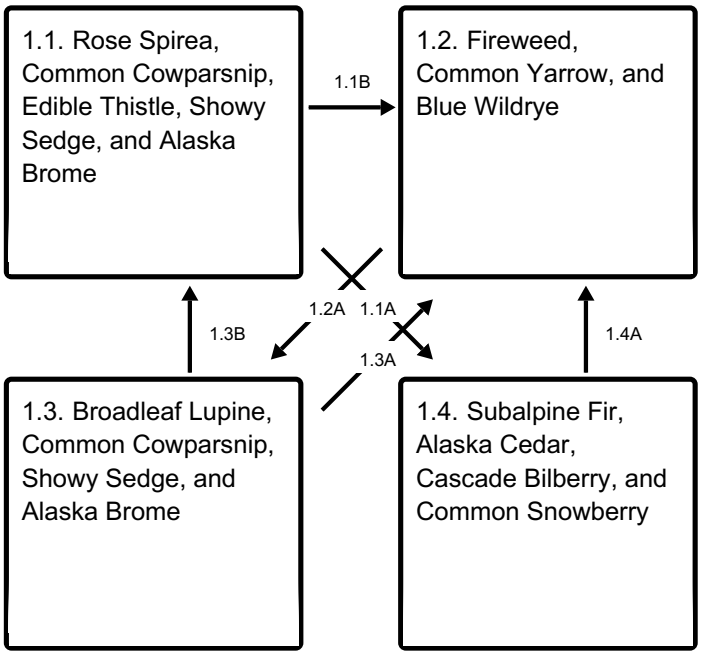
High snowpack generally precludes tree establishment on sites, but trees may occasionally establish at the lower elevations of this ecological site. Once established, trunks and limbs may provide shelter from snowdrifts and allow additional seedlings to recruit in tree island mosaics. Cryic Udic Subalpine Meadow sites are subject to high-intensity winds that are capable of uprooting and throwing trees. Temporal and spatial patterns of tree establishment on this site are unpredictable due to large interannual variations in snowfall.

State and transition model

Ecosystem states



State 1 submodel, plant communities



1.1B - High-intensity disturbance

1.1A - Time without disturbance

1.2A - Time without disturbance

1.3B - Time without disturbance

1.3A - High-intensity disturbance

1.4A - High-intensity disturbance

State 1
Reference

Cryic Udic Moist Subalpine Meadow sites support communities of shrubs, forbs, and graminoids. Three communities exist in the Reference state which encompass varying stages of regeneration from disturbance. There is also a tree island community which may arise given an extensive time without disturbance.

Dominant plant species

- subalpine fir (*Abies lasiocarpa*), tree
- Alaska cedar (*Callitropsis nootkatensis*), tree
- rose spirea (*Spiraea douglasii*), shrub
- Cascade bilberry (*Vaccinium deliciosum*), shrub
- common snowberry (*Symphoricarpos albus*), shrub
- Alaska brome (*Bromus sitchensis*), grass
- blue wildrye (*Elymus glaucus*), grass
- common cowparsnip (*Heracleum maximum*), other herbaceous
- edible thistle (*Cirsium edule*), other herbaceous
- showy sedge (*Carex spectabilis*), other herbaceous
- fireweed (*Chamerion angustifolium*), other herbaceous
- common yarrow (*Achillea millefolium*), other herbaceous

Community 1.1
Rose Spirea, Common Cowparsnip, Edible Thistle, Showy Sedge, and Alaska Brome

Structure: meadow with forbs, grasses, and graminoids This community is characterized by a diverse composition of forbs, grasses, sedges, and shrubs. Common reference community plants include rose spirea (Spirea douglasii), common cowparsnip (*Heracleum maximum*), edible thistle (*Cirsium edule*), Sitka valerian (*Valeriana sitchensis*), partridgefoot (*Luetkea pectinata*), showy sedge (*Carex spectabilis*), blue wildrye (*Elymus glaucus*), and Alaska brome (*Bromus sitchensis*).

Community 1.2
Fireweed, Common Yarrow, and Blue Wildrye

Structure: grass and forb meadow This community is an early seral stage, occurring after severe disturbance. Fireweed is generally the first species to establish on site. Common

yarrow (*Achillea millefolium*) and blue wildrye (*Elymus glaucus*) are subdominant to minor on site.

Community 1.3
Broadleaf Lupine, Common Cowparsnip, Showy Sedge, and Alaska Brome

Structure: Grass and forb meadow This community is an intermediate seral stage in which few fast-growing shrubs have begun to regenerate on site. Species richness is diminished relative to phase 1.1. Additional time will allow slower-growing species to reestablish on site.

Community 1.4
Subalpine Fir, Alaska Cedar, Cascade Bilberry, and Common Snowberry

Structure: Tree island Given enough time without significant disturbance, subalpine fir (*Abies lasiocarpa*) and Alaska cedar (*Callitropsis nootkatensis*) may recruit to the site. Tree establishment tends to be patchy and discontinuous on this site, resulting in a mosaic of tree islands within a non-forested, meadow or shrubland matrix. Tree cover results in diminished understory richness and production.

Pathway 1.1B
Community 1.1 to 1.2

Severe disturbance such as avalanche, landslide, or fire that removes most vegetation from the site.

Pathway 1.1A
Community 1.1 to 1.4

Time without disturbance.

Pathway 1.2A
Community 1.2 to 1.3

Time without disturbance.

Pathway 1.3B
Community 1.3 to 1.1

Time without disturbance.

Pathway 1.3A

Community 1.3 to 1.2

Severe disturbance such as avalanche, landslide, or fire that removes most vegetation from the site.

Pathway 1.4A
Community 1.4 to 1.2

Severe disturbance such as avalanche, landslide, or fire that removes most vegetation from the site.

Additional community tables

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Contributors

Erin Kreutz
Abigail Field
Max Ross
Erik Dahlke
Alec Haulotte

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	04/09/2026
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):**

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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:**
