USDA Natural Resources
Conservation Service

Ecological site AX001X01X302
Cryic Udic Dry Subalpine Meadow

Last updated: 5/15/2025
Accessed: 04/10/2026

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.

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 Subalpine Dry Meadow sites occur on cirques, bench basins, ridges, and

summits at elevations above 900 meters. These sites are characterized by a community of shrubs, forbs, and graminoids. Tree establishment is generally precluded by high snowpack, low temperatures, intense solar radiation, and desiccating winds; however, tree islands may occasionally develop on site. Cryic Udic Subalpine Dry Meadow sites are generally located on the leeward side of the peninsula where precipitation is relatively low. In addition, these sites are more likely found on exposed South and West aspects where evaporative loss due to solar radiation is very high. Dry conditions on site favor drought hardy species. These sites may generate run-off moisture that increases the effective precipitation of associated Cryic Udic Moist Meadow, Cryic Udic Wet Meadow, and Cryic Aquic Meadow sites.

Associated sites

AX001X01X304	**Cryic Udic Moist Subalpine Meadow** Cryic Udic Moist Subalpine Meadow sites may be found on more stable slopes adjacent to Cryic Udic Dry Subalpine meadow sites. Increased effective precipitation favors productivity on Cryic Udic Moist Subalpine Meadows.
AX001X01X305	**Cryic Udic Wet Subalpine Meadow** Cryic Udic Wet Subalpine Meadow sites may be found on more stable slopes adjacent to Cryic Udic Dry Subalpine Meadow sites. Cryic Udic Wet Subalpine Meadow sites have seasonally high water tables but are not subject to ponding.
AX001X01X306	**Cryic Aquic Subalpine Wet Meadow** Cryic Aquic Subalpine Wet Meadow sites may be found on more stable slopes adjacent to Cryic Udic Dry Subalpine Meadow sites. Cryic Aquic Subalpine Wet Meadow sites are subject to frequent ponding for long duration.

Similar sites

AX001X01X303	**Cryic Udic Subalpine Meadow** Cryic Udic Subalpine Meadow sites typically occur outside of the rain shadow of the Olympic mountains or on slightly more stable slopes. Cryic Udic Subalpine Meadow sites receive additional effective precipitation and have higher productivity.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Juniperus communis*
Herbaceous	(1) *Phlox diffusa* (2) *Festuca idahoensis ssp. roemeri*

Legacy ID

Physiographic features

This site primarily occurs on glacial valley walls and colluvial aprons on mountains. Cryic Udic Dry Subalpine Meadow sites occur on less stable slope positions and generate run-off that is captured by more stable downslope sites.

Table 2. Representative physiographic features

Landforms	(1) Mountains (2) Glacial-valley wall (3) Colluvial apron
Flooding frequency	None
Ponding frequency	None
Elevation	1,100–1,900 m
Slope	0–100%
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

There are no dominant water features influencing plant community dynamics on site.

Soil features

The soils that support this ecological site occur in the cryic soil temperature regime and the udic soil moisture regime. Lollah-dry soils are very deep, formed from colluvium from metasedimentary rock, and occur on cirques and glacial valley walls. Allincreek-dry soils are shallow, formed from residuum, and occur on ridges, summits, 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) Residuum (2) Colluvium–metasedimentary rock
Surface texture	(1) Very gravelly silt loam (2) Very gravelly loam (3) Very gravelly sandy loam
Drainage class	Well drained
Soil depth	25 cm
Surface fragment cover <=3"	0–5%
Surface fragment cover >3"	0%
Available water capacity (0-39.9cm)	1.09–4.39 cm
Soil reaction (1:1 water) (0-9.9cm)	4.5–5.5
Subsurface fragment volume <=3" (0-20.1cm)	15–50%
Subsurface fragment volume >3" (0-20.1cm)	0–20%

Ecological dynamics

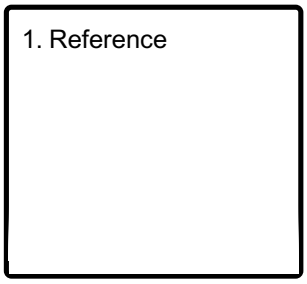
The Cryic Udic Dry Subalpine Meadow site is found at mid-to-high elevations in the park where snowpack persists into the spring and summer. Long-duration snowpack cover significantly reduces growing degree days on site. These sites are typically located toward the leeward side of the Olympic mountains and are found on exposed South and West aspects where solar radiation significantly reduces the effective precipitation on site. These sites are typically located on gentle to moderate slopes and produce runoff water that is captured by downslope, stable Moist Subalpine Meadow, Wet Subalpine Meadow, and Aquic Subalpine Meadow sites.

Cryic Udic Dry Subalpine 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 High Cryic Udic Forest and High Cryic Udic Dry Forest sites which 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. Cryic Udic Dry Subalpine 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.

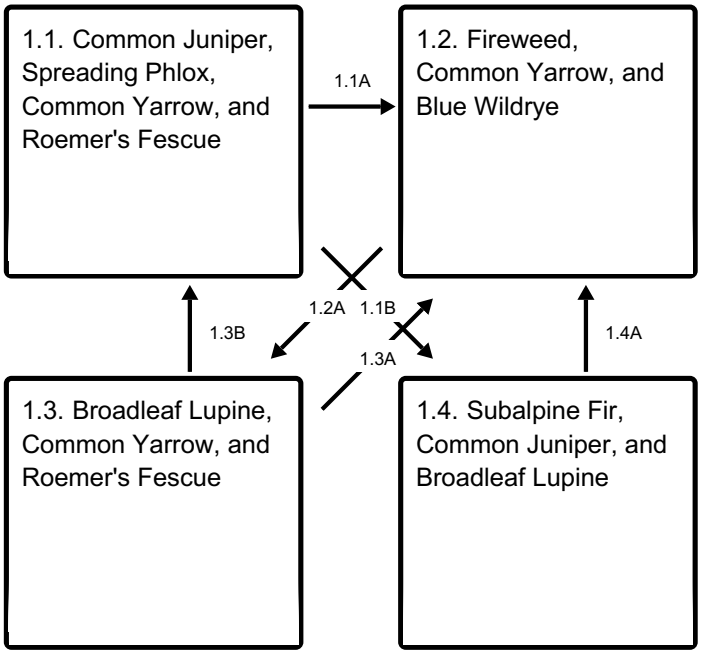
High snowpack generally precludes tree establishment on sites, but trees may occasionally establish at the lower elevations of this ecological site. Once established, trunks and limbs may provide shelter from snowdrifts and allow additional seedlings to recruit in tree island mosaics. Cryic Udic Dry 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



1.1A - High-intensity disturbance

1.1B - 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 Dry 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
- common juniper (*Juniperus communis*), shrub
- Roemer's fescue (*Festuca idahoensis ssp. roemeri*), grass
- wildrye (*Elymus*), grass
- spreading phlox (*Phlox diffusa*), other herbaceous
- common yarrow (*Achillea millefolium*), other herbaceous
- broadleaf lupine (*Lupinus latifolius*), other herbaceous

Community 1.1
Common Juniper, Spreading Phlox, Common Yarrow, and Roemer's Fescue

Structure: meadow / shrubland This community is characterized by a diverse composition of forbs, grasses, and sedges. Common reference community plants include common juniper (*Juniperus communis*), common yarrow (*Achillea millefolium*), spreading phlox (*Phlox diffusa*), pink mountainheath (*Phyllodoce empetriformis*), fescue sandwort (*Arenaria capillaris* ssp. americana), and wooly pussytoes (*Antennaria lanata*).

Community 1.2
Fireweed, Common Yarrow, and Blue Wildrye

Structure: disturbed site with forb and grass regeneration This community occurs in the period following severe disturbance that removes most vegetation from the site. This community is dominated by fireweed (*Chamerion angustifolium*), with some common yarrow (*Achillea millefolium*) and blue wildrye (*Elymus glaucus*) frequently present and increasing with time.

Community 1.3
Broadleaf Lupine, Common Yarrow, and Roemer's Fescue

Structure: Grass and forb meadow This is an intermediate seral stage where additional forb and grass species have begun to recruit to the site. Broadleaf lupine (*Lupinus latifolius*) and Roemer’s fescue (*Festuca idahoensis* ssp. roemeri) are commonly present in this community phase.

Community 1.4
Subalpine Fir, Common Juniper, and Broadleaf Lupine

Structure: Tree island Given enough time without significant disturbance, subalpine fir (*Abies lasiocarpa*) 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. The understory of this community is dominated by mature shrubs.

Pathway 1.1A
Community 1.1 to 1.2

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

Pathway 1.1B
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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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	04/10/2026
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:**

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:

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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:**
