

# Ecological site AX001X03X401

## Cryic Udic Forest

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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 long and narrow resource area stretches along the Pacific Border Province of the Pacific Mountain System in Oregon and Washington. The area is bounded by the Olympic Mountains on the north and the Klamath Mountains on the south. Most of the area consists of hills and low mountains with gentle to steep slopes. The parent materials are composed primarily of young Tertiary sedimentary rocks with some minor volcanic rocks. Glacial till and outwash deposits are found in the northern half of the area within Washington. In the far southern portion of the area, near the Klamath Mountains, the sedimentary rocks are older and some have been metamorphosed. The average annual precipitation ranges from 60 to 200 inches, increasing with elevation.

The dominant soil orders in this MLRA are Andisols, Inceptisols, and Ultisols. Soil depth ranges from shallow to very deep. While most soils in the area are well drained and occur on foothills, mountain slopes and ridges, floodplain and depressional soils can range from well drained to very poorly drained. Soil textures are typically medial, loamy, or clayey. The dominant soils in the area have a mesic or frigid soil temperature regime and a udic soil moisture regime; however, soils with an aquic soil moisture regime or cryic soil temperature regime do occur.

### LRU notes

The Central Pacific Coast Range land resource unit (LRU 3) of MLRA 1 ranges from the Olympic Peninsula south into northern Oregon. LRU 3 is located south of the Olympic National Forest and extends to the Siletz River in Oregon. LRU 3 is bounded on the west by MLRA 4a Sitka Spruce Belt and MLRA 2 Willamette and Puget Sound Valleys to the east. Several major rivers have headwaters in this LRU or carved valleys through the landscape depositing more recent alluvium. These include the Chehalis, Columbia, Grays, Humptulips, Klaskanine, Nehalem, Satsop, Siletz, Willapa, Wilson, Wynoochee, and Yamhill Rivers.

### Ecological site concept

This ecological site is found on the western Coast Range in the Pacific Northwest in northern Oregon. It is located on shoulder slopes and summits of mountains. Elevations are typically between 2,800 and 3,700 feet with slopes ranging from 3 to 90 percent.

Pacific silver fir (*Abies amabilis*) and western hemlock (*Tsuga heterophylla*) are the most common overstory species with some noble fir (*Abies procera*), Douglas-fir (*Pseudotsuga menziesii*), and western white pine (*Pinus monticola*). Noble fir, Douglas-fir, and western white pine trees occur in younger forests and are relatively shade intolerant. Overtime, these trees are typically replaced by more shade tolerant species such as Pacific silver fir and western hemlock. Common understory shrubs may include red huckleberry (*Vaccinium parvifolium*), oval-leaf huckleberry (*Vaccinium ovalifolium*), black mountain huckleberry (*Vaccinium membranaceum*), salal (*Gaultheria shallon*), salmonberry (*Rubus spectabilis*), rusty menziesia (*Menziesia ferruginea*), Cascade Oregongrape (*Mahonia nervosa*), and vine maple (*Acer circinatum*). The herbaceous layer is sparse, at times entirely absent. When present, they may include Oregon oxalis (*Oxalis oregana*), common beargrass (*Xerophyllum tenax*), deerfoot vanillaleaf (*Achlys triphylla*), western swordfern (*Polystichum munitum*), and twinflower (*Linnaea borealis*). The most common natural disturbance on this ecological site is windthrow following large storms which create

pockets of forest openings. In addition, western hemlock is highly susceptible to rot diseases from fungi such as; *Armillaria ostoyae*, *Heterobasidion annosum*, *Phellinus weirii*, and *Echinodontium tinctorium* which may exacerbate the extent and area of disturbance. The resulting openings in the canopy allow sunlight to reach the forest floor, benefiting the understory. Disturbance by fire is infrequent due to the high humidity and precipitation within the western hemlock zone; however, the site has a fire regime between 150-400 years and may experience stand replacing catastrophic wildfires (US Department of Agriculture, 2012).

## Associated sites

AX001X03X402	<p><b>Frigid Udic Forest</b>            Ecological Site Cryic Udic Forest is located at higher elevations from Frigid Udic Forest. It is typically found on shoulders and summits of mountains within this range.</p>
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**Table 1. Dominant plant species**

Tree	(1) <i>Abies amabilis</i> (2) <i>Tsuga heterophylla</i>
Shrub	(1) <i>Vaccinium parvifolium</i> (2) <i>Gaultheria shallon</i>
Herbaceous	(1) <i>Oxalis oregana</i> (2) <i>Polystichum munitum</i>

## Legacy ID

F001XC401OR

## Physiographic features

This ecological site is located on shoulder slopes and summits of mountains. Elevations are typically between 2,800 and 3,700 feet with slopes ranging from 3 to 90 percent.

**Table 2. Representative physiographic features**

Landforms	(1) Mountains > Mountain slope (2)
Flooding frequency	None
Ponding frequency	None
Elevation	853–1,128 m
Slope	3–90%
Aspect	W, NW, N, NE, E, SE, S, SW

## Climatic features

The climate has cool, moist summers and cold, wet winters. Mean annual precipitation ranges from 120 to 150 inches. Average annual temperatures range from 39 to 45 degrees F.

**Table 3. Representative climatic features**

Frost-free period (characteristic range)	10-100 days
Freeze-free period (characteristic range)	
Precipitation total (characteristic range)	3,048-3,810 mm

## Influencing water features

In general, this ecological site is not influenced by wetland or riparian water features. This site does not experience flooding or ponding.

## Soil features

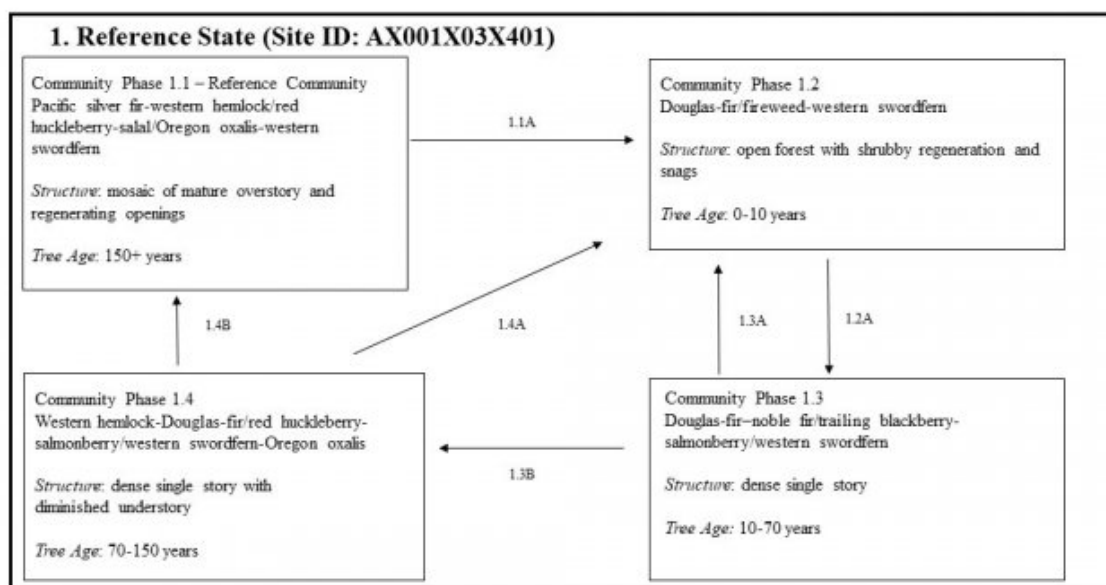
Soils that support this ecological site occur in the cryic soil temperature regime and the udic soil moisture regime.

**Table 4. Representative soil features**

Parent material	(1) Colluvium–igneous rock (2) Residuum–igneous rock
Surface texture	(1) Gravelly, medial loam (2) Medial silt loam (3) Very cobbly, medial loam (4) Medial loam
Drainage class	Well drained
Soil depth	51–152 cm
Surface fragment cover <=3"	0–15%
Surface fragment cover >3"	0–1%
Clay content (0-30.5cm)	15–23%
Subsurface fragment volume <=3" (2.5-152.4cm)	12–26%
Subsurface fragment volume >3" (2.5-152.4cm)	2–30%

## Ecological dynamics

### State and transition model



*Abies amabilis-Tsuga heterophylla/Vaccinium parvifolium-Gaultheria shallon/Oxalis oregana-Polystichum munitum*  
 Pacific silver fir-western hemlock/red huckleberry-salal/Oregon oxalis-western swordfern

Community Phase Pathway 1.X = Community Phase X=Y = Transition Pathway

## State 1

### Community 1.1

Pacific silver fir - western hemlock / red huckleberry - salal / Oregon oxalis - western swordfern Structure: mosaic of mature overstory and regenerating openings Pacific silver fir and western hemlock are the most common overstory species in this community. Both are considered to be very shade tolerant, and perhaps the most shade tolerant of any tree species in North America (Crawford, 1990). Douglas-fir, noble fir, and western white pine may be present but there will be minimal regeneration under closed canopy forests, at times, entirely absent. The dense canopy created by multiple age groups of hemlocks may block most of the sunlight from the forest floor, leading to sparse understory in some areas. Gaps in the mid-canopy and overstory that allow sunlight to reach the ground are where the majority of the understory plants establish. When there is no mid-canopy, the understory tends to be more continuous. The most common natural disturbance on this site is small gap dynamics following the death of one or two trees or windthrow. Common understory species include red huckleberry, salal, Cascade Oregon grape, twinflower, rusty menziesia, Oregon oxalis, common beargrass, western swordfern, and deerfoot vanilla leaf.

#### Dominant plant species

- Pacific silver fir (*Abies amabilis*), tree
- western hemlock (*Tsuga heterophylla*), tree
- noble fir (*Abies procera*), tree
- Douglas-fir (*Pseudotsuga menziesii*), tree
- western white pine (*Pinus monticola*), tree
- red huckleberry (*Vaccinium parvifolium*), shrub
- oval-leaf blueberry (*Vaccinium ovalifolium*), shrub
- thinleaf huckleberry (*Vaccinium membranaceum*), shrub
- salal (*Gaultheria shallon*), shrub
- Cascade barberry (*Mahonia nervosa*), shrub
- salmonberry (*Rubus spectabilis*), shrub
- rusty menziesia (*Menziesia ferruginea*), shrub
- vine maple (*Acer circinatum*), shrub
- redwood-sorrel (*Oxalis oregana*), other herbaceous
- western swordfern (*Polystichum munitum*), other herbaceous
- common beargrass (*Xerophyllum tenax*), other herbaceous
- sweet after death (*Achlys triphylla*), other herbaceous
- twinflower (*Linnaea borealis*), other herbaceous

### Community 1.2

Douglas-fir/fireweed - western swordfern Structure: open forest with shrubby regeneration and snags Community phase 1.2 is an early seral plant community that has been impacted by a stand-replacing disturbance such as a wildfire, large scale wind event, mass movement, or major insect pest or disease. Nearly all trees are absent, but some fire-resistant trees may survive in the overstory. Douglas-fir is relatively fire tolerant, and large overstory trees may be present. Snags are prevalent and remain standing and decaying. Large stems may be present on the surface and serve as nurse sites. The understory is predominately early seral tree, shrub, and forb species such as Douglas-fir, noble fir, fireweed (*Chamerion angustifolium*), and western swordfern.

#### Dominant plant species

- Douglas-fir (*Pseudotsuga menziesii*), tree
- fireweed (*Chamerion angustifolium*), grass
- western swordfern (*Polystichum munitum*), grass

### Community 1.3

Douglas-fir –noble fir / trailing blackberry– salmonberry/ western swordfern Structure: dense single story Community phase 1.3 is an early seral forest in regeneration, possibly with scattered remnant mature trees. Species composition depends on the natural seed sources present and the intensity of disturbance. When resulting from a moderate to severe fire event, it is probable that shrubs will out-compete tree seedlings. Vine maple, red

huckleberry, salmonberry, and trailing blackberry (*Rubus ursinus*) all have the capacity to rapidly recover and spread when top-killed, slowing successful overstory regeneration. Seed sources for tree species would be from the surrounding, undisturbed forest and any of the survivors of the disturbance and would result in a mixed stand which could include Douglas-fir, western hemlock, western white pine, and noble fir.

#### **Dominant plant species**

- Douglas-fir (*Pseudotsuga menziesii*), tree
- noble fir (*Abies procera*), tree
- California blackberry (*Rubus ursinus*), shrub
- salmonberry (*Rubus spectabilis*), shrub
- vine maple (*Acer circinatum*), shrub
- red huckleberry (*Vaccinium parvifolium*), shrub
- western swordfern (*Polystichum munitum*), other herbaceous

#### **Community 1.4**

Western hemlock – Douglas-fir / red huckleberry – salmonberry / western swordfern – Oregon oxalis Structure: dense single story with diminished understory Douglas-fir and noble fir will dominate the overstory canopy, however more shade tolerant species such as Pacific silver fir and western hemlock will increase in basal area as saplings. Canopy closure is almost 100% leading to diminished shrub and forb layers. However, some understory species better adapted to at least partial shade, such as twinflower, will begin to increase. Over time the forest will begin to self-thin due to the elevated competition. Species composition depends on the original seed source(s) available. The forest could be single or mixed-species including Douglas-fir, western hemlock, noble fir, and Pacific silver fir.

#### **Dominant plant species**

- western hemlock (*Tsuga heterophylla*), tree
- Douglas-fir (*Pseudotsuga menziesii*), tree
- noble fir (*Abies procera*), tree
- Pacific silver fir (*Abies amabilis*), tree
- red huckleberry (*Vaccinium parvifolium*), shrub
- salmonberry (*Rubus spectabilis*), shrub
- salal (*Gaultheria shallon*), shrub
- Cascade barberry (*Mahonia nervosa*), shrub
- western swordfern (*Polystichum munitum*), other herbaceous
- twinflower (*Linnaea borealis*), other herbaceous
- sweet after death (*Achlys triphylla*), other herbaceous

#### **Pathway 1.1A**

##### **Community 1.1 to 1.2**

This pathway represents a major stand-replacing disturbance such as a high-intensity fire, large scale wind event, major insect pest infestation, timber harvest, or large mass movement event leading to the stand initiation phase of forest development.

#### **Pathway 1.2A**

##### **Community 1.2 to 1.3**

This pathway represents growth over time with no further major disturbance.

#### **Pathway 1.3A**

##### **Community 1.3 to 1.2**

This pathway represents a major stand-replacing disturbance such as a high-intensity fire, large scale wind event, major insect pest or disease infestation, timber harvest, or large mass movement leading to the stand initiation phase of forest development.

## **Pathway 1.3B**

### **Community 1.3 to 1.4**

This pathway represents growth over time with no further major disturbance.

## **Pathway 1.4B**

### **Community 1.4 to 1.1**

This pathway represents growth over time with no further major disturbance.

## **Pathway 1.4A**

### **Community 1.4 to 1.2**

This pathway represents a major stand-replacing disturbance such as a high-intensity fire, timber harvest, large scale wind event, major insect pest or disease infestation, or large mass movement leading to the stand initiation phase of forest development.

## **Additional community tables**

### **Inventory data references**

Other Established Classifications for Ecological Site

National Vegetation Classification Group G241 – North-Central Pacific Maritime Silver Fir-Western Hemlock Rainforest, A3386 *Abies amabilis* - *Tsuga heterophylla* / *Achlys triphylla* Forest Alliance

USDA Forest Service Plant Association and Management Guide of the Northern Oregon Coast Range: Pacific silver fir/Oregon Oxalis-swordfern

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Washington Department of Natural Resources, Natural Heritage Program. 2015. Ecological Systems of Washington State. A Guide to Identification.

## Contributors

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## Approval

Kirt Walstad, 9/09/2023

## 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	12/14/2021
Approved by	Kirt Walstad
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:**

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