Ecological site AX003X00F005
Western Middle Cascades Low Cryic Udic Forest Group

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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): 003X–Olympic and Cascade Mountains

The Cascade and Olympic Mountains (MLRA 3) include the west slope and parts of the east slope of the Cascades Mountains in Washington and Oregon. The Olympic Mountains in Washington State are also included. These mountains are part of a volcanic arc located at a convergent plate boundary. Volcanic rocks predominate but metamorphic and sedimentary rocks occur in the North Cascades and Olympic Mountains. Topography is generally dissected and steep, but some areas consist of constructional volcanic platforms and isolated stratovolcanoes. Elevation is usually 500 to 6000 feet but reaches to 14,410 ft at the summit of Mount Rainier. Many areas hosted alpine glaciers or ice sheets during the Pleistocene, and a few remain today. Climate becomes cooler and moister with increasing elevation and latitude. Low elevations experience a long growing season and mild temperatures. High elevations can accumulate snowpack lasting into summer and frost may occur in any month. Average annual precipitation ranges from 60 to 180 inches in most areas. Most precipitation falls during the fall, winter, and spring during low-intensity frontal storms. Summers are relatively dry. Average annual temperature is 27 to 50 degrees F. The frost-free period is 10 to 180 days.

LRU notes

The Western Cascades land resource unit (LRU E) is located in western Oregon. It is bounded by the Santiam River on the north, the High Cascade volcanic platform on the east, the Rogue-Umpqua Divide on the south, and the Willamette and Umpqua Valleys on the west. This area is equivalent to the area generally known as the “Old Cascades.” Bedrock consists of basalt and andesite of the Sardine Formation overlying the Little Butte Volcanic Series which contains soft tuff (Orr, et al. 1992). The Sardine Formation “cap” is absent at many locations. Topography is dissected and steep in most areas. Areas of low relief contain ancient and contemporary landslides. Alpine glaciation occurred in headwater basins during the Pleistocene but subsequent mass movement has partially obscured glacial features (Noller, et al. 2016). Soil moisture regime is udic or aquic. Soil temperature regime ranges from mesic to cryic. Soils in this LRU generally have higher apparent clay content compared with those to the north and Spodosols do not occur. Most soils contain an appreciable amount of volcanic glass. Inceptisols usually have isotic mineralogy. Andisols are usually amorphic and meet the second criteria for andic soil properties (Soil Survey Staff, 2014). Ultisols can occur at the lowest elevations. Conifer forest is the dominant vegetation. Natural fire is dominantly moderately frequent, mixed-severity (Spies, et al. 2018). Franklin and Spies (1991) noted an increase in tree bole fire scars south of 44.5 degrees latitude in the Oregon Cascades. This LRU hosts small amounts of fire-tolerant species common in the Siskiyou-Trinity Area (MLRA 5) but absent in areas to the north. These species include Pacific madrone (Arbutus menziesii), incense cedar (Calocedrus decurrens), giant chinkapin (Chrysolepis chrysophylla), and sugar pine (Pinus lambertiana). At low to mid elevations, Douglas-fir (Pseudotsuga menziesii) is a long-lived, early-seral tree; western hemlock (Tsuga heterophylla) is an associated shade-tolerant tree. Red alder (Alnus rubra) is a short-lived, early-seral tree. It occurs ephemerally on uplands but persists on wet or repeatedly-disturbed sites. At high elevations, Noble fir (Abies procera) is an early-seral tree; Pacific silver fir (Abies amabilis) is an associated shade-tolerant tree. Sitka alder (Alnus viridis ssp. sinuata) and vine maple (Acer circinatum) form persistent shrubfields on sites subject to heavy snowpack or avalanches. Wetlands typically support shrubby or herbaceous vegetation.

Classification relationships

This ecological site group description covers a variety of warm Pacific silver fir plant associations including the following (McCain and Diaz 2002): • Pacific silver fir / threeleaf foamflower • Pacific silver fir / Oregon oxalis • Pacific silver fir / vine maple / threeleaf foamflower • Pacific silver fir - grand fir / starry false lily of the valley • Pacific silver fir / Alaska blueberry / bunchberry dogwood • Pacific silver fir / Pacific rhododendron - Alaska blueberry / bunchberry dogwood • Pacific silver fir - western hemlock / Pacific rhododendron - salal • Pacific silver fir / Alaska blueberry - salal • Pacific silver fir / Pacific rhododendron - Cascade barberry • Pacific silver fir / Cascade barberry

Ecological site concept

This forested site occurs in the warmer portion of the Pacific silver fir zone characterized by substantial winter snow accumulations and occasional summer frost. Soil temperature regime is cryic, and soil moisture regime is udic. Forest litter turnover and associated nutrient cycling may be rather slow compared with western hemlock sites. Elevation is typically 3500 to 4600 feet.

Associated sites

AX003X00D004	**Western Middle Cascades Frigid Udic Forest Group** Lower elevation, warmer, and drier.

Similar sites

AX003X03F007	**Glaciated Middle Cascades Cryic Udic Forest Group** Glaciated landforms and higher elevation community.

Table 1. Dominant plant species

Tree	(1) *Pseudotsuga menziesii* (2) *Abies amabilis*
Shrub	Not specified
Herbaceous	Not specified

Legacy ID

F003XE005OR

Physiographic features

Landform: mountain slopes, landslides
Elevation: 3500 to 4600 feet
Slope: 0 to 90 percent
Aspect: all aspects
Flooding: none
Ponding: none

Table 2. Representative physiographic features

Landforms	(1) Mountain slope (2) Landslide
Flooding frequency	None
Ponding frequency	None
Elevation	1,070 – 1,400 m

Slope	0 – 90 %
Aspect	W, NW, N, NE, E, SE, S, SW

Climatic features

Mean annual air temperature: 39 to 45 degrees F
Mean annual precipitation: 65 to 120 inches
Frost free period: 50 to 110 days

Precipitation occurs mainly during fall, winter, and spring. Summers are dry. Substantial snowpack accumulates during winter, and summer frost occasionally occurs.

Influencing water features

None

Wetland description

None

Soil features

Drainage class: well drained or moderately well drained
Parent material: colluvium, residuum, till; mixed with volcanic ash
Restrictive feature(s): shallow to very deep to bedrock
Soil temperature regime: cryic
Soil moisture regime: udic
Soil reaction: very strongly or strongly acid
Soil mineralogy: amorphic or isotic

Soils are usually very deep and well drained, but those with a brief seasonal water table still capable of supporting Douglas-fir (Pseudotsuga menziesii) are included in this concept. The rooting zone is usually moist but may be dry up to 45 consecutive days in late summer. Litter layers under mature forest are rather thick and often exhibit an advanced stage of decomposition. O horizons associated with this site on the Willamette National Forest were usually 4 to 8 cm thick (inner quartiles, n=44). Organic materials at the surface were slightly decomposed, but 59 percent of pedons contained moderately or highly decomposed plant materials above an abrupt boundary with mineral soil (Rand, 2020). Springtails and mites are the primary arthropod shredders (Moldenke, et al. 2000) whose small body size may account for the apparent lack of mixing at the litter-mineral soil interface. Soils usually have umbric epipedons. Andic soil properties derived from the weathering of volcanic ash are usually present throughout the profile. Andisols are the primary soil order, but Inceptisols are also present. Spodosols do not occur. Apparent fine-earth textures are usually loams, silt loams, or sandy loams. Apparent clay content ranges from 10 to 27 percent.

Table 3. Representative soil features

Parent material	(1) Colluvium (2) Residuum (3) Till (4) Volcanic ash
Drainage class	Moderately well drained to well drained

Ecological dynamics

Central Concept:
This forested site occurs in the warmer portion of the Pacific silver fir zone characterized by substantial winter snow accumulations and occasional summer frost. Soil temperature regime is cryic, and soil moisture regime is udic. Forest litter turnover and associated nutrient cycling may be rather slow compared with western hemlock sites. Elevation is typically 3500 to 4600 feet.
In contrast, cooler Pacific silver fir environments beyond the limits of this site occur at higher elevations, have more persistent snowpack, and more frequent summer frost. Mountain hemlock is often present. Stand replacement fires dominate in this environment at frequencies > 200 years. Mixed severity fires may occur very infrequently (Morrison and Swanson 1990, Garza 1995, Agee 1996, Weisberg 1998, Spies et al. 2018).
Range in Variability:
Duration of snowpack and length of seasonal soil dryness linked to local landscape position, aspect, and soil depth may define subtypes with distinctive reference communities. Southern exposures and convex slopes may support drought-tolerant communities. Northern exposures and concave slopes may support moist communities. Soils with a seasonal water table may restrict rooting depth for some species.
Disturbance:
Fire is the dominant natural landscape level driver. Mixed severity fires occur in this vegetation type, with areas of low (30%), moderate (30-70%), and high (> 70%) overstory mortality expressed across an area, with proportions varying dependent on site and fire weather characteristics. Fires are less frequent than in the western hemlock zone, with historical fire frequency varying from 100 to 250 years mean fire return intervals (MFRI) (Morrison and Swanson 1990, Garza 1995, Weisberg 1998, Spies et al. 2018). Wind, insects and pathogens, snow and ice, and infrequent landslides may also shape forest composition and pattern at finer scales. Human management is prevalent in this type, with activities such as regeneration harvest and thinning occurring within its range and dominating phase trajectories over fire (Spies et al. 2013).
Vegetation composition:
Douglas-fir (Pseudotsuga menziesii (Mirb.) Franco), Pacific silver fir and western hemlock (Tsuga heterophylla (Raf.) Sarg.) are common tree associates that span most of these types. Noble fir (Abies procera Rehder), an early seral species, is also found throughout, and may become co-dominant in some areas. Other trees, such as western redcedar (Thuja plicata Donn ex D. Don), and grand fir (Abies grandis (Douglas ex D. Don) Lindl.) are found more commonly in the warmer and sometimes drier portions of this type (McCain and Diaz 2002).
Understory shrub species are varied. Tall shrubs, such as Pacific rhododendron (Rhododendron macrophyllum D. Don ex G. Don) and thinleaf huckleberry (Vaccinium membranaceum Douglas ex Torr) as well as low shrubs such as Cascade barberry (Mahonia nervosa (Pursh) Nutt.) are common dominants and key indicators of this vegetation group. Vine maple (Acer circinatum Pursh) and pipsissewa (Chimaphila umbellata (L.) W.P.C. Barton) are also frequent. Dwarf rose (Rosa gymnocarpa Nutt.), red huckleberry (Vaccinium parvifolium Sm.), salal (Gaultheria shallon Pursh), and roughfruit berry (Rubus lasiococcus A. Gray) occur in warmer areas. On cooler, moister sites Alaska blueberry (Vaccinium alaskaense Howell) may cooccur with thinleaf huckleberry (McCain and Diaz 2002).
A diverse array of herbs occupy these sites. Sweet after death (Achlys triphylla (Sm.) DC), Columbian windflower (Anemone deltoidea Hook.), bunchberry dogwood (Cornus canadensis L.), bride’s bonnet (Clintonia uniflora (Menzies ex Schult. & Schult. f.) Kunth), western rattlesnake plantain (Goodyera oblongifolia Raf.), twinflower (Linnaea borealis L.), starry false lily of the valley (Maianthemum stellatum (L.) Link), sidebells wintergreen (Orthilia secunda (L.) House), threeleaf foamflower (Tiarella trifoliata L), Pacific trillium (Trillium ovatum Pursh), evergreen violet (Viola sempervirens Greene) and common beargrass (Xerophyllum tenax (Pursh) Nutt.) are common throughout. Oregon oxalis (Oxalis oregana Nutt.) is found in moister conditions within this type (McCain and Diaz 2002).
Structural Descriptions:

Phases are described by size class, cover class and layering. Size class description refers to either the average diameter of the dominant and co-dominant trees (quadratic mean diameter or qmd) in the state and transition model or the general sizes by species in the following narrative.

Size Class
Grass Forb/Seedling Sapling Pole Small Medium Large/Giant
DBH (inches) NA 0.1-4.9 5-9.9 10-19.9 20-29.9 =30
Canopy Cover Class
Open Moderate Closed
Canopy cover (%) 60

State and transition model

Additional community tables

Table 4. Community 1.1 plant community composition

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

Table 5. Community 1.2 plant community composition

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

Table 6. Community 1.3 plant community composition

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

Table 7. Community 1.4 plant community composition

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

Table 8. Community 1.5 plant community composition

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

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Approval

Kirt Walstad, 1/24/2025

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	10/05/2023
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:**

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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:**
