USDA Natural Resources Conservation Service

Ecological site AX003X05X002
Western Cascades Swamp Group

Last updated: 2/29/2024
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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 shrub fields on sites subject to heavy snowpack or avalanches. Wetlands typically support shrubby or herbaceous vegetation.

Classification relationships

This ecological site group description is similar to the following plant associations described by Christy (2004):

• Red alder / slough sedge - skunk cabbage
• red alder / common ladyfern - skunk cabbage

Ecological site concept

Central Concept: This deciduous forested site occurs on ponded or low-velocity flooded wetlands adjacent to uplands that support Douglas-fir - western hemlock forest. Red alder usually dominates the tree layer due to its of tolerance of anaerobic conditions. American skunkcabbage (*Lysichiton americanus*) is its typical understory associate. Soil temperature regime can be mesic or frigid, and soil moisture regime is aquic. Elevation is typically 500 to 3500 feet.

Associated sites

AX003X05X001	**Western Cascades Flood Plain Group** Relation to the water table and the upper floodplains of the valley floor.

Similar sites

AX003X05X002	**Western Cascades Swamp Group** Relation to the water table and the upper floodplains of the valley floor.

Table 1. Dominant plant species

Tree	(1) *Alnus rubra*
Shrub	(1) *Lysichiton americanus*
Herbaceous	Not specified

Legacy ID

F003XE002OR

Physiographic features

Landform: depressions, drainageways on mountains; depressions on stream terraces
Elevation: 500 to 3500 feet
Slope: 0 to 20 percent
Flooding: frequent or occasional; long or brief (low-velocity)
Ponding: frequent or occasional; long or brief

This ecological site group occurs in wetlands with a ponding or low-energy flooding regime. It usually occurs within landslides with deranged surface drainage. It may occur along 1st and 2nd order streams but unlike Floodplain Group (F003XE001OR) does not usually occur adjacent to cobble and gravel channels. Occasionally, this site occurs in depressions on stream terraces of large rivers where ponding rather than flooding occurs.

Table 2. Representative physiographic features

Landforms	(1) Depression (2) Mountains > Drainageway
Flooding duration	Brief (2 to 7 days) to long (7 to 30 days)

Flooding frequency	Occasional to frequent
Ponding duration	Brief (2 to 7 days) to long (7 to 30 days)
Ponding frequency	Occasional to frequent
Elevation	500–3,500 ft
Slope	0–20%
Aspect	Aspect is not a significant factor

Climatic features

Mean annual air temperature: 42 to 54 degrees F
Mean annual precipitation: 60 to 100 inches
Frost free period: 80 to 190 days

Precipitation occurs mainly during fall, winter, and spring. Summers are dry. Rain and snow occur in winter but snowpack rarely develops.

Influencing water features

Ponding or low-energy flooding occurs on this site. A water table exists within the rooting zone during at least part of the growing season.

Wetland description

Wetland description: Palustrine system, Forested Wetland class (Cowardin, et al. 1979)

Soil features

Drainage class: somewhat poorly to very poorly drained
Parent material: loamy alluvium, colluvium, residuum
Restrictive feature(s): none
Soil temperature regime: mesic or frigid
Soil moisture regime: aquic
Soil reaction: slightly acid or moderately acid
Soil mineralogy: isotic

Inceptisols are the predominant common soil order. Umbric epipedons containing mucky-mineral material (organic matter content >10%) are common. The upper part of the profile sometimes contains stratified loamy material and wood fragments. Underlying layers are often non-stratified, clayey, and contain low-chroma matrix colors with or without iron-manganese concentrations. Soil reaction is relatively neutral compared with surrounding uplands possibly due to groundwater discharge and reduction reactions in anaerobic soils.

Table 3. Representative soil features

Parent material	(1) Alluvium (2) Colluvium (3) Residuum
Drainage class	Somewhat poorly drained to very poorly drained

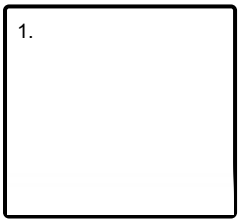
Ecological dynamics

Central Concept: This deciduous forested site occurs on ponded or low-velocity flooded wetlands adjacent to uplands that support Douglas-fir - western hemlock forest. Red alder usually dominates the tree layer due to its of tolerance of anaerobic conditions. American skunkcabbage (*Lysichiton americanus*) is its typical understory

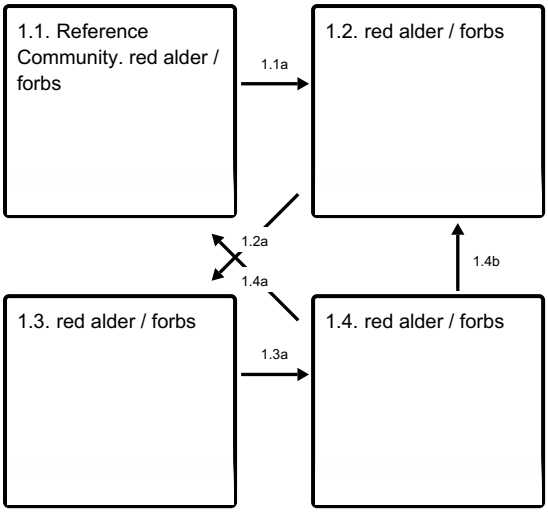
associate. Soil temperature regime can be mesic or frigid, and soil moisture regime is aquic. Elevation is typically 500 to 3500 feet.
Range in Characteristics: At the lowest elevations Oregon ash (*Fraxinus latifolia*) may occur, and soils may contain argillic horizons. Sites with the longest hydroperiod (at all elevations) may support mainly sedges and rushes.
Disturbance: Landslide is the dominant natural landscape level driver. Historical landslide frequency mirrored flooding events on approximately 100-year intervals with more recent increased frequency in areas of high road density and timber harvest activities (Lyons and Beschta 1983, Marion 1981). Landslide disturbance impacts are mostly focused on valleys or terraces below steep slopes. Large landslides generally result in complete removal of vegetation and mixing of deposited soil, which affects subsequent vegetation establishment and community development for the next century (Miles and Swanson 1986). Further erosion may occur on landslide scars during storm events. Human management is prevalent in this type, with activities such as regeneration harvest and thinning occurring within its range, dominating phase trajectories over fire (Marion 1981).
Vegetation composition: The overstory is dominated by red alder with small amounts of western redcedar (*Thuja plicata* Donn ex D. Don), western hemlock (*Tsuga heterophylla* (Raf.) Sarg.), and bigleaf maple (*Acer macrophyllum*) found on the periphery or on elevated microsites.
In the ALRU/ATFI-LYAM3 plant association salmonberry (*Rubus spectabilis* Pursh) and vine maple (*Acer circinatum* Pursh) are abundant in the shrub layer. Small amounts of California blackberry (*Rubus ursinus* Cham. & Schltdl.), dune willow (*Salix hookeriana* Barratt ex Hook.), rose spirea (*Spiraea douglasii* Hook.), twinberry honeysuckle (*Lonicera involucrata* (Richardson) Banks ex Spreng.), and salmonberry may be found in the ALRU/CAOB3-LYAM3 association in wet areas. Salal (*Gaultheria shallon* Pursh) and vine maple are often found on top of stumps or logs.
The herbaceous layer is dominated by common ladyfern, American skunkcabbage, and slough sedge. A variety of species occur on drier microsites including western swordfern (*Polystichum munitum* (Kaulf.) C. Presl), water parsely (*Oenanthe sarmentosa* C. Presl ex DC.), Mexican hedgenettle (*Stachys mexicana* Benth.), Siberian springbeauty (*Claytonia sibirica* L.), youth on age (*Tolmiea menziesii* (Pursh) Torr. & A. Gray), and California nettle (*Urtica dioica* L. ssp. gracilis (Aiton) Seland.).
Structural Descriptions Used in State and Transition Model: 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 (%) <10 10-60 >60

State and transition model

Ecosystem states



State 1 submodel, plant communities



State 1

Community 1.1
Reference Community. red alder / forbs

Growth from community phase 1.4 is the dominant pathway producing this condition. Dominant and co-dominant small to medium red alder (age 40 to 80 years; 72-89% cover) in a single-layer with moderate to closed canopy are indicators of this late-successional community. Small gaps are scattered throughout phase. Trace amounts of shade-tolerant bigleaf maple, western hemlock, and western redcedar may be found around edges. American skunkcabbage and slough sedge are wetland obligates that often dominate the herbaceous layer. CP1.1 red alder / forbs Small/Medium, single-layered, moderate-closed canopy, scattered small gaps, shade tolerant tree species Age class: 40-80 years

Community 1.2
red alder / forbs

This community phase is a post-disturbance, early seral condition, resulting from landslide activity. Single-layered, open canopy conditions, with sprouting (age 1 to 5 years), shade-tolerant trees (bigleaf maple) characterize this phase. Forbs and grasses are abundant. Trees are in the seedling stage. CP1.2 red alder / forbs Forbs, grasses, seedlings, single layered, open canopy, shade tolerant tree species Age class: 1-5

Community 1.3
red alder / forbs

This mid-seral phase is the result of growth from CP 1.2 or landslide disturbance of CP 1.4. Saplings and poles (age 5 to 15 years) of trees from either of these phases may persist in this phase. Canopy cover is closed and may include persisting shade-tolerant species such as bigleaf maple, western hemlock, and western redcedar (Christy 2004). CP1.3 red alder / forbs Sapling/pole-sized, single layered, moderate-closed canopy, shade tolerant tree species Age class: 5-15

Community 1.4
red alder / forbs

Growth from CP1.3 produces this community phase. Forest structure is still simple and largely single layered. Canopy cover is moderate to closed and dominated by small to medium sized (age 15 to 40 years) red alder. Bigleaf maple and small amounts of western hemlock and western redcedar may be present. CP1.4 red alder / forbs Pole/Small, single layered, moderate-closed canopy, shade tolerant tree species Age class: 15-40

Pathway 1.1a
Community 1.1 to 1.2

This pathway represents landslide disturbance.

Pathway 1.2a
Community 1.2 to 1.3

Growth is the major process transitioning out of this early seral condition.

Pathway 1.3a
Community 1.3 to 1.4

Growth is the major process transitioning out of this phase.

Pathway 1.4a
Community 1.4 to 1.1

Growth will serve to transition this phase into the reference community.

Pathway 1.4b
Community 1.4 to 1.2

This pathway represents landslide disturbance.

Additional community tables

Other references

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Approval

Kirt Walstad, 2/29/2024

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	Kirt Walstad
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:**
