

Ecological site AX001X04X412 Mesic Udic Wet Forest

Last updated: 5/07/2024
Accessed: 11/04/2024

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. Soils range from shallow to very deep, well drained, medial, and loamy or clayey and occur on foothills and mountain slopes and ridges. The soils in the area dominantly have a mesic or frigid soil temperature regime and a udic soil moisture regime.

LRU notes

The Southern Pacific Coast Range land resource unit (LRU 4) of MLRA 1 is located in central to southern Oregon State. The LRU extends from the Siletz River to the Rogue River and 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 carved valleys through the landscape depositing more recent alluvium. These include the Asea, Coos, Coquille, Green, Yachats, Siletz, Siuslaw, Umpqua, and Rogue Rivers.

Ecological site concept

This ecological site is found on the western Coast Range in the Pacific Northwest from central to southern Oregon. It is located on mountains, side slopes, benches, and ridgetops. Elevations are typically between 50 and 4,000 feet with slopes ranging from 0 to 60 percent.

The most common overstory species are Port Orford cedar (*Chamaecyparis lawsoniana*) and western hemlock (*Tsuga heterophylla*). Douglas-fir (*Pseudotsuga menziesii*), tanoak (*Notholithocarpus densiflorus*), and grand fir (*Abies grandis*) may be present. Red alder (*Alnus rubra*) may be common where there are forest openings.

Regeneration of red alder is limited by canopy cover and is commonly in gaps where sunlight is most available. Common understory species include salal (*Gaultheria shallon*), Pacific rhododendron (*Rhododendron macrophyllum*), evergreen huckleberry (*Vaccinium ovatum*), Cascade oregongrape (*Mahonia nervosa*), western swordfern (*Polystichum munitum*), and Oregon oxalis (*Oxalis oregana*).

The most common natural disturbance on this ecological site is from windthrow of overstory trees, which results in patchy, small pockets of open areas. These areas commonly occur in conjunction with either root-, butt- or stem-rot. Port Orford cedar is also highly susceptible to two fungal root rots; *Phytophthora lateralis* and *Phytophthora cinnamoni* (Uchytel, 1990). Wildfire is uncommon, but when it occurs it may be stand replacing. The natural fire regime for Port Orford cedar is 400 to 1,400 years (US Department of Agriculture, 2012).

Associated sites

AX001X04X410	Mesic Udic Forest Mesic Udic Wet Forest is located at similar elevations as Mesic Udic Forest, but is often found on backslopes or footslopes where moisture is retained longer and soils have a high water table for a portion of the growing season. Port Orford cedar (<i>Chamaecyparis lawsoniana</i>) is often an indicator species for Mesic Udic Wet Forest.
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Table 1. Dominant plant species

Tree	(1) <i>Chamaecyparis lawsoniana</i> (2) <i>Tsuga heterophylla</i>
Shrub	(1) <i>Gaultheria shallon</i> (2) <i>Rhododendron macrophyllum</i>
Herbaceous	(1) <i>Polystichum munitum</i> (2) <i>Oxalis oregana</i>

Legacy ID

F001XD412OR

Physiographic features

This ecological site is located on mountains, side slopes, benches, and ridgetops. Elevations are typically between 50 and 4,000 feet with slopes ranging from 0 to 60 percent.

Table 2. Representative physiographic features

Landforms	(1) Mountains > Mountain slope
Flooding frequency	None
Ponding frequency	None
Elevation	50–4,000 ft
Slope	0–60%
Water table depth	12–60 in
Aspect	W, NW, N, NE, E, SE, S, SW

Climatic features

The climate has hot, moist summers and warm, wet winters. Mean annual precipitation ranges from 60 to 130 inches. Average annual temperatures range from 45 to 54 degrees F. The mild temperatures, abundant precipitation, and a long growing season result in highly productive forestlands.

Table 3. Representative climatic features

Frost-free period (characteristic range)	100-240 days
Freeze-free period (characteristic range)	
Precipitation total (characteristic range)	60-130 in

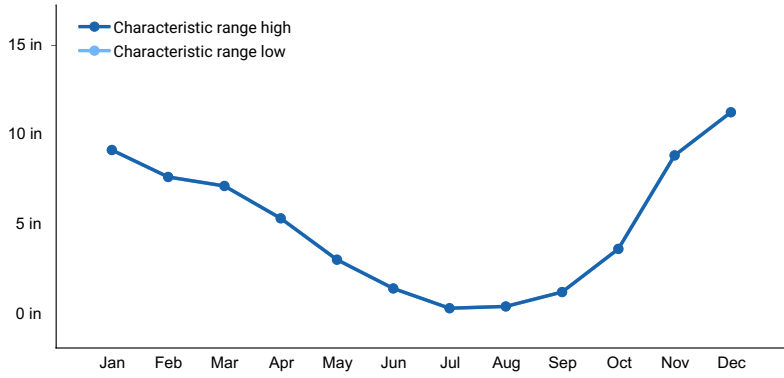


Figure 1. Monthly precipitation range

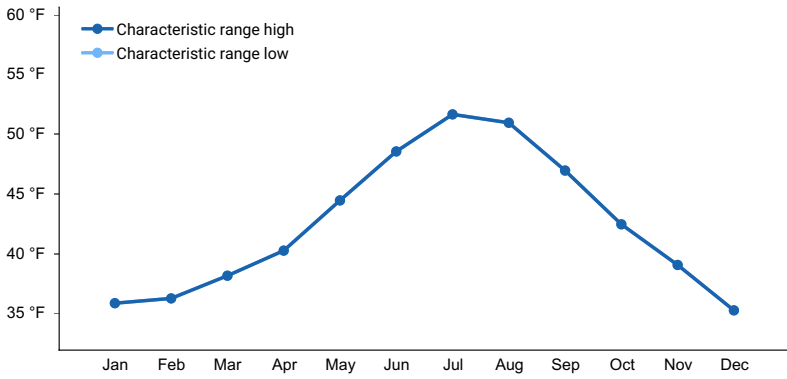


Figure 2. Monthly minimum temperature range

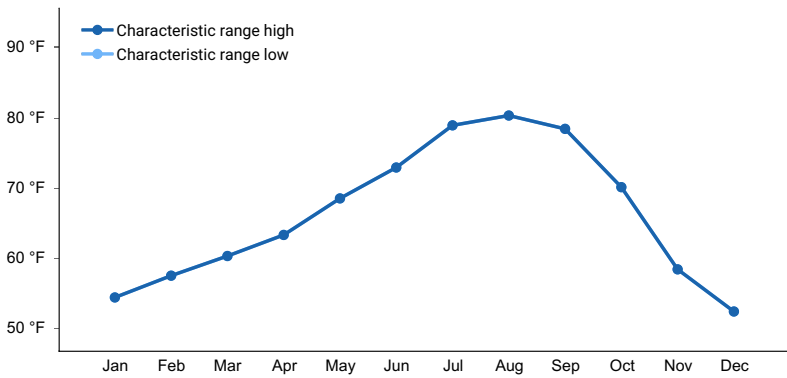


Figure 3. Monthly maximum temperature range

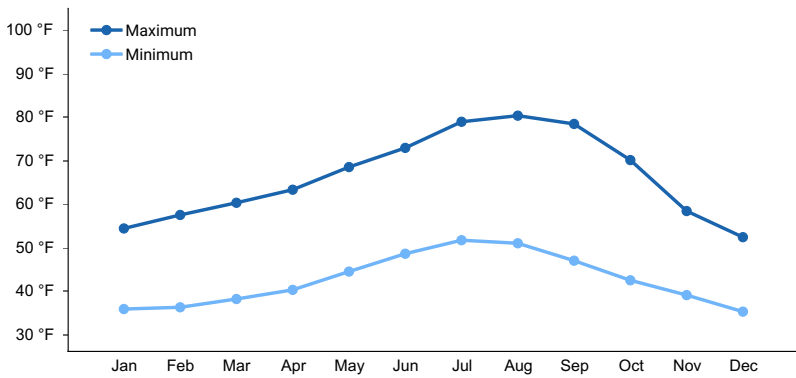


Figure 4. Monthly average minimum and maximum temperature

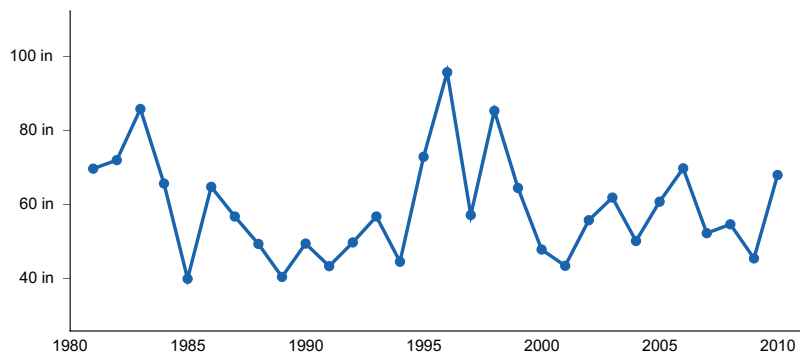


Figure 5. Annual precipitation pattern

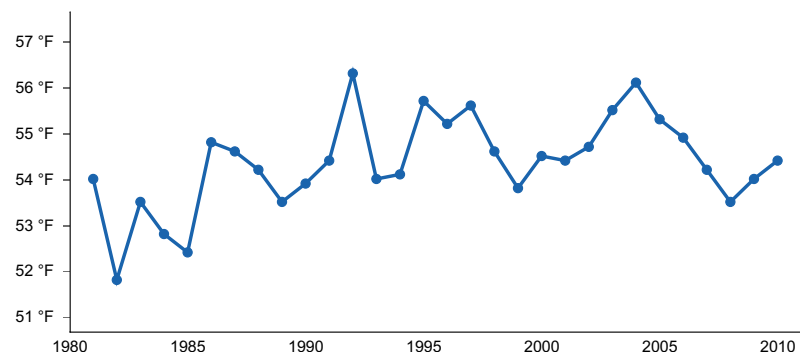


Figure 6. Annual average temperature pattern

Climate stations used

- (1) POWERS [USC00356820], Powers, OR

Influencing water features

In general, this ecological site is not influenced by wetland or riparian water features but may be found on stream terraces or adjacent to wetland and riparian areas. This site does not experience flooding or ponding; the soils have a high water table from March through June.

Soil features

Soils that support this ecological site occur in the mesic soil temperature regime and the udic soil moisture regime. The soil is usually moist but is dry within the moisture control section for less than 45 consecutive days following the summer solstice. Excess moisture can be limiting to some species, however, and soils with a seasonally high water table in the upper part of the profile may not be included in this concept.

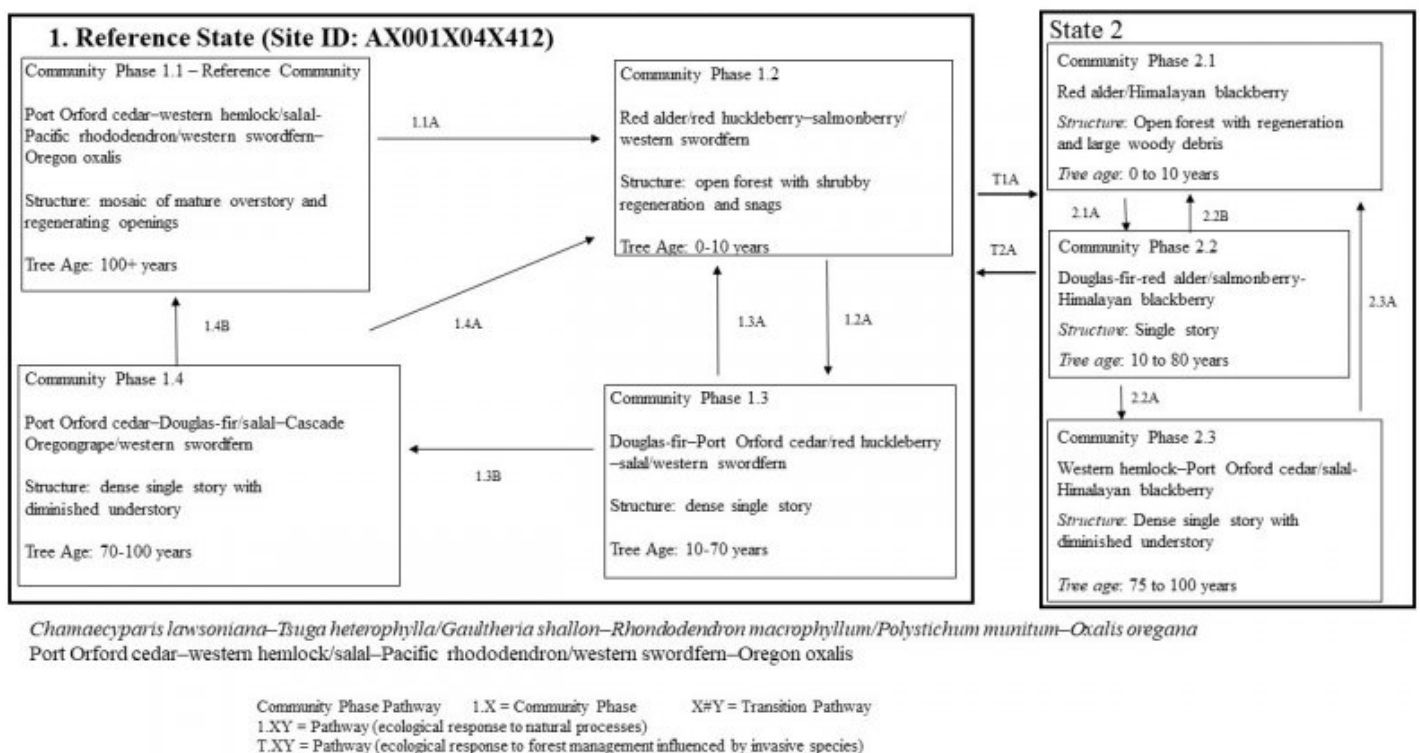
Table 4. Representative soil features

Parent material	(1) Colluvium–igneous and sedimentary rock (2) Residuum–igneous and sedimentary rock (3) Alluvium
Surface texture	(1) Silt loam (2) Gravelly silt loam (3) Loam (4) Gravelly loam (5) Sandy loam (6) Gravelly sandy loam (7) Very gravelly sandy loam (8) Channery loam
Drainage class	Somewhat poorly drained to well drained

Depth to restrictive layer	12–60 in
Surface fragment cover <=3"	0–37%
Surface fragment cover >3"	0–20%
Clay content (1-9in)	6–35%
Subsurface fragment volume <=3" (1-60in)	0–44%
Subsurface fragment volume >3" (1-60in)	0–43%

Ecological dynamics

State and transition model



State 1 Reference State

Community 1.1
 Port Orford cedar – western hemlock / salal –Pacific rhododendron / western swordfern – Oregon oxalis



Port Orford cedar – western hemlock / salal – Pacific rhododendron / western swordfern – Oregon oxalis Structure: mosaic of mature overstory and regenerating openings Port Orford cedar and western hemlock are the most common overstory species in the Reference Community. Douglas-fir, grand fir, and tanoak are also likely present. Gaps in the mid-canopy and overstory allow sunlight to reach the ground and are where the majority of the understory plants establish. In addition, these gaps provide opportunities for deciduous tree species such as red alder and bigleaf maple (*Acer macrophyllum*) to regenerate throughout this reference community. Common understory shrub species include salal, Pacific rhododendron, red huckleberry (*Vaccinium parvifolium*), evergreen huckleberry, vine maple (*Acer circinatum*), Cascade oregongrape, western swordfern, and Oregon oxalis.

Dominant plant species

- Port Orford cedar (*Chamaecyparis lawsoniana*), tree
- western hemlock (*Tsuga heterophylla*), tree
- Douglas-fir (*Pseudotsuga menziesii*), tree
- grand fir (*Abies grandis*), tree
- tanoak (*Notholithocarpus densiflorus*), tree
- salal (*Gaultheria shallon*), shrub
- Pacific rhododendron (*Rhododendron macrophyllum*), shrub
- California huckleberry (*Vaccinium ovatum*), shrub
- Cascade barberry (*Mahonia nervosa*), shrub
- vine maple (*Acer circinatum*), shrub
- western swordfern (*Polystichum munitum*), other herbaceous
- redwood-sorrel (*Oxalis oregana*), other herbaceous

Community 1.2

Red alder / red huckleberry - salmonberry / western swordfern

Red alder / red huckleberry - salmonberry / 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. Port Orford cedar is relatively fire tolerant, and large overstory trees may be present. Snags are prevalent and remain standing and decaying. Large woody debris may be present on the surface and serve as nurse sites. The understory is predominately early seral tree, shrub, and forb species such as red alder, red huckleberry, and salmonberry. Red alder has several competitive advantages and can establish quickly, relative to conifers. Red alder can sprout and establish in full sunlight and fixes nitrogen providing an early competitive advantage (Villarin, 2009). In addition, the seeds of deciduous species are light and can be transported long distances by wind and water, allowing for rapid recolonization. Red alder seedlings and saplings will typically establish 3 to 10 years following disturbance, depending on severity.

Dominant plant species

- red alder (*Alnus rubra*), tree
- Douglas-fir (*Pseudotsuga menziesii*), tree
- Port Orford cedar (*Chamaecyparis lawsoniana*), tree
- red huckleberry (*Vaccinium parvifolium*), shrub
- salmonberry (*Rubus spectabilis*), shrub
- western swordfern (*Polystichum munitum*), other herbaceous

Community 1.3

Douglas-fir – Port Orford cedar / red huckleberry - salal / western swordfern

Douglas-fir – Port Orford cedar / red huckleberry - salal / 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. Red alder, red huckleberry, evergreen huckleberry, western swordfern, and salmonberry may be abundant in the understory depending on sunlight availability (Bailey, 1968). Red alder will begin to die between 40 to 70 years following disturbance and allow more light to penetrate the newly nitrogen rich soil (Naiman, 2009). As a result, conifer regeneration becomes more prevalent in this community phase. Seed sources for tree species would be from the surrounding, undisturbed forest. The combination of new seedling growth and the survivors of the previous disturbance would result in a mixed stand which could include Douglas-fir and Port Orford cedar.

Dominant plant species

- Douglas-fir (*Pseudotsuga menziesii*), tree
- Port Orford cedar (*Chamaecyparis lawsoniana*), tree
- red alder (*Alnus rubra*), tree
- red huckleberry (*Vaccinium parvifolium*), shrub
- salal (*Gaultheria shallon*), shrub
- California huckleberry (*Vaccinium ovatum*), shrub
- salmonberry (*Rubus spectabilis*), shrub
- western swordfern (*Polystichum munitum*), other herbaceous

Community 1.4

Port Orford cedar – Douglas-fir / salal – Cascade Oregongrape / western swordfern



Port Orford cedar – Douglas-fir / salal – Cascade Oregon grape / western swordfern Structure: dense single story with diminished understory Community phase 1.4 is a forest in the competitive exclusion stage, possibly with scattered remnant mature trees. There is increasing competition among individual trees for available water and nutrients. Douglas-fir and Port Orford cedar will dominate the overstory canopy, however red alder may be present in pockets of canopy openings. In addition, western hemlock is shade tolerant and will begin to establish in the shade of mature Douglas-fir and Port Orford cedar trees. Canopy closure is almost 100 percent leading to diminished shrub and forb layers. Some understory species better adapted to at least partial shade will begin to increase. Over time, the forest will begin to self-thin due to the elevated competition.

Dominant plant species

- Port Orford cedar (*Chamaecyparis lawsoniana*), tree
- Douglas-fir (*Pseudotsuga menziesii*), tree
- western hemlock (*Tsuga heterophylla*), tree
- salal (*Gaultheria shallon*), shrub
- Cascade barberry (*Mahonia nervosa*), shrub
- salmonberry (*Rubus spectabilis*), shrub
- California huckleberry (*Vaccinium ovatum*), shrub
- western swordfern (*Polystichum munitum*), 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 management, 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 significant 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 management, or large mass movement leading to the stand initiation phase of forest development.

Pathway 1.3B

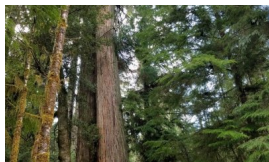
Community 1.3 to 1.4

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

Pathway 1.4B Community 1.4 to 1.1



Port Orford cedar – Douglas-fir
/ salal – Cascade Oregon grape
/ western swordfern



Port Orford cedar – western
hemlock / salal – Pacific
rhododendron / western
swordfern – Oregon oxalis

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, large scale wind event, major insect pest or disease infestation, timber management, or large mass movement leading to the stand initiation phase of forest development.

State 2 Disturbed State

Community 2.1 Red alder/Himalayan blackberry

Red alder/Himalayan blackberry Structure: Open forest with regeneration and large woody debris Community Phase 2.1 represents a recently disturbed forest that is naturally regenerating. Large woody debris are often prolific following large-scale disturbances which inhibits vegetation to establish under natural conditions. Areas that are not replanted immediately (1 to 3 years) following a timber harvest or large-scale disturbance may become vulnerable to invasive species infestation. Typically, commercially managed forests will be replanted following disturbance and species preference depends on site conditions and long-term economic market decisions. Overall, species biodiversity in forests managed for short rotation timber is diminished. Natural reforestation depends on available seed sources following disturbance. Early seral species such as red alder tend to regenerate quickly with abundant sunlight. Plant community composition is typically homogenous and even-aged. Following disturbance, these sites are often dominated by Himalayan blackberry (*Rubus armeniacus*) which tend to outcompete native species establishment. Invasive species management is most critical during this phase.

Dominant plant species

- red alder (*Alnus rubra*), tree
- Himalayan blackberry (*Rubus armeniacus*), shrub

Community 2.2 Douglas-fir-red alder/salmonberry-Himalayan blackberry

Douglas-fir-red alder/salmonberry-Himalayan blackberry Structure: Single story Community phase 2.2 represents an even-aged, regenerating forest. Douglas-fir can regenerate quickly on nurse logs or in recently disturbed soils. Shade-intolerant red alder remains a large component in the overstory until it reaches maturity (Fonda, 1974). The vegetation in areas that have been replanted commonly is dense and even aged, and the understory species are sparse in areas that have a high percentage of canopy cover. Salmonberry is a common understory species, but invasive species increase in prominence. Himalayan blackberry can greatly impact the shrubby understory and outcompete native species. Management techniques such as pre-commercial thinning and mitigation of invasive species will accelerate the maturation and improve the health of the forest.

Dominant plant species

- Douglas-fir (*Pseudotsuga menziesii*), tree

- red alder (*Alnus rubra*), tree
- salmonberry (*Rubus spectabilis*), shrub
- Himalayan blackberry (*Rubus armeniacus*), shrub

Community 2.3

Western hemlock-Port Orford cedar/salal-Himalayan blackberry

Western hemlock-Port Orford cedar/salal-Himalayan blackberry Structure: Dense single story with diminished understory Community phase 2.3 represents a maturing forest that has increased plant diversity. Western hemlock and Port Orford cedar will begin to regenerate under dense, shrubby canopies. It will begin to establish in the overstory canopy along with Douglas-fir. Invasive species will inhibit the overall health and structure of the forest, creating an ecosystem which is susceptible to devastation from insects and disease. The dense, shrubby understory is susceptible to wildfires. Commercial logging operations commonly take place during this phase as trees reach economical maturity in size and volume. It is presumed that without timber management during this phase, an old-growth western hemlock and Port Orford cedar stand will develop.

Dominant plant species

- western hemlock (*Tsuga heterophylla*), tree
- Port Orford cedar (*Chamaecyparis lawsoniana*), tree
- Douglas-fir (*Pseudotsuga menziesii*), tree
- salal (*Gaultheria shallon*), shrub
- Himalayan blackberry (*Rubus armeniacus*), shrub
- western swordfern (*Polystichum munitum*), other herbaceous

Pathway 2.1A

Community 2.1 to 2.2

This pathway represents growth over time with no further major disturbance or active forest management.

Pathway 2.2B

Community 2.2 to 2.1

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

Pathway 2.2A

Community 2.2 to 2.3

This pathway represents growth over time with no further major disturbance or active forest management.

Pathway 2.3A

Community 2.3 to 2.1

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

Transition T1A

State 1 to 2

This pathway represents an area of major disturbance that removes most of the overstory. Large-scale disturbances such as this, have the potential to increase the vulnerability of invasive species infestation when the seed source is either nearby or introduced to the site. This type of disturbance will impact the ecological site and the natural feedbacks that maintained the reference state.

Transition T2A

State 2 to 1

This pathway represents intensive management to restore the historic plant community.

Additional community tables

Inventory data references

Other Established Classifications for Ecological Site

National Vegetation Classification: A0104 *Chamaecyparis lawsoniana* Forest Alliance and CEGL000045
Chamaecyparis lawsoniana – *Tsuga heterophylla* / *Gaultheria shallon* – *Rhododendron macrophyllum* Forest.

USDA Forest Service Plant Associations of Southwestern Oregon: Port Orford Cedar – western hemlock / western swordfern

Other references

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Contributors

Erin Kreutz
Erik Dahlke
David Rand

Approval

Kirt Walstad, 5/07/2024

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	12/20/2021
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:**

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:

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):**

14. **Average percent litter cover (%) and depth (in):**

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):**

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:**

17. **Perennial plant reproductive capability:**
