USDA Natural Resources Conservation Service

Ecological site F003XN946WA
Southern Washington Cascades Moist Low Cryic Coniferous 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): 003X–Olympic and Cascade Mountains

Steep mountains and narrow to broad, gently sloping valleys characterize this MLRA. A triple junction of two oceanic plates and one continental plate is directly offshore from Puget Sound. Subduction of the oceanic plates under the westerly and northwesterly moving continental plate contributes to volcanic activity in the Cascade Mountains. Movement among these plates has resulted in major earthquakes and the formation of large stratovolcanoes. The Cascade Mountains consist primarily of volcanic crystalline rock and some associated metasedimentary rock. The mean annual precipitation is dominantly 60 to 100 inches, but it is 30 to 60 inches on the east side of the Cascade Mountains.
The soil orders in this MLRA are dominantly Andisols, Spodosols, and Inceptisols and minor areas of Entisols and Histosols. The soils are dominantly in the frigid or cryic temperature regime and the udic moisture regime. The soils generally are shallow to very deep, well drained, ashy to medial, and loamy or sandy. They are on mountain slopes and ridges.

Ecological site concept

This ecological site is at middle to high elevations (1,800 to 5,700 feet) in Mount Rainier National Park. Climate is key in the succession of the forest dynamics. The cold, wet winters and dry, cool summers impact the species composition and site productivity. This ecological site is in swales and on terraces and debris aprons of glacial-valley walls.
The soils that support this site are in the cryic soil temperature regime and the aquic soil moisture regime. They are somewhat poorly drained and very deep. They have a seasonal high water table in March through June. The most common natural disturbance is windthrow due to the seasonal high water table. Soil moisture is not a limiting factor for forest growth because of the abundance of precipitation and the inherent water-holding properties of soils influenced by volcanic ash. A thin organic horizon consisting of decomposing twigs, needles, and litter is on the soil surface. This horizon helps to protect the soil from wind and water erosion.
Pacific silver fir (*Abies amabilis*) and western redcedar (*Thuja plicata*) are the most common overstory species. Bigleaf maple (*Acer macrophyllum*), western hemlock (*Tsuga heterophylla*), Douglas-fir (*Pseudotsuga menziesii*), and red alder (*Alnus rubra*) may be codominant. Devilsclub (*Oplopanax horridus*), vine maple (*Acer circinatum*), salmonberry (*Rubus spectabilis*), and thimbleberry (*Rubus parviflorus*) make up the dense subcanopy.

Associated sites

F003XN942WA	**Southern Washington Cascades Moist Frigid Coniferous Forest** Ecological site F003NX946WA is located at higher elevations compared to F003XN942WA. The presence of Pacific silver fir is a good indicator for F003XN946WA.
F003XN950WA	**Southern Washington Cascades Moist High Cryic Coniferous Forest** Ecological site F003NX950WA is located at higher elevations compared to F003XN946WA. The presence of mountain hemlock, Alaska cedar, and Cascade azalea are a good indicators for F003XN950WA.

Similar sites

F003XN945WA	**Southern Washington Cascades Wet Low Cryic Coniferous Forest** Ecological F003XN945WA, Southern Washington Cascades Wet Low Cryic Coniferous Forest, has features similar to those of site F003XN946WA, Washington Cascades Moist Low Cryic Coniferous Forest. Ecological site F003XN945WA is wetter than site F003XN946WA. It is prone to frequent periods of ponding and it has a higher seasonal water table. As a result, site F003XN945WA supports species adapted to wetness, such as western redcedar, red alder, and American skunkcabbage. Ecological F003XN946WA is drier, and it supports species such as Pacific silver fir, western redcedar, and devilsclub.
F003XN947WA	**Southern Washington Cascades Low Cryic Coniferous Forest** Ecological F003XN946WA, Southern Washington Cascades Moist Low Cryic Coniferous Forest, has features similar to those of site F003XN947WA, Washington Cascades Low Cryic Coniferous Forest. The soils of site F003XN947WA are well drained. Species adapted to the drier conditions, such as Pacific silver fir, western hemlock, and black mountain huckleberry, are common.

Table 1. Dominant plant species

Tree	(1) *Abies amabilis* (2) *Thuja plicata*
Shrub	(1) *Oplopanax horridus*
Herbaceous	(1) *Polystichum munitum*

Physiographic features

This ecological site is in swales and on terraces and debris aprons of glacial-valley walls at middle to high elevations (1,800 to 5,700 feet) in Mount Rainier National Park. Slope commonly is 0 to 35 percent.

Table 2. Representative physiographic features

Landforms	(1) Swale (2) Terrace (3) Glacial-valley wall
Flooding frequency	None
Ponding frequency	None
Elevation	1,800–5,700 ft
Slope	0–35%
Water table depth	0–60 in
Aspect	W, NW, N, NE, E, SE, S, SW

Climatic features

Most of the annual precipitation is received in October through March. The mean annual precipitation is 63 to 106 inches, and the mean annual air temperature is 37 to 44 degrees F. Generally, the summers are cool and dry and the winters are cold and wet.

Table 3. Representative climatic features

Frost-free period (characteristic range)	60-90 days
Freeze-free period (characteristic range)	
Precipitation total (characteristic range)	63-106 in

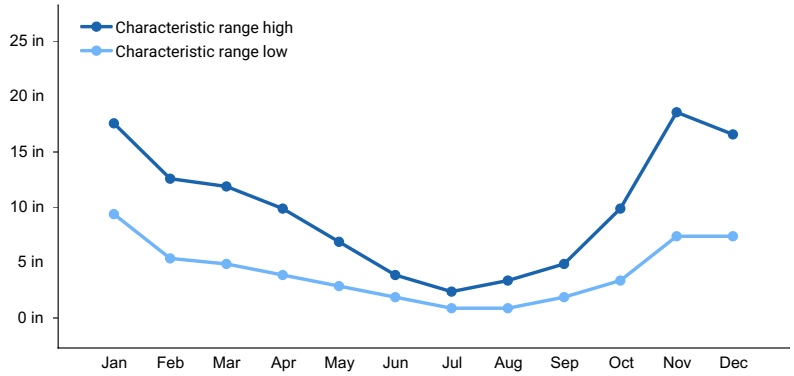


Figure 1. Monthly precipitation range

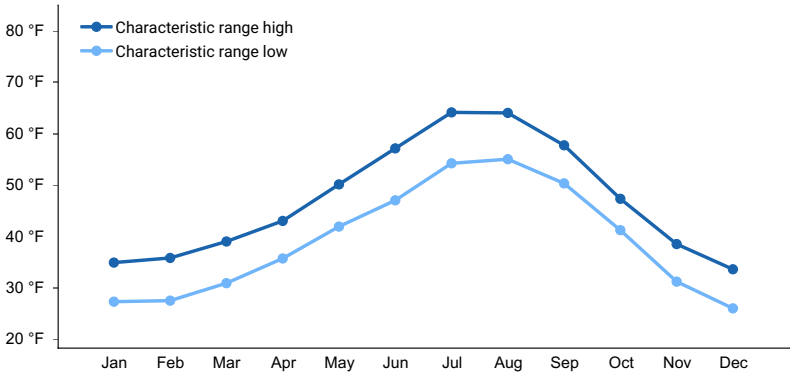


Figure 2. Monthly minimum temperature range

Influencing water features

In general, this ecological site is not influenced by wetland or riparian water features. The soils have a seasonal high water table at a depth of 10 to 20 inches at some time during the growing season. The water table typically rises in spring and recedes in fall.

Soil features

Applicable soils: Vantrump

Applicable soil map units: 8110, 8120, 8125, 8130, 8150, 9100, 9110, 9120, 9125

The Vantrump soils formed in volcanic ash over andesite colluvium. They have a seasonal high water table at a depth of 10 to 20 inches at some time during the growing season. They are not subject to flooding or ponding. The particle-size control section is less than 35 percent rock fragments. The soils are coarse textured and are primarily ashy sandy loam or ashy loamy sand. Pumice paragravel is in some pedons. The soils have an ochric epipedon, redoximorphic features, and andic properties. Podsolization in not evident in the profile.

Table 4. Representative soil features

Parent material	(1) Volcanic ash–andesite
Surface texture	(1) Ashy sandy loam (2) Paragravelly, ashy sandy loam (3) Ashy loamy sand
Drainage class	Somewhat poorly drained
Soil depth	60 in
Surface fragment cover <=3"	0–30%
Surface fragment cover >3"	0–5%

Available water capacity (Depth not specified)	4.1–10.2 in
Soil reaction (1:1 water) (Depth not specified)	3.5–5.5
Subsurface fragment volume <=3" (Depth not specified)	0–35%
Subsurface fragment volume >3" (Depth not specified)	0–5%

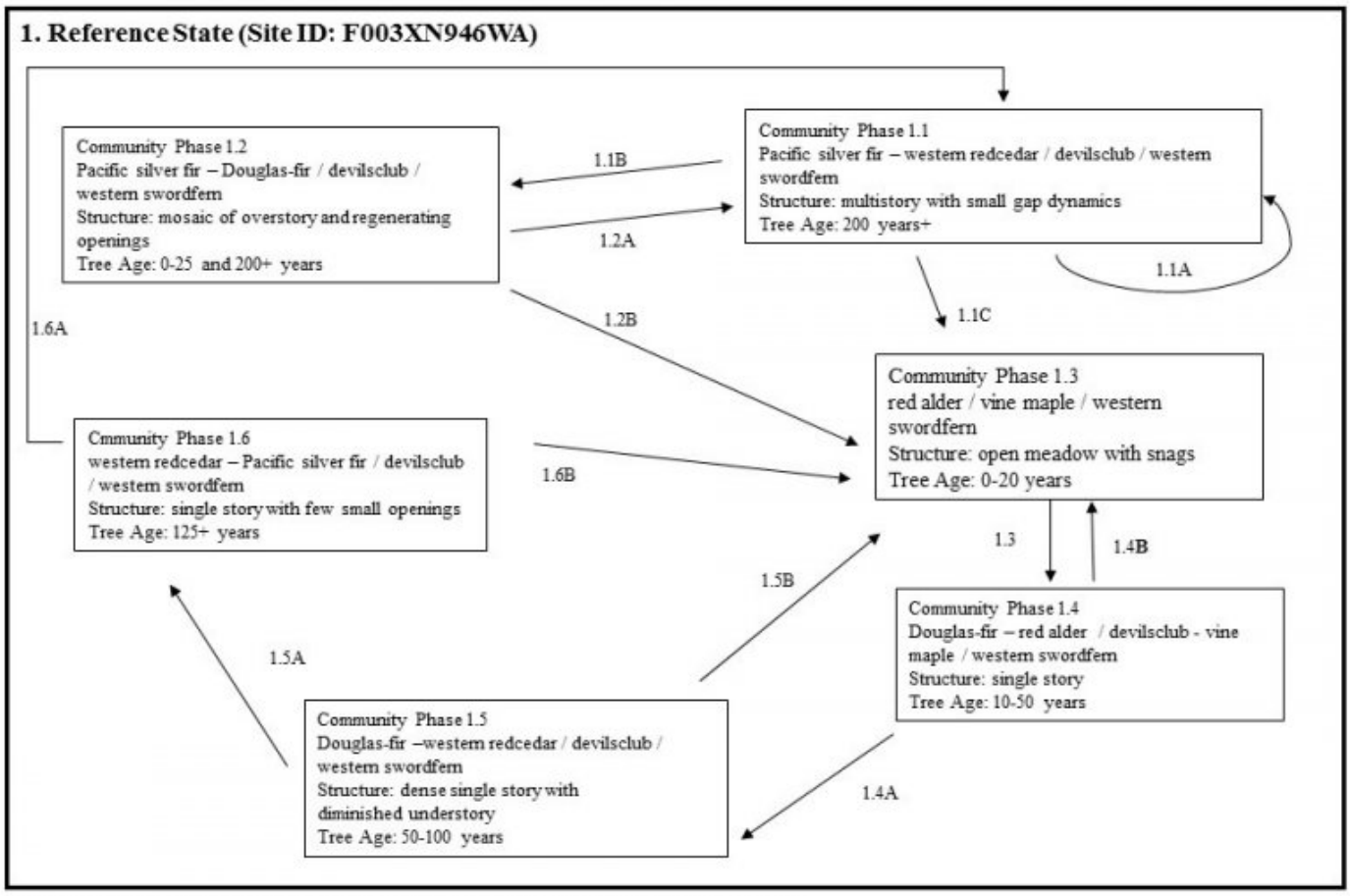
Ecological dynamics

This ecological site is on the cool, moist slopes of Mount Rainier at elevations of 1,800 to 5,700 feet, depending on aspect. A seasonal high water table is at a depth of 10 to 20 inches from the soil surface. Pacific silver fir (*Abies amabilis*) and western redcedar (*Thuja plicata*) are the most common overstory species. Bigleaf maple (*Acer macrophyllum*), western hemlock (*Tsuga heterophylla*), Douglas-fir (*Pseudotsuga menziesii*), and red alder (*Alnus rubra*) may be minor components of the overstory.

The most common natural disturbance is windthrow due to the seasonal high water table. The shallow rooting zone in the saturated areas causes roots to grow laterally, resulting in frequent tip-ups. This results in openings in the canopy that allow more sunlight to reach the forest floor, leading to a shrubby understory. Because of the frequent tip-ups, this site has a hummocky surface with an abundance of downed woody debris. Western redcedar regenerates successfully in the disturbed areas and reproduces on fallen branches and trees (Minore, 1990). Devilsclub (*Oplopanax horridus*), vine maple (*Acer circinatum*), salmonberry (*Rubus spectabilis*), and thimbleberry (*Rubus parviflorus*) make up the dense subcanopy. This site has an herb layer that consists of common western swordfern (*Polystichum munitum*), deer fern (*Blechnum spicant*), western oakfern (*Gymnocarpium dryopteris*), and twinflower (*Linnaea borealis*) in scattered areas.

Pacific silver fir, western hemlock, and Douglas-fir on this site are highly susceptible to forest pathogens, particularly annosus (Heterobasidion annosum). Disturbance by fire is infrequent because of the high humidity and precipitation. The frequency of high-intensity, stand-replacing wildfires is approximately 500 years or more (Tesky, 1992).

State and transition model



Abies amabilis –Thuja plicata / Oplopanax horridus / Polystichum munitum

Pacific silver fir –western redcedar / devilsclub / western swordfern

→ Community Phase Pathway 1.X = Community Phase
1.XY = Pathway (ecological response to natural disturbances)

State 1

Community 1.1
Pacific silver fir-western redcedar/devilsclub/western swordfern

Structure: Multistory with small gap dynamics Pacific silver fir and western redcedar are the most common overstory species in the reference community. Pacific silver fir is considered very shade tolerant, perhaps the most of any tree species in North America (Crawford, 1990). Western redcedar is shade tolerant, and it can survive up to 1,000 years of age (Minore, 1990). Douglas-fir is present, but regeneration is minimal under a closed canopy. Because of this, it may be absent in some areas. Common understory species include devilsclub (*Oplopanax horridus*), vine maple (*Acer circinatum*), salmonberry (*Rubus spectabilis*), thimbleberry (*Rubus parviflorus*), western swordfern (*Polystichum munitum*), deer fern (*Blechnum spicant*), western oakfern (*Gymnocarpium dryopteris*), and twinflower (*Linnaea borealis*). The dense canopy created by multiple age groups of trees may block most of the sunlight from the forest floor, leading to sparse understory in some areas. Most of the understory plants become established in areas where gaps in the mid-canopy and overstory allow sunlight to reach the ground. The understory tends to be more continuous in areas where there is no mid-canopy. A common disturbance is small gap dynamics (openings of 1/2 acre or smaller) following the decline of shade-intolerant species or mortality of vegetation. Community phase pathway 1.1A This pathway represents minor disturbances, such as small pockets of root disease, individual tree mortality, and windthrow, that maintain the overall structure of the reference community. Mortality of individual trees or clusters of trees creates gaps in the canopy that allow sunlight to reach the forest floor. This promotes growth of forbs and shrubs and regeneration of overstory species, maintaining a multi-storied, uneven-aged forest.

Forest overstory. The forest has multiple canopy layers. The upper layer is 160 to 225 feet in height, and it averages 115 feet. The diameter of the trees varies depending on species, but the average diameter at breast height is 25 inches. Some Pacific silver fir and western hemlock trees have a diameter of more than 30 inches.

Dominant plant species

- Pacific silver fir (*Abies amabilis*), tree
- western redcedar (*Thuja plicata*), tree
- Douglas-fir (*Pseudotsuga menziesii*), tree
- western hemlock (*Tsuga heterophylla*), tree
- red alder (*Alnus rubra*), tree
- bigleaf maple (*Acer macrophyllum*), tree
- devilsclub (*Oplopanax horridus*), shrub

- vine maple (*Acer circinatum*), shrub
- salmonberry (*Rubus spectabilis*), shrub
- thimbleberry (*Rubus parviflorus*), shrub
- western swordfern (*Polystichum munitum*), other herbaceous
- deer fern (*Blechnum spicant*), other herbaceous
- western oakfern (*Gymnocarpium dryopteris*), other herbaceous
- twinflower (*Linnaea borealis*), other herbaceous

Community 1.2
Pacific silver fir–Douglas-fir/devilsclub/western swordfern

Structure: Mosaic of mature overstory and regenerating openings Community phase 1.2 has some areas that resemble community phase 1.1, but it also has moderate-sized openings (2 to 4 acres). Pacific silver fir is subject to windthrow. The small openings in the forest allow trees that are less tolerant of shade to establish (Crawford, 1990). Many of the shrubs in the plant community, such as devilsclub, salmonberry, and vine maple, respond well to increased sunlight. This may delay or prevent reforestation of the openings.

Dominant plant species

- Pacific silver fir (*Abies amabilis*), tree
- Douglas-fir (*Pseudotsuga menziesii*), tree
- western hemlock (*Tsuga heterophylla*), tree
- devilsclub (*Oplopanax horridus*), shrub
- salmonberry (*Rubus spectabilis*), shrub
- vine maple (*Acer circinatum*), shrub
- western swordfern (*Polystichum munitum*), other herbaceous

Community 1.3
Red alder/vine maple/western swordfern

Structure: Open meadow with snags Community phase 1.3 is an early seral plant community that has been impacted by a stand-replacing disturbance, such as a wildfire, large-scale windstorm, large mass movement, or major insect infestation. Most of the trees are destroyed. Some fire-resistant trees may survive in the overstory. Standing, decaying snags are prevalent. The understory is dominantly shrubs and forbs such as red alder, vine maple, devilsclub, and salmonberry. Some grasses will establish, but they will be replaced by shrubs over time. Tree seedlings and saplings will begin to establish within 3 to 10 years, depending on the severity of the disturbance.

Dominant plant species

- red alder (*Alnus rubra*), tree
- vine maple (*Acer circinatum*), shrub
- devilsclub (*Oplopanax horridus*), shrub
- salmonberry (*Rubus spectabilis*), shrub

Community 1.4
Douglas-fir–red alder/devilsclub–vine maple/western swordfern

Structure: Single story Community phase 1.4 is an early seral forest in regeneration. Scattered remnant mature trees may be present. The species composition depends on the natural seed sources present and the intensity of the disturbance. After a moderate or severe fire, shrubs are likely to outcompete tree seedlings. Vine maple, red alder, red huckleberry, black mountain huckleberry, and devilsclub, which may have been moderate in abundance previously, have the capacity to recover rapidly and spread if top-killed. This slows regeneration of the overstory. Seed sources for tree species are from the surrounding, undisturbed forests and surviving trees. This results in a mixed stand that may include Douglas-fir, western hemlock, and western redcedar.

Dominant plant species

- Douglas-fir (*Pseudotsuga menziesii*), tree
- red alder (*Alnus rubra*), tree
- devilsclub (*Oplopanax horridus*), shrub
- vine maple (*Acer circinatum*), shrub
- red huckleberry (*Vaccinium parvifolium*), shrub
- thinleaf huckleberry (*Vaccinium membranaceum*), shrub
- western swordfern (*Polystichum munitum*), other herbaceous

Community 1.5
Douglas-fir–western redcedar/devilsclub/western swordfern

Structure: Dense single story with diminished understory Community phase 1.5 is a forest in the competitive exclusion stage. Scattered remnant mature trees may be present. Individual trees compete for available water and nutrients. Douglas-fir and western redcedar are dominant in the overstory canopy; however, saplings of more shade-tolerant species such as Pacific silver fir and western hemlock increase in basal area. The canopy is almost 100 percent closed, which leads to diminished shrubs and forbs. Some understory species better adapted to at

least partial shade, such as twinflower and black mountain huckleberry, will increase in abundance. Over time, the forest will begin to self-thin from competition. The species composition depends on the original seed sources available. The forest may include a single species or mixed species, including Douglas-fir, western redcedar, western hemlock, and Pacific silver fir.

Dominant plant species

- Douglas-fir (*Pseudotsuga menziesii*), tree
- western redcedar (*Thuja plicata*), tree
- western hemlock (*Tsuga heterophylla*), tree
- Pacific silver fir (*Abies amabilis*), tree
- devilsclub (*Oplopanax horridus*), shrub
- thinleaf huckleberry (*Vaccinium membranaceum*), shrub
- western swordfern (*Polystichum munitum*), other herbaceous
- twinflower (*Linnaea borealis*), other herbaceous

Community 1.6
Western redcedar-Pacific silver fir/devilsclub/western swordfern

Structure: Single story with few small openings Community phase 1.6 is a maturing forest that is beginning to differentiate vertically. Individual trees are dying as a result of competition, disease, insects, or windthrow, allowing some sunlight to reach the forest floor. In these areas, the understory increases and overstory tree species may regenerate. The abundance of less shade-tolerant species such as Douglas-fir increases, and the abundance of very shade-tolerant species such as western redcedar, western hemlock, and Pacific silver fir decreases.

Dominant plant species

- western redcedar (*Thuja plicata*), tree
- Pacific silver fir (*Abies amabilis*), tree
- western hemlock (*Tsuga heterophylla*), tree
- Douglas-fir (*Pseudotsuga menziesii*), tree
- devilsclub (*Oplopanax horridus*), shrub
- western swordfern (*Polystichum munitum*), other herbaceous
- twinflower (*Linnaea borealis*), other herbaceous

Pathway 1.1B
Community 1.1 to 1.2

Pacific silver fir-western redcedar/devilsclub/western swordfern

Pacific silver fir–Douglas-fir/devilsclub/western swordfern

This pathway represents a larger disturbance, such as a windstorm, insect infestation, or pocket of root rot. Areas of regeneration are 2 to 4 acres in size. Historically, this spatial pattern was caused by pockets of disease such as annosum root rot (Heterobasidion annosum), minor insect infestations, or fires of low to moderate intensity. Pacific silver fir is subject to windthrow. The small openings in the forest allow trees that are less tolerant of shade to establish (Crawford, 1990).

Pathway 1.1C
Community 1.1 to 1.3

This pathway represents a major stand-replacing disturbance such as a fire of high intensity, large-scale windstorm, major insect infestation, or large mass movement. The frequency of fire on this ecological site typically is 500 years. Volcanic activity may disrupt the ecology of the landscape beyond the boundaries of the site and the purpose of this site description.

Pathway 1.2A
Community 1.2 to 1.1

Pacific silver fir–Douglas-fir/devilsclub/western swordfern

Pacific silver fir-western redcedar/devilsclub/western swordfern

This pathway represents growth over time with no further significant disturbance. The areas of regeneration go through the typical phases of stands, including competitive exclusion, maturation, understory re-initiation, until they resemble the old-growth structure of the reference community.

Pathway 1.2B
Community 1.2 to 1.3

This pathway represents a major stand-replacing disturbance, such as a high-intensity fire (typical fire interval of 500 years), large-scale windstorm, major insect infestation, or large mass movement. This results in the initiation phase of forest development.

Pathway 1.3
Community 1.3 to 1.4

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

Pathway 1.4B
Community 1.4 to 1.3

This pathway represents a major stand-replacing disturbance, such as a high-intensity fire, large-scale windstorm, major insect infestation, or large mass movement. This results in the initiation phase of forest development.

Pathway 1.4A
Community 1.4 to 1.5

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

Pathway 1.5B
Community 1.5 to 1.3

This pathway represents a major stand-replacing disturbance, such as a high-intensity fire, large-scale windstorm, major insect infestation, or large mass movement. This leads to the initiation phase of forest development.

Pathway 1.5A
Community 1.5 to 1.6

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

Pathway 1.6A
Community 1.6 to 1.1

This pathway represents growth over time with no further major disturbance. Continued growth over time and ongoing mortality lead to increased vertical diversification. The community begins to resemble the structure of the reference community, including small pockets of regeneration and a more diversified understory.

Pathway 1.6B

Community 1.6 to 1.3

This pathway represents a major stand-replacing disturbance, such as a high-intensity fire, large-scale windstorm, major insect infestation, or large mass movement. This leads to the initiation phase of forest development.

Additional community tables

Table 5. Community 1.1 forest overstory composition

Common Name	Symbol	Scientific Name	Nativity	Height (Ft)	Canopy Cover (%)	Diameter (In)	Basal Area (Square Ft/Acre)
Tree							
Pacific silver fir	ABAM	*Abies amabilis*	Native	–	–	–	–
western hemlock	TSHE	*Tsuga heterophylla*	Native	–	–	–	–
Douglas-fir	PSME	*Pseudotsuga menziesii*	Native	–	–	–	–
red alder	ALRU2	*Alnus rubra*	Native	–	–	–	–
western redcedar	THPL	*Thuja plicata*	Native	–	–	–	–

Table 6. Community 1.1 forest understory composition

Common Name	Symbol	Scientific Name	Nativity	Height (Ft)	Canopy Cover (%)
Forb/Herb					
sweet after death	ACTR	*Achlys triphylla*	Native	1–24	0–35
twinflower	LIBO3	*Linnaea borealis*	Native	1–3	0–10
Fern/fern ally					
western swordfern	POMU	*Polystichum munitum*	Native	6–24	0–20
common ladyfern	ATFI	*Athyrium filix-femina*	Native	4–24	0–15
western oakfern	GYDR	*Gymnocarpium dryopteris*	Native	1–24	0–10
Shrub/Subshrub					
vine maple	ACCI	*Acer circinatum*	Native	12–180	0–60
devilsclub	OPHO	*Oplopanax horridus*	Native	12–72	0–25
salmonberry	RUSP	*Rubus spectabilis*	Native	12–48	0–15
thinleaf huckleberry	VAME	*Vaccinium membranaceum*	Native	6–36	0–15

Other information

Pathogens

Annosus root disease (Heterobasidion annosum) can affect nearly all conifer species in the Pacific Northwest. This disease is slow growing, but it can cause severe root and butt decay in affected stands. It commonly affects stands in conjunction with armillaria and laminated root rots and precedes bark beetle infestations.
Signs and symptoms of annosus commonly are difficult to differentiate from those of armillaria. Obvious signs include circular pockets of windthrown trees and canopy dieback. A distinctive fruiting body, called a conk, is in hollow stumps of forests affected by annosus. Other identifying features include a reddish stain, decay, and a spongy texture in the heartwood and roots (Goheen, 2006). Regeneration of conifers may be unsuccessful for several decades, until the soil is void of fungal inoculum. Application of borax on freshly cut tree stumps (within 24 hours) may reduce the spread in managed stands.

Table 7. Representative site productivity

Common Name	Symbol	Site Index Low	Site Index High	CMAI Low	CMAI High	Age Of CMAI	Site Index Curve Code	Site Index Curve Basis	Citation
western hemlock	*TSHE*	–	123	–	227	90	–	–	
Pacific silver fir	*ABAM*	96	151	104	192	90	–	–	

Inventory data references

Other Established Classifications

National vegetation classification: Vancouverian Flooded and Swamp Forest Macrogroup-North Pacific Montane Riparian Woodland

U.S. Department of Agriculture, Forest Service, plant association: ABAM/OPHO

U.S. Department of the Interior, National Park Service, plant association: ABIAMA-TSUHET/OPLHOR

Type locality

Location 1: Pierce County, WA	
Township/Range/Section	T17N R10E S33
Latitude	46° 54′ 39″
Longitude	121° 32′ 44″

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Approval

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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	04/28/2024
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:**