Ecological site F003XN950WA
Southern Washington Cascades Moist High 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 in cold, moist areas of Mount Rainier National Park at an elevation of 3,200 to 7,900 feet, depending on aspect. Elevation and climate are key components in the succession of the forest. The cold winters, deep snowpack, short growing season, and mild summers impact the rates of growth and maturity. Fog and a heavy cloud cover may provide moisture in summer for forests along the timberline (Crawford, 2009).
The soils that support this ecological site are in the cryic soil temperature regime and the aquic soil moisture regime. They are on debris aprons of mountain slopes, moraines, cirque floors, lahars, and swales of glacial-valley walls. The seasonal high water table is at a depth of 10 to 20 inches during part of the growing season. Soil moisture is not a limiting factor to 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.
The most common natural disturbance is windthrow due to the seasonal high water table. The shallow rooting zone in saturated areas causes roots to grow laterally and results in frequent tip-ups. Other disturbances include forest pathogens, such as root rot, and high-intensity, low-frequency wildfires that are stand replacing.
Mountain hemlock (*Tsuga mertensiana*) and Alaska cedar (*Callitropsis nootkatensis*) are the most common overstory species. Pacific silver fir (*Abies amabilis*), noble fir (*Abies procera*), subalpine fir (*Abies lasiocarpa*), Engelmann spruce (*Picea engelmannii*), and Sitka alder (*Alnus viridis* ssp. sinuata) may be minor components of the overstory. Cascade azalea (*Rhododendron albiflorum*), devilsclub (*Oplopanax horridus*), vine maple (*Acer circinatum*), salmonberry (*Rubus spectabilis*), and thimbleberry (*Rubus parviflorus*) make up the dense subcanopy.

Associated sites

F003XN951WA	**Southern Washington Cascades High Cryic Coniferous Forest** Ecological site F003XN950WA, Southern Washington Cascades Moist High Cryic Coniferous Forest, is located within the same elevation zone to site F003XN951WA, Southern Washington Cascades High Cryic Coniferous Forest. The dominant differentiating features are the depth to the water table and soil drainage class. The soils associated with site F003XN950WA have a higher water table depth during part of the growing season and are somewhat poorly drained. The vegetation on this site, such as Alaska cedar, Cascade azalea, and Sitka mountain ash, is suited to wetter environments. The soils associated with site F003XN951WA are moderately well drained or well drained. The vegetation on this site, such as subalpine fir and mountain heather, is suited to drier conditions. It is hypothesized that under long periods of drier conditions, F003XN950WA will progress toward an old-growth stand that resembles that of site F003XN951WA.
F003XN949WA	**Southern Washington Cascades High Cryic Riparian Forest** Ecological Site F003XN949WA, Southern Washington Cascades High Cryic Riparian Forest is located within the same elevation as site F003XN950WA, Southern Washington Cascades Moist High Cryic Coniferous Forest. The sites are differentiated by disturbance regime and soil drainage. Ecological Site F003XN949WA is subject to flooding and vegetation is often less mature than site F003XN950WA. Vegetation within the riparian corridor is dominated by Alaska cedar, Sitka alder, and willows.

Similar sites

F003XN951WA	**Southern Washington Cascades High Cryic Coniferous Forest** Ecological site F003XN950WA, Southern Washington Cascades Moist High Cryic Coniferous Forest, is located within the same elevation zone to site F003XN951WA, Southern Washington Cascades High Cryic Coniferous Forest. The dominant differentiating features are the depth to the water table and soil drainage class. The soils associated with site F003XN950WA have a higher water table depth during part of the growing season and are somewhat poorly drained. The vegetation on this site, such as Alaska cedar, Cascade azalea, and Sitka mountain ash, is suited to wetter environments. The soils associated with site F003XN951WA are moderately well drained or well drained. The vegetation on this site, such as subalpine fir and mountain heather, is suited to drier conditions. It is hypothesized that under long periods of drier conditions, F003XN950WA will progress toward an old-growth stand that resembles that of site F003XN951WA.

Table 1. Dominant plant species

Tree	(1) *Tsuga mertensiana* (2) *Callitropsis nootkatensis*
Shrub	(1) *Rhododendron albiflorum* (2) *Rubus lasiococcus*
Herbaceous	Not specified

Physiographic features

This ecological site is on debris aprons of mountains slopes, lahars, cirque floors, swales of glacial-valley walls, and moraines at the upper montane elevations (3,200 to 7,900 feet). The site is on all aspects and slopes; however, it is dominantly on slopes of 0 to 35 percent.

Table 2. Representative physiographic features

Landforms	(1) Mountains > Lahar (2) Mountains > Cirque floor (3) Mountains > Glacial-valley wall > Swale (4) Mountains > Moraine

Climatic features

This ecological site is on debris aprons of mountains slopes, lahars, cirque floors, swales of glacial-valley walls, and moraines at the upper montane elevations (3,200 to 7,900 feet). The site is on all aspects and slopes; however, it is dominantly on slopes of 0 to 35 percent.

Table 3. Representative climatic features

Frost-free period (characteristic range)	30-60 days
Freeze-free period (characteristic range)	
Precipitation total (characteristic range)	1,702-2,794 mm

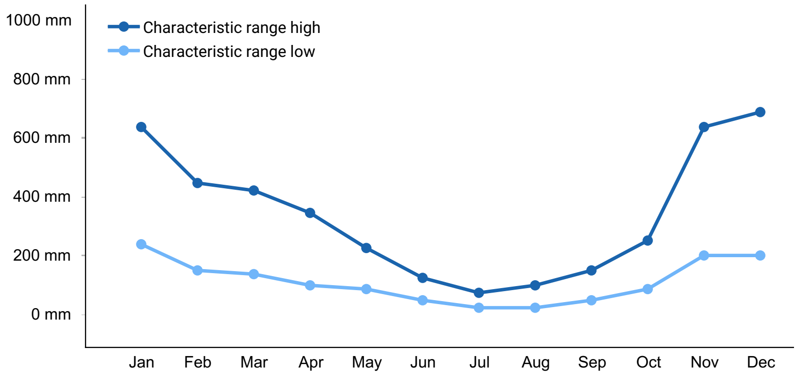


Figure 1. Monthly precipitation range

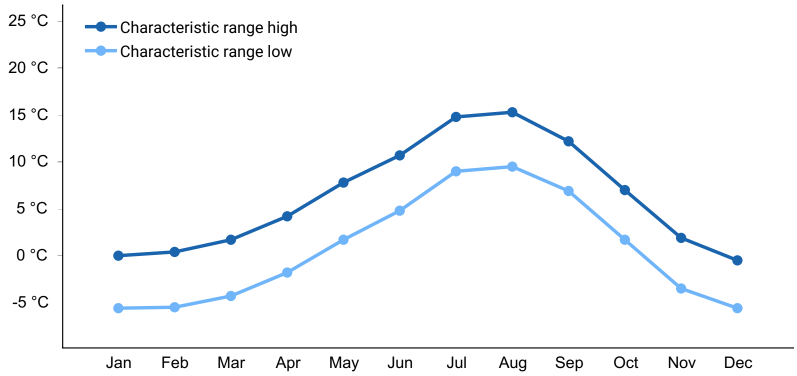


Figure 2. Monthly minimum temperature range

Influencing water features

Generally, 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 some time during the growing season. The water table typically rises in spring and recedes in fall.

Soil features

Applicable soils: Mysticlake, Wonderland

Applicable soil map units: 8201, 8203, 8210, 8211, 8220, 8225, 8230, 9210, 9220, 9225, 9994

The Mysticlake soils formed in volcanic ash over colluvium derived from andesite, and the Wonderland soils formed in mixed colluvium, till, and lahar deposits. The Mysticlake soils have less than 35 percent rock fragments in the particle-size control section, and the Wonderland soils have more than 35 percent rock fragments in the particle-size control section. The Mysticlake soils are coarse textured and primarily medial sandy loam and medial loamy sand. Pumice paragravel is in some areas. The Wonderland soils are coarse textured and have andesite fragments. They are primarily very gravelly ashy sandy loam and very gravelly ashy loamy sand. Both of the soils have an ochric epipedon, redoximorphic features, and andic properties. Podsolization in not evident in the soils.

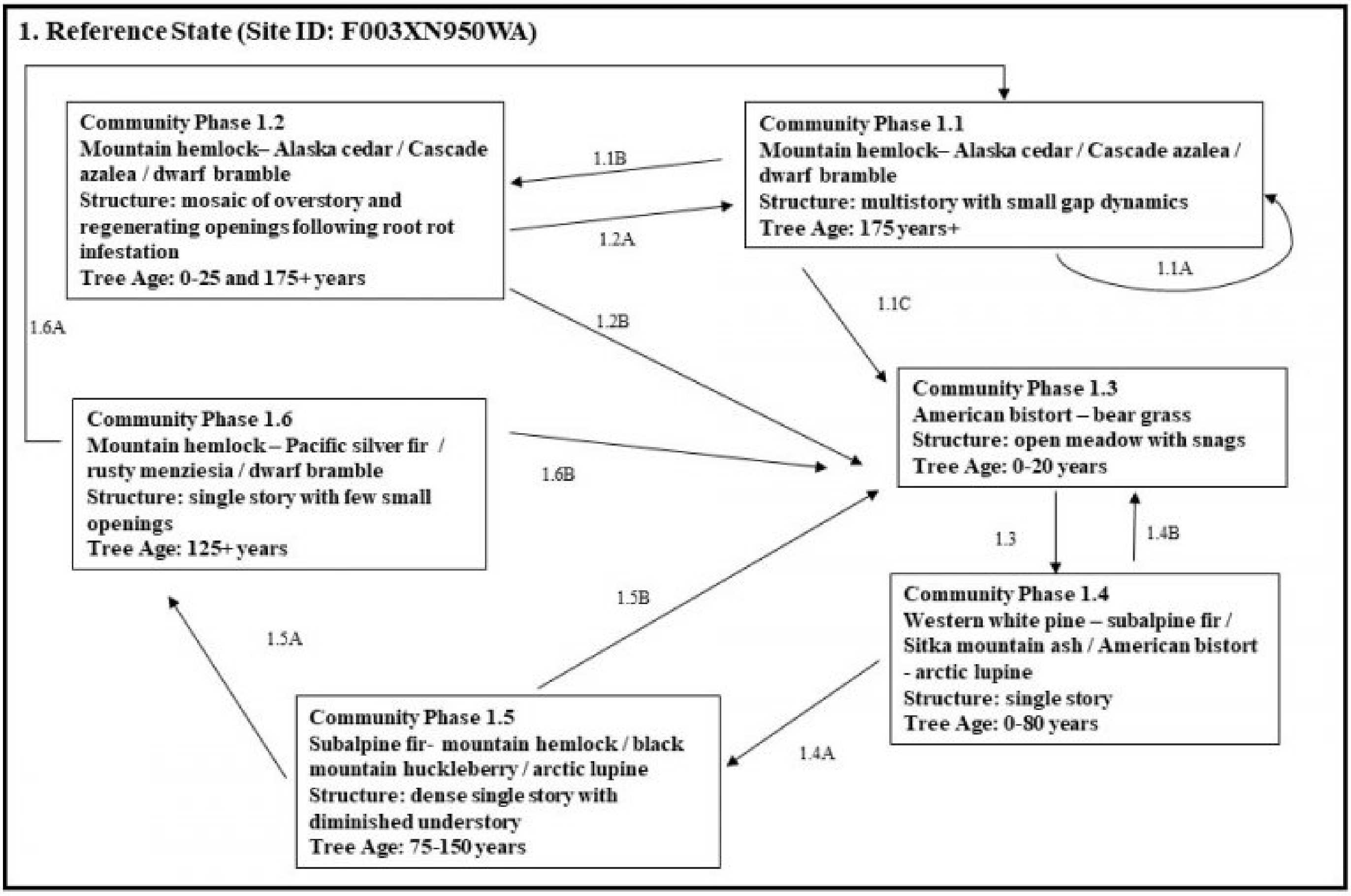
Table 4. Representative soil features

Parent material	(1) Volcanic ash–andesite (2) Colluvium–andesite (3) Till–andesite (4) Lahar deposits–andesite
Surface texture	(1) Medial sandy loam (2) Very gravelly, ashy fine sandy loam (3) Medial loamy sand
Drainage class	Somewhat poorly drained
Soil depth	152 cm
Surface fragment cover <=3"	0–40%
Surface fragment cover >3"	0–20%
Soil reaction (1:1 water) (Depth not specified)	3.5–6
Subsurface fragment volume <=3" (Depth not specified)	0–50%
Subsurface fragment volume >3" (Depth not specified)	0–20%

Ecological dynamics

Mountain hemlock (*Tsuga mertensiana*) and Alaska cedar (*Callitropsis nootkatensis*) are the most common overstory species. Pacific silver fir (*Abies amabilis*), noble fir (*Abies procera*), subalpine fir (*Abies lasiocarpa*), Engelmann spruce (*Picea engelmannii*), and Sitka alder (*Alnus viridis* ssp. sinuata) 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 saturated areas causes roots to grow laterally and results in frequent tip-ups. The openings in the canopy allow more sunlight to reach the forest floor, leading to a shrubby understory. Cascade azalea (*Rhododendron albiflorum*), devilsclub (*Oplopanax horridus*), vine maple (*Acer circinatum*), salmonberry (*Rubus spectabilis*), and thimbleberry (*Rubus parviflorus*) make up the dense subcanopy. Frequent tip-ups result in a hummocky surface and an abundance of downed woody debris. The site has an herb layer consisting of common dwarf bramble (*Rubus lasiococcus*), deer fern (*Blechnum spicant*), western oakfern (*Gymnocarpium dryopteris*), and twinflower (*Linnaea borealis*) in scattered areas.
Other disturbance factors include forest pathogens, such as root rot, and high-intensity, low-frequency wildfires that are stand replacing. The frequency of wildfires is relatively low because of the position on the landscape at the higher elevations and the extended periods of snowpack. The fire regime for mountain hemlock is 400 to 800 years. The fires commonly are stand replacing because of the dense forest canopy and the physiology of the trees that includes low, non-self-pruning branches (Tesky, 1992).

State and transition model



Tsuga mertensiana– Callitropsis nootkatensis / Rhododendron albiflorum /Rubus lasiococcus

Mountain hemlock– Alaska cedar / Cascade azalea / dwarf bramble

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

State 1
Reference State

Community 1.1
Mountain hemlock-Alaska cedar/Cascade azalea/dwarf bramble

Structure: Multistory with small gap dynamics Mountain hemlock is the dominant overstory species in the reference community, and it is the most shade tolerant-species. Alaska cedar, subalpine fir, Pacific silver fir, and noble fir are subspecies. Reproduction of these species is restricted under a closed canopy of mountain hemlock (Means, 1990). The dense canopy created by multiple age groups of hemlock may block most of the sunlight from the forest floor, which leads to sparse understory in some areas. Gaps in the mid-canopy and overstory allow sunlight to reach the ground. The majority of the understory plants become established in these areas. The understory is more continuous in areas where there is no mid-canopy. Common understory species include rusty menziesia, black mountain huckleberry, dwarf bramble, Cascade azalea, and Sitka valerian. The most common natural disturbance is small gap dynamics following the death of some trees. From recorded plot data, the average diameter at breast height of mountain hemlock is 19 inches and the average age is 270 years. The growing conditions of this ecological site limit timber production. 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 openings that allow sunlight to reach the forest floor. This promotes the growth of forbs and shrubs and regeneration of overstory species and maintains the multi-storied, uneven-aged forest.

Forest overstory. The forest has multiple canopy layers. The upper canopy is 90 to 135 feet in height, and the average is 80 feet. The diameter of the trees varies depending on the species, but the average diameter at breast height is 19 inches.

Forest understory. The composition of the understory varies depending on the overstory cover and competition for sunlight and moisture. As the overstory community matures toward the reference state, the understory vegetation is less prevalent. At the higher elevations, the density of the understory species is higher because the trees are less mature and the canopy is not closed. Overall cover of shrubs such as Cascade azalea and black mountain huckleberry is 30 to 50 percent. Dense pockets of shrubs are in some areas. Overall cover of forbs such as common beargrass, Sitka valerian, five-leaved bramble, and dwarf bramble is 5 to 30 percent.

Dominant plant species

- mountain hemlock (*Tsuga mertensiana*), tree
- Alaska cedar (*Callitropsis nootkatensis*), tree

- subalpine fir (*Abies lasiocarpa*), tree
- Pacific silver fir (*Abies amabilis*), tree
- noble fir (*Abies procera*), tree
- rusty menziesia (*Menziesia ferruginea*), shrub
- Cascade azalea (*Rhododendron albiflorum*), shrub
- devilsclub (*Oplopanax horridus*), shrub
- salmonberry (*Rubus spectabilis*), shrub
- thimbleberry (*Rubus parviflorus*), shrub
- vine maple (*Acer circinatum*), shrub
- roughfruit berry (*Rubus lasiococcus*), other herbaceous
- deer fern (*Blechnum spicant*), other herbaceous
- western oakfern (*Gymnocarpium dryopteris*), other herbaceous
- twinflower (*Linnaea borealis*), other herbaceous

Community 1.2
Mountain hemlock-Alaska cedar/Cascade azalea/dwarf bramble

Structure: Mosaic of mature overstory and regenerating openings Community phase 1.2 resembles community phase 1.1 in some areas, but it also has moderate-sized openings (2 to 4 acres). Many of the shrubs respond well to increased sunlight and may delay or prevent reforestation of the openings.

Dominant plant species

- mountain hemlock (*Tsuga mertensiana*), tree
- Alaska cedar (*Callitropsis nootkatensis*), tree
- Cascade azalea (*Rhododendron albiflorum*), shrub
- roughfruit berry (*Rubus lasiococcus*), other herbaceous

Community 1.3
American bistort-common beargrass

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, mass movement, or major insect infestation. Mountain hemlock is susceptible to damage from fire because of its low-hanging branches. It is not expected to survive moderate- or high-intensity fires; therefore, the fires are dominantly stand replacing (Tesky, 1992). Most of the trees are destroyed, but some fire-resistant trees may survive in the overstory. Standing, decaying snags are prevalent. The understory is dominantly shrubs and forbs such as American bistort, fireweed, common beargrass, and arctic lupine. Some grasses will establish, but they will be replaced by shrubs over time. Tree seedlings and saplings begin to establish within 3 to 10 years, depending on the severity of the disturbance.

Dominant plant species

- American bistort (*Polygonum bistortoides*), other herbaceous
- common beargrass (*Xerophyllum tenax*), other herbaceous

Community 1.4
Western white pine-subalpine fir/Sitka mountain ash/American bistort-arctic lupine

Structure: Single story Community phase 1.4 is an early seral forest in regeneration. Scattered remnant mature trees that are fire resilient may be present. The species composition depends on the natural seed sources present and the intensity of the disturbance. Western white pine and subalpine fir are suited to reproduction after a disturbance (Means, 1990). After a moderate or severe fire, shrubs and forbs may outcompete tree seedlings. American bistort, artic lupine, and partridgefoot, which may have been moderate in abundance previously, rapidly recover and spread when top-killed. This slows the regeneration of the overstory species. Tree species, including early successional species such as western white pine, commonly regenerate from an existing seed source. The stand is mixed and may include western white pine, Douglas-fir, mountain hemlock, and subalpine fir.

Dominant plant species

- western white pine (*Pinus monticola*), tree
- subalpine fir (*Abies lasiocarpa*), tree
- western mountain ash (*Sorbus sitchensis*), shrub
- American bistort (*Polygonum bistortoides*), other herbaceous
- arctic lupine (*Lupinus arcticus*), other herbaceous

Community 1.5
Subalpine fir-mountain hemlock/black mountain huckleberry/arctic lupine

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. Competition among individual trees for available water and nutrients increases. The canopy closure is nearly 100 percent, which leads to a diminished understory. Some understory species better adapted to at least partial shade, such as Sitka valerian, increase in abundance. Over time, the forest will begin to self-thin due to competition. The species composition depends on the original seed sources available. The forest may be composed of a single species or mixed species, including subalpine fir, mountain hemlock, Pacific silver fir, Alaska cedar, and Engelmann spruce.

Dominant plant species

- subalpine fir (*Abies lasiocarpa*), tree
- mountain hemlock (*Tsuga mertensiana*), tree
- thinleaf huckleberry (*Vaccinium membranaceum*), shrub
- western mountain ash (*Sorbus sitchensis*), shrub
- arctic lupine (*Lupinus arcticus*), other herbaceous

Community 1.6
Mountain hemlock-Pacific silver fir/rusty menziesia/dwarf bramble

Structure: Single story with few small openings Community phase 1.6 is a maturing forest that is beginning to become differentiated vertically. Individual trees are dying from competition, disease, insects, or windthrow, which allows some sunlight to reach the forest floor. The understory increases in abundance, and some pockets of overstory regeneration develop.

Dominant plant species

- mountain hemlock (*Tsuga mertensiana*), tree
- Pacific silver fir (*Abies amabilis*), tree
- subalpine fir (*Abies lasiocarpa*), tree
- rusty menziesia (*Menziesia ferruginea*), shrub
- thinleaf huckleberry (*Vaccinium membranaceum*), shrub
- roughfruit berry (*Rubus lasiococcus*), other herbaceous

Pathway 1.1B
Community 1.1 to 1.2

Mountain hemlock-Alaska cedar/Cascade azalea/dwarf bramble

Mountain hemlock-Alaska cedar/Cascade azalea/dwarf bramble

This pathway represents a larger disturbance, such as a windstorm, insect infestation, or root rot pocket. 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) or laminated root rot (Phellinus weirii), minor insect infestations, or low- or moderate-intensity fires. Because mountain hemlock is shallow rooted, it is susceptible to laminated root rot and windthrow (Tesky, 1992).

Pathway 1.1C
Community 1.1 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. The frequency of fire on this ecological site is 400 to 800 years. Volcanic activity has the potential to disrupt the landscape ecology beyond the boundaries of the ecological site and the purpose of this site description.

Pathway 1.2A
Community 1.2 to 1.1

Mountain hemlock-Alaska cedar/Cascade azalea/dwarf bramble

Mountain hemlock-Alaska cedar/Cascade azalea/dwarf bramble

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, and understory reinitiation, 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, large-scale windstorm, major insect infestation, or large mass movement. This leads to 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 leads to 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 (M)	Canopy Cover (%)	Diameter (Cm)	Basal Area (Square M/Hectare)
Tree							
mountain hemlock	TSME	*Tsuga mertensiana*	Native	–	–	–	–
subalpine fir	ABLA	*Abies lasiocarpa*	Native	–	–	–	–
Pacific silver fir	ABAM	*Abies amabilis*	Native	–	–	–	–
Alaska cedar	CANO9	*Callitropsis nootkatensis*	Native	–	–	–	–
noble fir	ABPR	*Abies procera*	Native	–	–	–	–

Table 6. Community 1.1 forest understory composition

Common Name	Symbol	Scientific Name	Nativity	Height (M)	Canopy Cover (%)
Forb/Herb					
roughfruit berry	RULA2	*Rubus lasiococcus*	Native	0.3–1.2	0–30
common beargrass	XETE	*Xerophyllum tenax*	Native	3.7–7.3	0–15
Sitka valerian	VASI	*Valeriana sitchensis*	Native	0.9–5.5	0–10
strawberryleaf raspberry	RUPE	*Rubus pedatus*	Native	0.3–1.2	0–5
Shrub/Subshrub					
Cascade azalea	RHAL2	*Rhododendron albiflorum*	Native	7.3–18.3	0–50
thinleaf huckleberry	VAME	*Vaccinium membranaceum*	Native	3–14.6	0–30
rusty menziesia	MEFE	*Menziesia ferruginea*	Native	1.8–11	0–20
red huckleberry	VAPA	*Vaccinium parvifolium*	Native	3.7–11	0–15
western mountain ash	SOSI2	*Sorbus sitchensis*	Native	1.2–18.3	0–10

Other information

Pathogen Information

Mountain hemlock forests of the Washington and Oregon Cascade Mountains are highly susceptible to laminated root rot (Phellinus weirii), which results in moderate disturbances and openings in the forest. The fungus can cause severe root rot and butt decay that can stunt the growth of trees and cause mortality. Pacific silver fir, subalpine fir, and noble fir may be affected by laminated root rot, but they rarely are killed by the disease.
Signs and symptoms of root rot include pockets of dead and fallen trees that are broken at or near ground level. The decay is identified by brown to reddish brown speckled staining in the sapwood and wood that separates along the growth rings. Regeneration of highly susceptible species in infected areas typically is unsuccessful (Goheen, 2006).
White pine blister rust (Cronartium ribicola) affects early seral white pine forests, and it may result in mortality of young trees. This disease commonly increases the rates of succession and transition by girdling infected trees. It affects five-needled pines. It commonly precedes an attack by mountain pine beetles in areas where large stands of western white pine are stressed or dying. This fungus requires an alternate currant (Ribes spp.) host to complete its lifecycle.
An identifier of blister rust commonly is swellings on branches, which exude sap in spring. Cankers and pustules that have yellow-orange blisters (aeciospores) by midsummer develop on branches and boles of trees.
Management may include removal of the currant (Ribes spp.), pruning affected branches, and planting genetically improved stock (Goheen, 2006).

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
Pacific silver fir	*ABAM*	76	121	72	145	100	–	–	
mountain hemlock	*TSME*	50	–	30	–	100	–	–	

Inventory data references

Other Established Classifications

National vegetation classification: North Pacific Mountain Hemlock-Silver Fir Forest and Tree Island Group

U.S. Department of Agriculture, Forest Service, plant association:
- ABAM/RHAL
- TSME/RHAL

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

Type locality

Location 1: Pierce County, WA	
Township/Range/Section	T17N R09E S3
Latitude	46° 59′ 38″
Longitude	121° 38′ 37″

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Contributors

Erin Kreutz
Erik Dahlke
Philip Roberts

Approval

Kirt Walstad, 5/10/2024

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	05/10/2024
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):**

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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:**
