

Ecological site F003XN928WA

Frigid/Xeric Active Natural Disturbance

Last updated: 1/30/2025

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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.



Figure 1. Mapped extent

Areas shown in blue indicate the maximum mapped extent of this ecological site. Other ecological sites likely occur within the highlighted areas. It is also possible for this ecological site to occur outside of highlighted areas if detailed soil survey has not been completed or recently updated.

Classification relationships

Related National Park Service Plant Alliances: *Pseudotsuga menziesii*-(*Pinus contorta* var. *latifolia*) Forest Alliance, *Pseudotsuga menziesii*-(*Pinus ponderosa*) Forest Alliance, *Pinus ponderosa*-(*Pseudotsuga menziesii*) Woodland and Savanna Alliance.

Associated sites

F003XN923WA	Cryic/Xeric Coniferous
F003XN927WA	Frigid/Xeric Coniferous

Table 1. Dominant plant species

Tree	(1) <i>Acer macrophyllum</i> (2) <i>Prunus emarginata</i>
Shrub	(1) <i>Corylus cornuta</i> (2) <i>Acer circinatum</i>
Herbaceous	(1) <i>Maianthemum stellatum</i> (2) <i>Streptopus amplexifolius</i>

Physiographic features

This native plant community is of limited extent on mountain slope positions at lower elevations along the east slope of the North Cascades. This site is confined to areas with a higher frequency of disturbance than the surrounding coniferous forest. These areas include rock fall and debris torrent deposits or, less often, avalanche paths and their runout areas.

This ecological site has only been mapped within the boundary of the North Cascades National Park Complex. This site, where mapped, ranged from 1000 to 5000 feet in elevation. The table below refers to the representative elevations of this site.

Table 2. Representative physiographic features

Landforms	(1) Mountain slope (2) Valley side
Flooding frequency	None
Ponding frequency	None
Elevation	1,000–3,500 ft
Slope	5–100%
Water table depth	60 in
Aspect	Aspect is not a significant factor

Climatic features

This ecological site receives most of its annual precipitation from October to April. The mean annual precipitation ranges from 20 to 65 inches and the mean annual temperature ranges from 35 to 49 degrees Fahrenheit. Generally this site occupies areas with warm dry summers and cool wet winters.

Precipitation and temperature data in the tables below was extracted from: PRISM Climate Group, Oregon State University, <http://prism.oregonstate.edu>, created February 2004. Information from the Ross Dam weather station, was used by the PRISM Climate Group to generate climate data for the North Cascades region.

Table 3. Representative climatic features

Frost-free period (average)	100 days
Freeze-free period (average)	120 days
Precipitation total (average)	65 in

Influencing water features

This ecological site is not influenced by wetland or riparian water features but may be found adjacent to incised streams.

Soil features

Applicable soils: Inspiration, Mesahchie.

The soils that support this native plant community occur in the frigid soil temperature regime (average annual temperature less than 8 degrees C, with a greater than 5 degrees C summer-winter fluctuation) and xeric soil moisture regime (the rooting zone is usually moist throughout the winter with prominent summer drought). In the xeric soil moisture regime, the soil profile typically dries out during the summer months for longer stretches of time than the udic counterparts of the North Cascades west slope. These soils are well drained and very deep and typically have significant coarse fragments within the soil profile, owing to the active nature of the landforms they

occupy. The Inspiration soil series is an Andisol and has a mantle of material with significant volcanic ash influence overlying colluvium. The Mesahchie soil series is an Inceptisol has a thinner ash mantle than the Inspiration series. The upper mantle of both series is characterized by a low bulk density and relatively high water holding capacity although an abundance of coarse fragments within the profile may limit the amount of moisture available. Soil moisture can be a limiting factor to forest growth on these soils owing to the lower precipitation totals in this zone and the resulting moisture deficit during the summer months. Soil profiles under this plant community tend to have thicker A horizons (umbric epipedons) than their coniferous forest counterparts, owing to the abundance of deciduous forest litter and herbaceous root matter incorporated into the soil profile.

A blank entry under soil depth column indicates no depth restriction within the soil profile.

For more information on soils and their terminology, please refer to Soil taxonomy: A Basic System of Soil Classification for Making and Interpreting Soil Surveys (Soil Survey Staff, 1999; <http://soils.usda.gov/technical/classification/taxonomy/>).

Table 4. Representative soil features

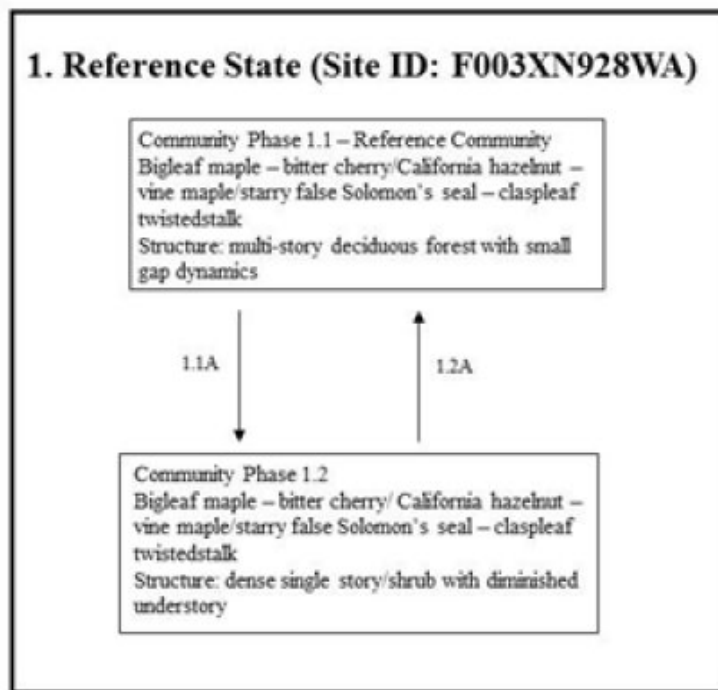
Surface texture	(1) Ashy fine sandy loam (2) Ashy sandy loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderately rapid to very rapid
Soil depth	60 in
Surface fragment cover <=3"	0–10%
Surface fragment cover >3"	0–10%
Available water capacity (0-40in)	4.2–15.99 in
Soil reaction (1:1 water) (0-40in)	4–7
Subsurface fragment volume <=3" (Depth not specified)	5–65%
Subsurface fragment volume >3" (Depth not specified)	5–50%

Ecological dynamics

This site is found on cool, dry, low elevations east of the Cascade Crest where there is active natural disturbance – most commonly debris torrents and less often avalanches. The repeated disturbance of these sites prevents the establishment of a coniferous overstory. Both bigleaf maple (*Acer macrophyllum*) and bitter cherry (*Prunus emarginata*) may be broken by falling debris or snow but both sprout prolifically from their roots (unlike conifers), leading to their continued presence on these sites. Douglas-fir (*Pseudotsuga menziesii*) and ponderosa pine (*Pinus ponderosa*) will occasionally be found on these sites. Common understory shrubs include beaked hazelnut (*Corylus cornuta*), vine maple (*Acer circinatum*), Sitka willow (*Salix sitchensis*), myrtle pachistima (*Paxistima myrsinites*), serviceberry (*Amelanchier alnifolia*), thimbleberry (*Rubus parviflorus*) and snowberry (*Symphoricarpos albus*). Common forbs include starry false Solomon's seal (*Maianthemum stellatum*), claspleaf twistedstalk (*Streptopus amplexifolius*), and broadleaf starflower (*Trientalis borealis*).

*This proposed ecological site requires further investigation as only four inventory plots were found to sample.

State and transition model



Acer macrophyllum - *Prunus emarginata* / *Corylus cornuta* var. *californica* –
Acer circinatum / *Maianthemum stellatum* –
Streptopus amplexifolius

bigleaf maple - bitter cherry / California hazelnut - vine maple /
 starry false Solomon's seal - claspleaf twistedstalk

→ Community Phase Pathway 1.X = Community Phase X→Y = Transition Pathway
 1.XY = Pathway (ecological response to natural processes)

Figure 4. State and Transition Model

State 1 Reference

Community 1.1

Multistory, Bigleaf Maple, Bitter Cherry, Beaked Hazelnut, Vine Maple, and Starry False Solomon's Seal

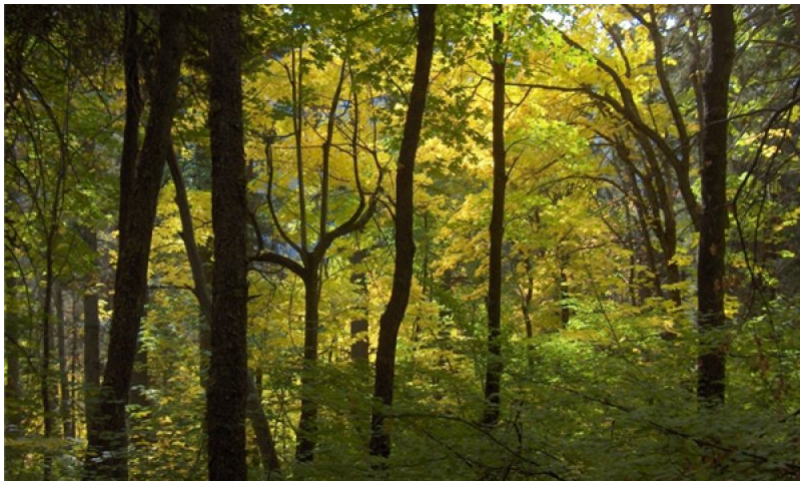


Figure 5. Reference Community

Structure: multi-story deciduous forest with small gap dynamics This community phase appears to be fairly stable with only minor disturbances such as the death of a single tree. Bigleaf maple is a host species of several decay

causing organisms but this is seldom an issue until the trees are mature to overmature. The dense canopy of bigleaf maple and bitter cherry, coupled with a secondary canopy of beaked hazelnut and vine maple leads to an understory of more shade tolerant species than the surrounding coniferous forests, such as claspleaf twistedstalk, starry false lily of the valley and broadleaf starflower. Bigleaf maple is also shade tolerant so it can perpetuate itself without major disturbance. Scattered conifers (Douglas-fir and ponderosa pine) may seed in when there are openings in the canopy.

Community 1.2

Single Story, Bigleaf Maple, Bitter Cherry, Beaked Hazelnut, Vine Maple, and Starry False Solomon’s Seal

Structure: dense single story/shrub with diminished understory C.P. 1.2 is forestland in regeneration after a major disturbance; there may be few, scattered mature trees that survived the disturbance. Bigleaf maple, bitter cherry, beaked hazelnut, vine maple, serviceberry, Sitka willow and thimbleberry all stump sprout prolifically and it seems that this ability out competes any conifer seedlings that may become established on these sites. The dense nature of this regeneration would limit the abundance of the forb layer for some time. Moisture can also be a limiting factor in these forests and, since the deciduous species will still have an intact root system after these disturbances, this may also give them a competitive advantage over new coniferous seedlings.

Pathway 1.1A

Community 1.1 to 1.2

This pathway represents a major stand-replacing disturbance, most commonly a debris torrent and less commonly an avalanche release.

Pathway 1.2A

Community 1.2 to 1.1

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

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							
bigleaf maple	ACMA3	<i>Acer macrophyllum</i>	Native	—	—	—	—
bitter cherry	PREM	<i>Prunus emarginata</i>	Native	—	—	—	—
Douglas-fir	PSME	<i>Pseudotsuga menziesii</i>	Native	—	—	—	—
ponderosa pine	PIPO	<i>Pinus ponderosa</i>	Native	—	—	—	—

Table 6. Community 1.1 forest understory composition

Common Name	Symbol	Scientific Name	Nativity	Height (Ft)	Canopy Cover (%)
Forb/Herb					
starry false lily of the valley	MAST4	<i>Maianthemum stellatum</i>	Native	1–2	1–10
broadleaf starflower	TRBOL	<i>Trientalis borealis</i> ssp. <i>latifolia</i>	Native	0.5–1	1–10
claspleaf twistedstalk	STAM2	<i>Streptopus amplexifolius</i>	Native	1–3	1–10
Shrub/Subshrub					
vine maple	ACCI	<i>Acer circinatum</i>	Native	2–15	40–60
beaked hazelnut	COCO6	<i>Corylus cornuta</i>	Native	2–15	20–40
Sitka willow	SASI2	<i>Salix sitchensis</i>	Native	6–20	10–30
Saskatoon serviceberry	AMAL2	<i>Amelanchier alnifolia</i>	Native	2–5	5–20
common snowberry	SYAL	<i>Symphoricarpos albus</i>	Native	2–6	5–20
Oregon boxleaf	PAMY	<i>Paxistima myrsinites</i>	Native	0.5–2	1–10
thimbleberry	RUPA	<i>Rubus parviflorus</i>	Native	1–5	1–10

Inventory data references

Type Locality Plot ID: 07-CAB-071

Type locality

Location 1: Chelan County, WA	
Township/Range/Section	T34N R16E S34
UTM zone	N
UTM northing	5363461
UTM easting	659184
Latitude	48° 24' 15"
Longitude	120° 50' 58"

Other references

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Contributors

Kathryn Smith

Approval

Kirt Walstad, 1/30/2025

Rangeland health reference sheet

Interpreting Indicators of Rangeland Health is a qualitative assessment protocol used to determine ecosystem condition based on benchmark characteristics described in the Reference Sheet. A suite of 17 (or more) indicators are typically considered in an assessment. The ecological site(s) representative of an assessment location must be known prior to applying the protocol and must be verified based on soils and climate. Current plant community cannot be used to identify the ecological site.

Author(s)/participant(s)	
Contact for lead author	
Date	01/30/2025
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:
