

Ecological site F003XN929WA

Low Cryic/Udic East Coniferous

Last updated: 5/10/2024

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General information

Provisional. A provisional ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model and enough information to identify the ecological site.



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.

This ecological site includes the following USDA Forest Service Plant Associations: ABAM/VAME/CLUN and ABAM/VAME-PYSE (Silver Fir Series). (Lillybridge 1995)

Associated sites

F003XN923WA	Cryic/Xeric Coniferous
F003XN925WA	High Cryic/Udic Coniferous
F003XN926WA	Cryic/Udic Active Natural Disturbance

Table 1. Dominant plant species

Tree	(1) <i>Abies amabilis</i> (2) <i>Picea engelmannii</i>
Shrub	(1) <i>Vaccinium membranaceum</i> (2) <i>Paxistima myrsinites</i>

Herbaceous	(1) <i>Clintonia uniflora</i> (2) <i>Orthilia secunda</i>
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Physiographic features

This native plant community occurs across many landscape positions at middle elevations of the North Cascades. This site occupies the low cryic/udic east soil temperature/moisture regime and extends across glacial valleys to mountain slopes and in some locations to the ridge lines above.

This ecological site has only been mapped within the boundary of the North Cascades National Park Complex. This site, where mapped, ranged from 3000 to 6000 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 (3) Stream terrace
Flooding duration	Very brief (4 to 48 hours) to brief (2 to 7 days)
Flooding frequency	None to occasional
Ponding frequency	None
Elevation	762–1,463 m
Slope	15–65%
Water table depth	51 cm
Aspect	Aspect is not a significant factor

Climatic features

This ecological site receives most of its annual precipitation from October to April in the form of snow that will commonly persist into late spring and early summer. The mean annual precipitation ranges from 35 to 85 inches and the mean annual temperature ranges from 33 to 45 degrees Fahrenheit. Generally this site occupies areas with cool dry summers and cold 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)	75 days
Freeze-free period (average)	90 days
Precipitation total (average)	2,159 mm

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. Occasionally and for brief amounts of time, the site may be flooded by adjacent rivers and streams but overall this has an insignificant influence on the plant community.

Soil features

Applicable soils: Noca, Tepeh and the dry phases of Chilliwack, Kimtah, Maggib, Perfect and Terror.

The soils that support this native plant community occur in the low cryic east soil temperature regime and udic soil moisture regime (the rooting zone is usually moist throughout the winter and the majority of summer). For the purposes of the soil inventory, the cryic zone (average annual temperature less than 8 degrees C, with less than 5 degrees C difference from winter to summer) was divided into several zones to distinguish soil and/or climatic differences between the lower elevation west side zone (low cryic/udic west), the higher elevation crest zone (high cryic/udic), and lower elevation east side zone (low cryic/udic east). These soils are moderately well to well drained and soil depth ranges from moderately deep to very deep. Generally these soils have a mantle of material with significant volcanic ash influence overlying glacial till or colluvium. The upper mantle is characterized by a low bulk density and high water holding capacity. Soil moisture is not a limiting factor to forest growth on these soils owing to abundance of precipitation and the inherent water holding properties of soils influenced by volcanic ash. Typically under a coniferous overstory, as the amount of precipitation increases the degree of pedogenic weathering increases. In soils with significant volcanic ash influence and landscape stability (i.e. geologic time), weathering produces Spodosols such as the Chilliwack, Kimtah, Maggib, and Yawning soil series. Some soil properties of these Spodosols are similar to the other soils found under this native plant community, but morphologically Spodosols are visually distinct because of the typically bright albic and spodic horizon sequence in the upper soil profile. Weak expression of this morphology may be visible in the Andisols and Inceptisols of this grouping but generally these soils exhibit an ochric epipedon and cambic subsurface diagnostic horizon.

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	Moderately well drained to well drained
Permeability class	Moderate to very rapid
Soil depth	51 cm
Surface fragment cover <=3"	0–10%
Surface fragment cover >3"	0–10%
Available water capacity (0-101.6cm)	10.67–40.61 cm
Soil reaction (1:1 water) (0-101.6cm)	4–7
Subsurface fragment volume <=3" (Depth not specified)	5–80%
Subsurface fragment volume >3" (Depth not specified)	5–50%

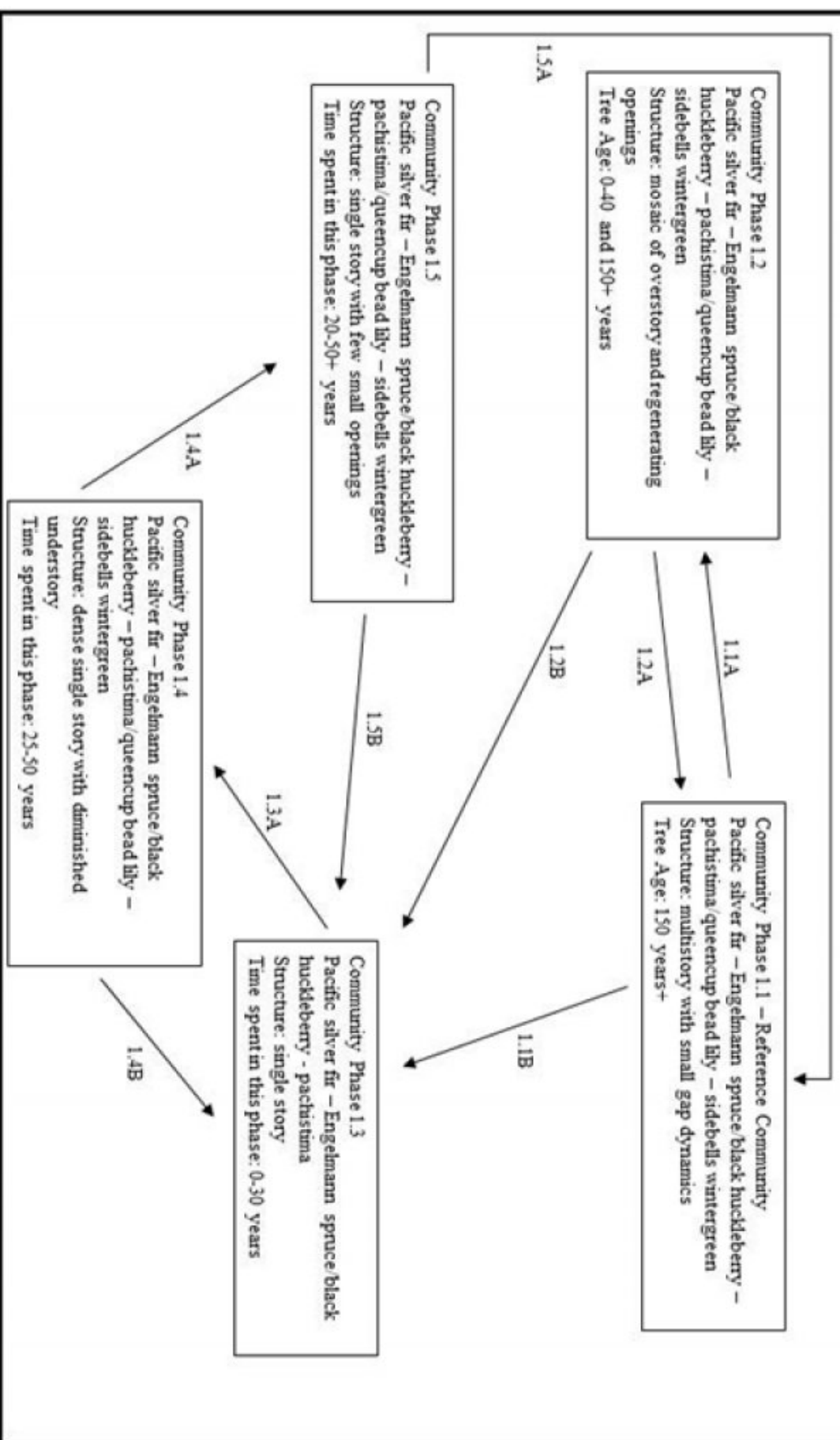
Ecological dynamics

This site is found on cool, dry, mid-elevations on the east side of the Cascade Crest. Pacific silver fir (*Abies amabilis*) and Engelmann spruce (*Picea engelmannii*) are the dominant overstory species with subalpine fir (*Abies lasiocarpa*), Douglas-fir (*Pseudotsuga menziesii*) and western hemlock (*Tsuga heterophylla*) often present. The historic fire regime is not well studied in these forests. The dominant overstory species of this site, with the exception of Douglas-fir, are not adapted to withstand fire, and therefore it is assumed that the fire frequency is one of relatively low frequency (150+ years) and high intensity. These fires would be stand replacing events. Windthrow would be a more common disturbance on these sites, leading to open patches within stands where increased sunlight would benefit the understory and tree seedlings and saplings. Common shrub species include black huckleberry (*Vaccinium membranaceum*), pachistima (*Paxistima myrsinites*), dwarf bramble (*Rubus lasiococcus*), Utah honeysuckle (*Lonicera utahensis*), prickly currant (*Ribes lacustre*) and princes pine (*Chimaphila umbellata*).

Common forbs include queencup bead lily (*Clintonia uniflora*), sidebells wintergreen (*Orthilia secunda*), threeleaf foamflower (*Tiarella trifoliata*) and western rattlesnake plantain (*Goodyera oblongifolia*).

State and transition model

1. Reference State (Site ID: F003XN929WA)



Abies amabilis – Picea engelmanni/Vaccinium membranaceum – Paxistima myrsinites/Clintonia uniflora – Orthilia secunda

Pacific silver fir – Engelmann spruce/black huckleberry – pachistima/queencup bead lily – sidebells wintergreen

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

Figure 4. State and Transition Model

Reference State

Community 1.1

Pacific silver fir – Engelmann spruce/black huckleberry – pachistima/queencup bead lily



Figure 5. Reference Community

Structure: multistory with small gap dynamics. Pacific silver fir and Engelmann spruce are the dominant overstory species in Community Phase 1.1 - Reference Community. Subalpine fir, western hemlock and Douglas-fir can all be minor overstory components. The amount of canopy cover will affect the continuity of the shrub layer; typically the canopy becomes less dense at the upper elevations of this ecological site. The most common natural disturbance on these sites would be the small gap dynamics following the death of one or two overstory trees, allowing for the release of advanced regeneration and/or an increase in the understory shrub community.

Community 1.2

Pacific silver fir – Engelmann spruce/black huckleberry – pachistima/queencup bead lily

Structure: mosaic of overstory and regenerating openings CP 1.2 retains some areas that resemble CP 1.1 but also contains moderate sized (2-5 acres) openings. Both of the dominant overstory species are host to a variety of root and heart rots which can either kill the tree outright or make it susceptible to windbreakage. A pocket of rot or a moderate windthrow event will create opens allowing for regeneration. The understory community would also benefit from increased sunlight may delay reforestation of the newly formed openings.

Community 1.3

Pacific silver fir – Engelmann spruce/black huckleberry – pachistima

Structure: single story/shrub. CP 1.3 is forestland in regeneration, possibly with scattered remnant mature trees; species composition depends on the natural seed sources present and the intensity of disturbance but would likely still be dominated by Pacific silver fir and Engelmann spruce. Both species are favored hosts of the western spruce budworm and a large outbreak of the defoliating insect would lead to CP 1.3 as would a stand-replacing wildfire. The variety of shrub species found on this site can compete for water and nutrients and this may result in delayed reforestation.

Community 1.4

Pacific silver fir – Engelmann spruce/black huckleberry – pachistima/queencup bead lily

Structure: single story CP 1.4 is a forest in the competitive exclusion stage, possibly with scattered remnant mature trees; there is increasing competition among individual trees for the available water and nutrients. Canopy closure is almost 100% in areas that have successfully reforested, leading to a diminished shrub understory. The increased shade does benefit many forb species (such as queencup bead lily, sidebells wintergreen, threeleaf foamflower and western rattlesnake plantain). Toward the end of this community phase the forest will begin to self-thin due to the overstory competition.

Community 1.5

Pacific silver fir – Engelmann spruce/black huckleberry – pachistima/queencup bead lily

Structure: single story with few small openings CP 1.5 is a maturing forest which is starting to differentiate vertically. The taller overstory canopy allows for more sunlight to reach the forest floor, as does the death of individual trees (whether due to insects, disease, competition or windthrow). This allows for an increase in understory abundance as well as for some pockets of overstory tree species regeneration.

Pathway 1.1A

Community 1.1 to 1.2

This pathway represents a larger disturbance – an insect infestation, wind storm or rot pocket would create this forest structure. Areas of regeneration would range from approximately 2 to 5 acres.

Pathway 1.1B

Community 1.1 to 1.3

This pathway represents a major stand-replacing disturbance such as a high-intensity fire, large scale wind event or major insect infestation.

Pathway 1.2A

Community 1.2 to 1.1

This pathway represents growth over time with no further significant disturbance. The areas of regeneration pass through the typical stand phases – competitive exclusion, maturation, 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 leading to the stand initiation phase of forest development.

Pathway 1.3A

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 leading to the stand initiation phase of forest development.

Pathway 1.4A

Community 1.4 to 1.5

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

Pathway 1.5A

Community 1.5 to 1.1

This pathway represents no further major disturbance. Continued growth over time, as well as ongoing mortality, leads to continued vertical diversification. The community begins to resemble the structure of the reference community, with pockets of regeneration and a continued increase in understory diversity.

Pathway 1.5B

Community 1.5 to 1.3

This pathway represents a major stand-replacing disturbance leading to the stand 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							
Pacific silver fir	ABAM	<i>Abies amabilis</i>	Native	—	—	—	—
Engelmann spruce	PIEN	<i>Picea engelmannii</i>	Native	—	—	—	—
subalpine fir	ABLA	<i>Abies lasiocarpa</i>	Native	—	—	—	—
Douglas-fir	PSME	<i>Pseudotsuga menziesii</i>	Native	—	—	—	—
western hemlock	TSHE	<i>Tsuga heterophylla</i>	Native	—	—	—	—

Table 6. Community 1.1 forest understory composition

Common Name	Symbol	Scientific Name	Nativity	Height (M)	Canopy Cover (%)
Forb/Herb					
bride's bonnet	CLUN2	<i>Clintonia uniflora</i>	Native	0.2–0.3	1–20
sidebells wintergreen	ORSE	<i>Orthilia secunda</i>	Native	0.2–0.3	1–10
threeleaf foamflower	TITR	<i>Tiarella trifoliata</i>	Native	0.2–0.6	1–10
western rattlesnake plantain	GOOB2	<i>Goodyera oblongifolia</i>	Native	0.2–0.3	1–10
Shrub/Subshrub					
thinleaf huckleberry	VAME	<i>Vaccinium membranaceum</i>	Native	0.3–1.2	5–60
Oregon boxleaf	PAMY	<i>Paxistima myrsinites</i>	Native	0.3–0.9	5–25
roughfruit berry	RULA2	<i>Rubus lasiococcus</i>	Native	0.2–0.3	1–20
prickly currant	RILA	<i>Ribes lacustre</i>	Native	0.3–1.2	1–15
pipsissewa	CHUM	<i>Chimaphila umbellata</i>	Native	0.2–0.3	1–10
Vine/Liana					
Utah honeysuckle	LOUT2	<i>Lonicera utahensis</i>	Native	0.3–7.6	1–15

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
Engelmann spruce	PIEN	80	110	76	127	95	—	—	
Pacific silver fir	ABAM	65	95	0	0	0	—	—	

Inventory data references

Type Locality Plot ID: 06-CAB-010

Type locality

Location 1: Chelan County, WA	
Township/Range/Section	T34N R17E S11
UTM zone	N

UTM northing	5370280
UTM easting	669840
Latitude	48° 27' 46"
Longitude	120° 42' 6"

Other references

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Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service. U.S. Department of Agriculture Handbook 436. <http://soils.usda.gov/technical/classification/taxonomy/>

Contributors

Kathryn Smith

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	05/19/2024
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:**
-