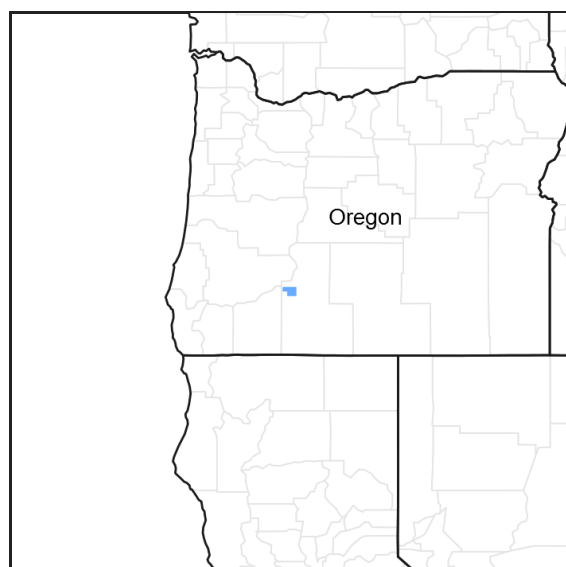


# **Ecological site F003XY700OR** **High Cascades Tree Line**

Last updated: 2/03/2025  
 Accessed: 05/10/2025

## **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.

**Table 1. Dominant plant species**

Tree	(1) <i>Pinus albicaulis</i>
Shrub	Not specified
Herbaceous	(1) <i>Luzula</i> (2) <i>Carex</i>

## **Physiographic features**

**Table 2. Representative physiographic features**

Landforms	(1) Ash flow (2) Debris flow (3) Stream
Flooding frequency	None
Ponding frequency	None
Elevation	7,000–8,900 ft
Slope	5–80%

Ponding depth	0 in
Water table depth	60 in
Aspect	Aspect is not a significant factor

## Climatic features

Winters are long, cold, windy and snowy, due to the very high elevations. Summers are short and cool. Effective precipitation comes mostly as snow. Average annual ppt is 67 inches.

**Table 3. Representative climatic features**

Frost-free period (average)	60 days
Freeze-free period (average)	90 days
Precipitation total (average)	100 in

## Influencing water features

None

## Soil features

This ecological site is found on soils formed in volcanic ash and andesitic lava deposits along high ridges.

**Table 4. Representative soil features**

Surface texture	(1) Paragravelly loamy sand (2) Ashy loamy sand
Family particle size	(1) Sandy
Drainage class	Somewhat excessively drained to excessively drained
Permeability class	Rapid to very rapid
Soil depth	60 in
Surface fragment cover <=3"	15–35%
Surface fragment cover >3"	0–30%
Available water capacity (0-40in)	2.9–7.2 in
Calcium carbonate equivalent (0-40in)	0%
Electrical conductivity (0-40in)	0 mmhos/cm
Sodium adsorption ratio (0-40in)	0
Soil reaction (1:1 water) (0-40in)	5.6–7.3
Subsurface fragment volume <=3" (Depth not specified)	15–40%
Subsurface fragment volume >3" (Depth not specified)	0–50%

## Ecological dynamics

The historic climax plant community is the Whitebark pine plant community. Under natural conditions the plant

community was very open. Whitebark pine dominated the overstory with possibly small amounts of lodgepole pine and mountain hemlock.

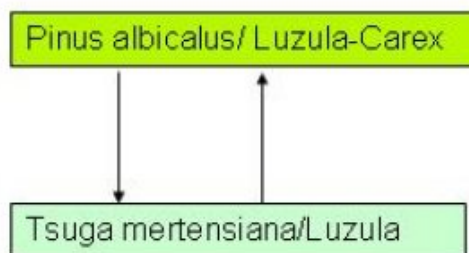
Fire frequency in whitebark plant communities was mixed in frequency and severity. Fire return intervals of 30 to 300+ years have been sited. Moderate fires (30-100 years) killed some whitebark and shade tolerant trees. Stand replacement fires (150+ years) killed almost all trees.

Whitebark would re-establish with the help of Clark's nutcracker, caching some seed in the soil. Seeds germinate in caches not found, producing new trees.

Fire exclusion allows Mountain hemlock to increase in composition in the plant community. Eventually it can become the dominant tree due to two reasons: 1) Fire exclusion, and 2) White Pine Blister rust.

White pine blister rust eventually kills an infected tree, though it can take decades. Early in the infection state, the disease limits seed production by infecting and killing cone producing branches. This leads to a decline in potential reproduction.

## State and transition model



## State 1 Reference

### Community 1.1 Whitebark Pine

Whitebark pine plant community is the Historic Climax Plant Community (HCPC). Site conditions are harsh. The

tree grows in exposed areas on tallus slopes. It is a fire dependent tree. The plant community described is an open plant community. Tree canopy cover is low and ground cover is low-moderate. This plant community is subsiding due to fire exclusion and the introduction of White Pine blister rust. This disease is having a detrimental affect on the whitebark pine. Infected trees ability to produce seed is drastically reduced. Trees are also dying before reaching seed bearing age.

**Forest overstory.** The typical forest overstory composition of the historic climax plant community.

**Forest understory.** The typical forest undestory composition of the historic climax plant community. Understory vegetation is expressed as "percent canopy" and "0" denotes less than 1% canopy.

**Table 5. Ground cover**

Tree foliar cover	15-20%
Shrub/vine/liana foliar cover	0-1%
Grass/grasslike foliar cover	15-20%
Forb foliar cover	0-1%
Non-vascular plants	0%
Biological crusts	0%
Litter	10-15%
Surface fragments >0.25" and <=3"	12-15%
Surface fragments >3"	3-8%
Bedrock	0%
Water	0%
Bare ground	25-30%

**Table 6. Soil surface cover**

Tree basal cover	0%
Shrub/vine/liana basal cover	0%
Grass/grasslike basal cover	2-5%
Forb basal cover	0-1%
Non-vascular plants	0%
Biological crusts	0%
Litter	15-20%
Surface fragments >0.25" and <=3"	15-20%
Surface fragments >3"	5-10%
Bedrock	0%
Water	0%
Bare ground	25-30%

**Table 7. Canopy structure (% cover)**

Height Above Ground (Ft)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.5	—	1-3%	3-7%	0-1%
>0.5 <= 1	—	0-1%	10-15%	—
>1 <= 2	0-1%	—	—	—
>2 <= 4.5	2-5%	—	—	—
>4.5 <= 13	2-5%	—	—	—
>13 <= 40	15-20%	—	—	—
>40 <= 80	—	—	—	—
>80 <= 120	—	—	—	—
>120	—	—	—	—

## Community 1.2 Mountain Hemlock Encroached

The mountain hemlock plant community occurs with the exclusion of fire. Normal fire occurrence kept the hemlock in check and allowed whitebark seed to germinate and grow without competition. The introduction of white pine blister rust is also having a negative affect on the white pine allowing mountain hemlock to encroach. The understory composition is low and so is the canopy cover.

**Forest overstory.** The typical forest overstory composition of the historic climax plant community.

**Forest understory.** The forest understory composition of the mountain hemlock plant community. Understory vegetation is expressed as "percent canopy" and "0" denotes less than 1% canopy.

**Table 8. Ground cover**

Tree foliar cover	20-30%
Shrub/vine/liana foliar cover	0%
Grass/grasslike foliar cover	10-15%
Forb foliar cover	0-1%
Non-vascular plants	0%
Biological crusts	0%
Litter	10-15%
Surface fragments >0.25" and <=3"	15-20%
Surface fragments >3"	5-10%
Bedrock	0%
Water	0%
Bare ground	20-30%

**Table 9. Soil surface cover**

Tree basal cover	1-2%
Shrub/vine/liana basal cover	0%
Grass/grasslike basal cover	2-5%
Forb basal cover	0-1%
Non-vascular plants	0%
Biological crusts	0%

Litter	10-15%
Surface fragments >0.25" and <=3"	10-15%
Surface fragments >3"	5-10%
Bedrock	0%
Water	0%
Bare ground	30-40%

**Table 10. Canopy structure (% cover)**

Height Above Ground (Ft)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.5	—	—	2-5%	0-1%
>0.5 <= 1	—	—	15-20%	—
>1 <= 2	1-2%	—	—	—
>2 <= 4.5	1-2%	—	—	—
>4.5 <= 13	5-10%	—	—	—
>13 <= 40	20-25%	—	—	—
>40 <= 80	2-5%	—	—	—
>80 <= 120	—	—	—	—
>120	—	—	—	—

## Pathway 1.1A

### Community 1.1 to 1.2

Exclusion of fire or introduction of white pine blister rust.

## Pathway 1.2A

### Community 1.2 to 1.1

Normal fire cycle

## Additional community tables

### Contributors

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## Approval

Kirt Walstad, 2/03/2025

## 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)	
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Contact for lead author	
Date	02/03/2025
Approved by	Kirt Walstad
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

## Indicators

1. **Number and extent of rills:**

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2. **Presence of water flow patterns:**

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3. **Number and height of erosional pedestals or terracettes:**

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):**

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5. **Number of gullies and erosion associated with gullies:**

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6. **Extent of wind scoured, blowouts and/or depositional areas:**

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7. **Amount of litter movement (describe size and distance expected to travel):**

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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):**
- 

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:**
-