Ecological site F006XA006WA
Cold Cryic Udic Mountain Slopes (Pacific Silver fir Cold Moist Shrub/Herb)

Last updated: 9/11/2023
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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): 006X–Cascade Mountains, Eastern Slope

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Stretching from northern Washington to southern Oregon, MLRA 6 encompasses the mountain slopes, foothills, elevated plateaus and valleys on the eastern slopes of the Cascade mountains. This MLRA is a transitional area between the Cascade Mountains to the west and the lower lying Columbia Basalt Plateau to the east. Situated in the rain shadow of the Cascade Crest, this MLRA receives less precipitation than portions of the cascades further west and greater precipitation than the basalt plateaus to the east. Geologically, the majority of the MLRA is dominated by Miocene volcanic rocks, while the northern portion is dominated by Pre-Cretaceous metamorphic rocks and the southern portion is blanketed with a thick mantle of ash and pumice from Mount Mazama. The soils in the MLRA dominantly have a mesic, frigid, or cryic soil temperature regime, a xeric soil moisture regime, and mixed or glassy mineralogy. They generally are moderately deep to very deep, well drained, and loamy or ashy. Biologically, the MLRA is dominated by coniferous forest, large expanses of which are dominated by ponderosa pine, Douglas-fir or lodgepole pine. Areas experiencing cooler and moister conditions include grand fir, white fir, and western larch while the highest elevations include pacific silver fir, subalpine fir and whitebark pine. Economically, timber harvest and recreation are important land uses in these forests. Historically, many of these forests would have experienced relatively frequent, low and mixed severity fire favoring the development of mature forests dominated by ponderosa pine or Douglas-fir. In the southern pumice plateau forests, less frequent, higher severity fire was common and promoted the growth of large expanses of lodgepole pine forests.

LRU notes

This ecological site resides on mountain slopes in the mountains at elevations of 2900 to 4900 feet on slopes 8 to 60 percent. The climate is cool and moist with 35 to 100 frost free days, mean annual air temperatures average 37 to 42 degrees Fahrenheit, and the mean annual precipitation ranges 35 to 70 inches.

Classification relationships

The ecological site relates to the Wenatchee National Forest plant associations:
CFS556 - Pacific silver fir/Cascade azalea-big huckleberry (ABAM/RHAL-VAME)
CFF254 - Pacific silver fir/deerfoot vanillaleaf (ABAM/ACTR)
CFS542 - Pacific silver fir/rusty menziesia (ABAM/MEFE)

Ecological site concept

The soils are Andisols, specifically Humic or Xeric Vitricryands that have and ashy-skeletal or ashy-pumiceous particle-size class, and Spodosols, specifically Andic Humicryods that have medial-skeletal over loamy-skeletal class. The parent materials are volcanic ash mixed with colluvium or pumice. These soils are in the cryic soil temperature and udic soil moisture regimes. These are well drained soils with no flooding, ponding or water table.

The Reference Community has *Abies amabilis* in the overstory and lower canopy layers, though seral species may be present in low cover including: ABGR, ABLA, PICO, PIMO3, PSME, TSHE, TSME. The understory is diverse and can include: RHAL2, ACTR, CLUN2, GOOB2, MEFE, PYROL, VAME, CARU, CHUM, GAOV2, LIBOL2, MANE2, PAMY, RUPA, ACHIL, CAGE2, FRAGA, MARE11, RIBES, ROSA5, VACA13, VACCI. The ecological site relates to the USFS plant associations: Pacific silver fir/Cascade azalea-big huckleberry, Pacific silver fir/deerfoot vanillaleaf and Pacific silver fir/rusty menziesia.

Associated sites

F006XA003WA	**Cryic Xeric Mountain Slopes (Subalpine fir Cool Moderately Dry Shrub/Herb)** Slightly warmer and drier.

Similar sites

F006XB002WA	**Cold Cryic Udic Mountain Slopes (Mountain Hemlock Cold Moderately Moist Shrub/Herb)** Higher elevations

Table 1. Dominant plant species

Tree	(1) *Abies amabilis*
Shrub	Not specified
Herbaceous	Not specified

Physiographic features

This ecological site resides on mountain slopes in the mountains at elevations of 2900 to 4900 feet on slopes of 8 to 55 percent.

Table 2. Representative physiographic features

Landforms	(1) Mountains > Mountain slope
Flooding frequency	None
Ponding frequency	None
Elevation	2,900–4,900 ft
Slope	8–60%
Aspect	W, NW, N, NE, E, SE, S, SW

Climatic features

The climate is cool and moist with average frost-free days of 43 to 87 days, mean annual air temperatures average 37 to 42 degrees Fahrenheit and the mean annual precipitation ranges 48 to 62 inches.

Table 3. Representative climatic features

Frost-free period (actual range)	43-87 days
Freeze-free period (actual range)	
Precipitation total (actual range)	48-62 in

Influencing water features

This site is not influenced by water from a wetland or stream.

Wetland description

N/A

Soil features

The soils are Andisols, specifically Humic or Xeric Vitricryands that have and ashy-skeletal or ashy-pumiceous particle-size class, and Spodosols, specifically Andic Humicryods that have medial-skeletal over loamy-skeletal class. The parent materials are volcanic ash mixed with colluvium or pumice. These soils are in the cryic soil temperature and udic soil moisture regimes. These are well-drained soils with no flooding, ponding or water table.

Table 4. Representative soil features

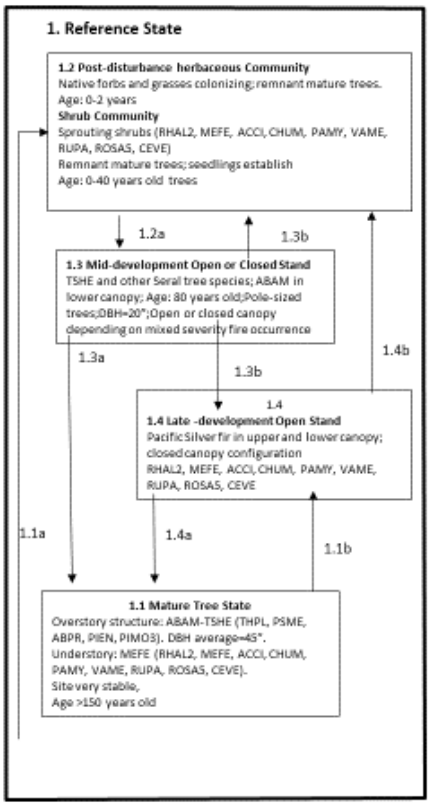
Parent material	(1) Volcanic ash (2) Colluvium (3) Pumice
Surface texture	(1) Ashy sandy loam
Family particle size	(1) Ashy-skeletal (2) Ashy-pumiceous
Drainage class	Well drained
Depth to restrictive layer	40–60 in
Soil depth	40–60 in
Surface fragment cover <=3"	0–20%
Surface fragment cover >3"	0–5%

Ecological dynamics

The fire return interval is generally rare (200 to 500 years) and is stand replacing, *Abies amabilis* is a fire avoider, meaning it perishes in fire although the resident seedbank and windblown tree seedlings quickly re-establish, shrubs re-sprout and pioneering herbaceous species establish on the site post-fire. Shrubs form a post-disturbance phase and include vine maple, Douglas maple, Scouler willow, pachistima, big huckleberry, serviceberry, Sitka alder and snowbrush ceanothus. Fires on the east side of the continental divide are more frequent due to the continental climate factors. Fire is a rare, large patch disturbance while diseases and insects are frequent, small disturbances that serve to open the tree canopy in patches and include: annosum and laminated root disease in ABLA, PIEN, ABAM, ABGR, TSHE, TSME; Indian paint fungus, mistletoe; severe outbreaks w/ mountain pine beetle (sere PICO), silver fir beetle.

FIRE
Rare, stand replacement 200-500 FRI
• FEIS: FRI=200-500 yrs. Severe stand replacing fire. IS A FIRE AVOIDER – PERISHES IN FIRE.
• WENA FRI=400 yrs.
• LANDFIRE: BPS 0111740 North Pacific Dry-Mesic Silver Fir-Western Hemlock-Douglas-fir Forest
Site index: Pacific Silver fir 55 – 90 100TA, Hoyer, Herman 1989 (05); Subalpine fir 60 – 80 100BA, Alexander 1967 (412); Douglas-fir 50 – 73 50BA, Cochran 1979b (765); Mountain Hemlock 70 100TA, Barnes 1962 (990); Grand fir 50 – 60 50BA, Cochran 1979a (031); Lodgepole pine 60 – 75 100TA, Alexander 1966 (520); Western hemlock 70 – 80 100TA, Barnes 1962 (990); Western larch 45 – 57 50TA, Schmidt 1976 (265); Western white pine 40 50TA, Haig 1932 (570)

State and transition model



1 Reference State

1.1 This phase has an overstory dominated by Pacific Silver Fir, with numerous lower tree canopies of seral species (ABGR, ABLA, PICO, PIMO3, PSME, TSHE, (less than 10% of TSME)), an understory of tall shrubs, and cool, moist adapted herbaceous species including: RHAL2, ACTR, CLUN2, GOOB2, MEFE, PYROL, VAME, CARU, CHUM, GAOV2, LIBOL2, MANE2, PAMY, RUPA, ACHIL, CAGE2, FRAGA, MARE11, RIBES, ROSA5, VACA13, ACCI.

1.2 Pioneering herbaceous community. Immediately post-fire, windblown tree seeds establish, shrub and herbaceous plants resprout and pioneering herbaceous plants establish on mineral soil interspaces. This is a short duration community phase. **Shrub Community**. This plant community contains a high diversity of shrubs including RHAL2, MEFE, ACCI, CHUM, PAMY, VAME, RUPA, ROSA5, CEVE). Seedlings mature to saplings. Seral species: ABGR, ABLA, PICO, PIMO3, PSME, TSHE, (less than 10% of TSME).

1.3 Mid-development community. This phase is dominated by a mix of Pacific Silver fir and seral tree species that are pole sized and are in either an open or closed canopy depending on the occurrence of mixed severity fire. If mixed severity fire occurs than an open canopy is created and maintained. The lower, secondary tree canopy layer is of Pacific Silver fir.

1.4 Late-development community. This plant community is dominated by larger trees that is a mix of Pacific Silver fir and seral tree species in the overstory in either an open or closed canopy configuration depending on the occurrence of mixed severity fire. Fire would create and maintain an open canopy configuration. The lower tree canopy has Pacific Silver fir.

1.1a Rare, stand-replacement fire that kills significant number of mature trees and top-kills shrubs and herbaceous plants. This disturbance causes a return to the pioneering, herbaceous community with resprouting shrubs.
1.1b Mixed severity fire can allow Douglas fir a competitive advantage over Pacific Silver Fir, resulting in community phase 1.4.
1.2a Saplings of seral tree species and Pacific Silver fir mature to pole-sized trees in either a closed canopy, if mixed severity fire does not occur or an open canopy if it does.
1.3a With time, the mid development community will grow into the mature reference phase.
1.3b Mixed severity fire can prefer Douglas fir, which dominates community phase 1.4.
1.4a With time, Pacific Silver fir in the lower tree canopy will dominate the overstory and transition the community phase to the reference phase.
1.4b Stand replacement fire would return this forest to the pioneering herbaceous phase.

State 1
Reference State

Community 1.1
Mature Tree State

This phase has an overstory dominated by Pacific silver fir, with numerous lower tree canopies of seral species (ABGR, ABLA, PICO, PIMO3, PSME, TSHE, (less than 10 percent of TSME)), an understory of tall shrubs, and cool, moist adapted herbaceous species including: RHAL2, ACTR, CLUN2, GOOB2, MEFE, PYROL, VAME, CARU, CHUM, GAOV2, LIBOL2, MANE2, PAMY, RUPA, ACHIL, CAGE2, FRAGA, MARE11, RIBES, ROSA5, VACA13, ACCI.

Dominant plant species

- Pacific silver fir (*Abies amabilis*), tree
- grand fir (*Abies grandis*), tree
- lodgepole pine (*Pinus contorta*), tree
- western white pine (*Pinus monticola*), tree
- Douglas-fir (*Pseudotsuga menziesii*), tree
- western hemlock (*Tsuga heterophylla*), tree
- Cascade azalea (*Rhododendron albiflorum*), shrub
- rusty menziesia (*Menziesia ferruginea*), shrub
- wintergreen (*Pyrola*), shrub
- thinleaf huckleberry (*Vaccinium membranaceum*), shrub
- western teaberry (*Gaultheria ovatifolia*), shrub
- Oregon boxleaf (*Paxistima myrsinites*), shrub
- thimbleberry (*Rubus parviflorus*), shrub
- creeping barberry (*Mahonia repens*), shrub
- currant (*Ribes*), shrub
- rose (*Rosa*), shrub
- vine maple (*Acer circinatum*), shrub
- pinegrass (*Calamagrostis rubescens*), grass
- sweet after death (*Achlys triphylla*), other herbaceous

- bride's bonnet (*Clintonia uniflora*), other herbaceous
- western rattlesnake plantain (*Goodyera oblongifolia*), other herbaceous
- pipsissewa (*Chimaphila umbellata*), other herbaceous
- longtube twinflower (*Linnaea borealis ssp. longiflora*), other herbaceous
- yarrow (*Achillea*), other herbaceous
- Geyer's sedge (*Carex geyeri*), other herbaceous
- strawberry (*Fragaria*), other herbaceous

Community 1.2
Post-disturbance herbaceous community

Pioneering herbaceous community. Immediately post-fire, windblown tree seeds establish, shrub and herbaceous plants re-sprout and pioneering herbaceous plants establish on mineral soil interspaces. This is a short duration community phase. Shrub Community. This plant community contains a high diversity of shrubs including RHAL2, MEFE, ACCI, CHUM, PAMY, VAME, RUPA, ROSA5, CEVE). Seedlings mature to saplings. Seral species: ABGR, ABLA, PICO, PIMO3, PSME, TSHE, (less than 10 percent of TSME).

Dominant plant species

- grand fir (*Abies grandis*), tree
- subalpine fir (*Abies lasiocarpa*), tree
- lodgepole pine (*Pinus contorta*), tree
- western white pine (*Pinus monticola*), tree
- Douglas-fir (*Pseudotsuga menziesii*), tree
- western hemlock (*Tsuga heterophylla*), tree
- Cascade azalea (*Rhododendron albiflorum*), shrub
- rusty menziesia (*Menziesia ferruginea*), shrub
- vine maple (*Acer circinatum*), shrub
- Oregon boxleaf (*Paxistima myrsinites*), shrub
- thinleaf huckleberry (*Vaccinium membranaceum*), shrub
- thimbleberry (*Rubus parviflorus*), shrub
- rose (*Rosa*), shrub
- snowbrush ceanothus (*Ceanothus velutinus*), shrub

Community 1.3
Mid-development open or closed stand

Mid-development community. This phase is dominated by a mix of Pacific silver fir and seral tree species that are pole-sized and are in either an open or closed canopy depending on the occurrence of mixed severity fire. If mixed severity fire occurs than an open canopy is created and maintained. The lower, secondary tree canopy layer is of Pacific Silver fir.

Dominant plant species

- Pacific silver fir (*Abies amabilis*), tree
- western hemlock (*Tsuga heterophylla*), tree

Community 1.4
Late-development open stand

This plant community is dominated by larger trees, a mix of Pacific silver fir and seral tree species in the overstory in either an open or closed canopy configuration depending on the occurrence of mixed severity fire. Fire would create and maintain an open canopy configuration. The lower tree canopy has Pacific silver fir.

Dominant plant species

- Pacific silver fir (*Abies amabilis*), tree
- Cascade azalea (*Rhododendron albiflorum*), shrub
- rusty menziesia (*Menziesia ferruginea*), shrub

- vine maple (*Acer circinatum*), shrub
- Oregon boxleaf (*Paxistima myrsinites*), shrub
- thinleaf huckleberry (*Vaccinium membranaceum*), shrub
- thimbleberry (*Rubus parviflorus*), shrub
- rose (*Rosa*), shrub
- snowbrush ceanothus (*Ceanothus velutinus*), shrub
- pipsissewa (*Chimaphila umbellata*), shrub

Pathway 1.1a
Community 1.1 to 1.2

Rare, stand-replacement fire that kills significant number of mature trees and top-kills shrubs and herbaceous plants. This disturbance causes a return to the pioneering, herbaceous community with re-sprouting shrubs.

Pathway 1.1b
Community 1.1 to 1.4

Mixed severity fire can allow Douglas-fir a competitive advantage over Pacific silver fir, resulting in Community Phase 1.4.

Pathway 1.2a
Community 1.2 to 1.3

Saplings of seral tree species and Pacific silver fir mature to pole-sized trees in either a closed canopy, if mixed severity fire does not occur or an open canopy if it does.

Pathway 1.3a
Community 1.3 to 1.1

With time, the mid development community will grow into the mature Reference Phase.

Pathway 1.3b
Community 1.3 to 1.2

Mixed severity fire can prefer Douglas fir, which dominates Community Phase 1.4.

Pathway 1.3b
Community 1.3 to 1.4

Mixed severity fire can prefer Douglas fir, which dominates Community Phase 1.4.

Pathway 1.4b
Community 1.4 to 1.2

Stand replacement fire would return this forest to the pioneering herbaceous phase.

Additional community tables

Inventory data references

Information presented here has been derived from NRCS data. Field observations from range trained personnel were also used. Other sources used as references include USDA NRCS Water and Climate Center, USDA NRCS National Range and Pasture Handbook, and USDA NRCS Soil Surveys from various counties.

Other references

Lillybridge, Terry R., et al. "Field guide for forested plant associations of the Wenatchee National Forest." Gen.

Tech. Rep. PNW-GTR-359. Portland, OR: US Department of Agriculture, Forest Service, Pacific Northwest Research Station. 335 p. In cooperation with: Pacific Northwest Region, Wenatchee National Forest 359 (1995).

Brockway, Dale G. Plant association and management guide for the Pacific silver fir zone: Gifford Pinchot National Forest. US Department of Agriculture, Forest Service, Pacific Northwest Region, 1983.

Henderson, Jan A. Field guide to the forested plant associations of the Mt. Baker-Snoqualmie National Forest. Vol. 28. No. 91. USDA, Forest Service, Pacific Northwest Region, 1992.

Landfire, USFS FEIS.

Contributors

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Approval

Kirt Walstad, 9/11/2023

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	10/12/2024
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:

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17. **Perennial plant reproductive capability:**