Ecological site F006XA005WA
Cool Frigid Xeric Mountain Slopes (Douglas-fir Cool Moderately Dry Shrub/Herb)

Last updated: 9/11/2023
Accessed: 10/12/2024

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

Major Land Resource Area (MLRA): 006X–Cascade Mountains, Eastern Slope.

Stretching from northern Washington to southern Oregon, MLRA6 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

Major Land Resource Area: 6 – Cascade Mountains, Eastern Slopes
Modal Land Resource Unit (LRU): Common Resource Area (CRA) 6.3 - Okanogan Pine / Fir Hills

This LRU occurs predominantly on slopes of mountains. The soils are dominantly in the Andisols and Inceptisols taxonomic order. Soil parent materials are dominantly colluvium and residuum from igneous, sedimentary, and metamorphic rock, and glacial till, with a mantle or mixture of volcanic ash in the upper part. Taxonomic soil climate is a frigid temperature regime and xeric moisture regime with average annual precipitation of about 24 inches.

Other LRU'S where the site occurs:
CRA 6.2 - Pasayten / Sawtooth Highland
CRA 6.5 - Chiwaukum Hills and Lowlands

Classification relationships

Forest Service Plant Associations:

CDS832 - Douglas-fir/low huckleberry (PSME/VAMY2)
CDS811 - Douglas-fir/huckleberry (PSME/VACCI)
CDS831 – Douglas-fir/dwarf huckleberry (PSME/VACA)

Associated sites

F006XA003WA	**Cryic Xeric Mountain Slopes (Subalpine fir Cool Moderately Dry Shrub/Herb)** Cooler, higher elevation sites.
F006XA001WA	**Cool Frigid Xeric Ashy Slopes (Douglas-fir Cool Dry Grass)** Higher elevation. Understory is dominated by pinegrass Occurs on southerly aspects.

Similar sites

F006XA001WA	**Cool Frigid Xeric Ashy Slopes (Douglas-fir Cool Dry Grass)** Higher elevation. Understory is dominated by pinegrass Occurs on southerly aspects.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	Not specified

Physiographic features

This ecological site is on mountain slopes. It is typically found between 3500 and 5000 feet in elevation on all aspects. Slope gradients range from 15 to 65 percent.

Table 2. Representative physiographic features

Landforms	(1) Mountains > Mountain slope
Flooding frequency	None
Ponding frequency	None
Elevation	3,500–5,000 ft
Slope	25–50%
Water table depth	80 in
Aspect	W, NW, N, NE, E, SE, S, SW

Table 3. Representative physiographic features (actual ranges)

Flooding frequency	None
Ponding frequency	None
Elevation	2,000–5,500 ft
Slope	15–65%
Water table depth	80 in

Climatic features

Mean Annual precipitation
Total Range: 20 - 40 inches
Central tendency: 22 - 38 inches

Mean Annual Air Temperature
Total Range: 3.9 - 7.2 C (39 - 45 F)

Central tendency: 4.4 - 6.7 C (40 - 44 F)

Frost-free period (days)
Total range: 80 - 125
Central tendency: 100 - 110

Table 4. Representative climatic features

Frost-free period (characteristic range)	100-110 days
Freeze-free period (characteristic range)	
Precipitation total (characteristic range)	22-38 in
Frost-free period (actual range)	80-125 days
Freeze-free period (actual range)	
Precipitation total (actual range)	20-40 in

Influencing water features

Soil features

This ecological site is associated with several soil mapunit components. The components are dominantly Typic Vitrixerands in the Andisols taxonomic order and Vitrandic Haploxerepts in the Inceptisols order. Soils are dominantly moderately deep to very deep and have average available water capacity of about 4.3 inches (10.9 cm) in the 0 to 40-inches (0-100 cm) depth range. Soil parent material is dominantly volcanic ash deposits over glacial till, and colluvium and residuum from granitic, volcanic, metamorphic, and sedimentary rock.
Dominant Soil Series: Brevco, Kafing, Louploup, Nevine, Pebcreek

Parent Materials:
Kind – volcanic ash, residuum, colluvium, glacial till
Origin – granitic rock, volcanic rock, metavolcanic rock, sedimentary rock, mixed sources

Table 5. Representative soil features

Surface texture	(1) Ashy sandy loam (2) Ashy fine sandy loam
Family particle size	(1) Sandy-skeletal (2) Loamy-skeletal (3) Ashy over loamy-skeletal
Drainage class	Well drained
Depth to restrictive layer	20–60 in
Surface fragment cover <=3"	0–20%
Surface fragment cover >3"	0–10%
Available water capacity (0-40in)	2.2–7 in
Soil reaction (1:1 water) (0-40in)	5.6–7.3
Subsurface fragment volume <=3" (Depth not specified)	15–35%
Subsurface fragment volume >3" (Depth not specified)	4–17%

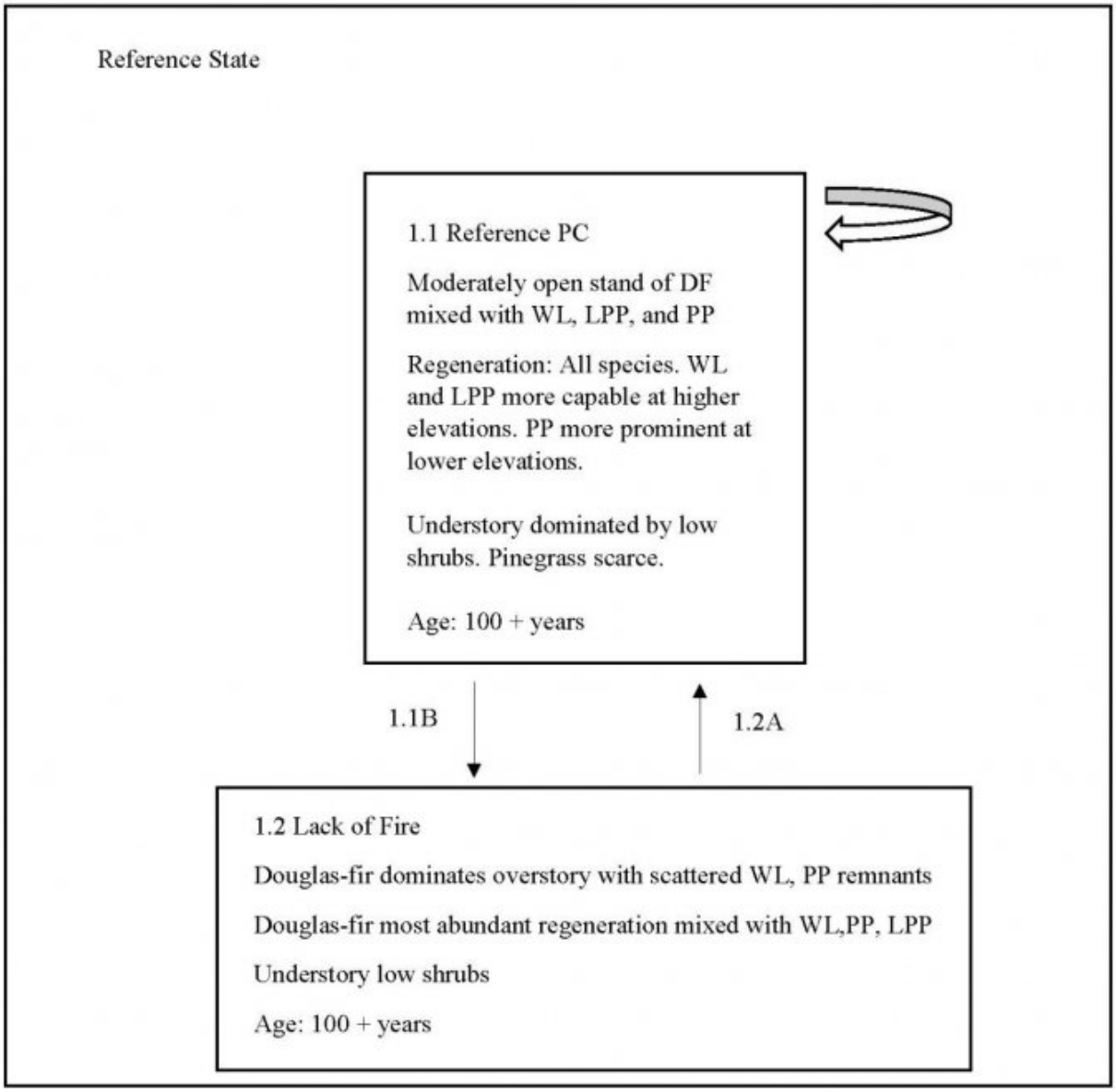
Table 6. Representative soil features (actual values)

Drainage class	Well drained
Depth to restrictive layer	20–60 in
Surface fragment cover <=3"	0–20%
Surface fragment cover >3"	0–10%
Available water capacity (0-40in)	2.2–7 in
Soil reaction (1:1 water) (0-40in)	5.6–7.3
Subsurface fragment volume <=3" (Depth not specified)	15–35%
Subsurface fragment volume >3" (Depth not specified)	4–17%

Ecological dynamics

This site is designated as Douglas-Fir Cool Moderately Dry Shrub/Herb. Elevation ranges 3500 – 5000 feet. Slopes can range 25 – 50%. Precipitation ranges 22 – 38 inches. Most of this site occurs on midslopes. It's a cool moderately dry environment. Main tree species are Douglas-fir, western larch, lodgepole pine, and ponderosa pine. Western larch and lodgepole pine will dominate early stands at higher elevations and north slopes. Ponderosa pine will be more prominent at lower warmer elevations. Douglas-fir is the dominant tree in late seral or climax condition. All tree species can establish in early seral conditions. Large ponderosa pine and larch remnants can be present in older forests. Fire frequencies tended to be frequent with moderately open stands.
The main understory species are low huckleberry, buffaloberry, pachistima, spirea, and bearberry. Big huckleberry may also be present. Dwarf huckleberry prominent in the PSME/VACA site. The most constant herb is pinegrass. This site will grade into Douglas-fir/bearberry on rocky/gravelly sites. Lack of bearberry and huckleberry and abundant pinegrass indicates a gradation into Douglas-fir/pinegrass.
The following USFS plant associations are included in this ecological site:
Douglas-fir/low huckleberry (PSME/VAMY) Central Zone Wenatchee National Forest
Douglas-fir/huckleberry (PSME/VACCI) – North Zone Okanogan National Forest
Douglas-fir/dwarf huckleberry (PSME/VACA) – North Zone Okanogan National Forest
All of the plant associations have moderate acreage in their respective areas.
Main insects and disease concerns are bark beetles and dwarf mistletoe.
Site productivity is moderate. Douglas-fir site index range is 55 – 85 (Cochran 1979b (765) 50BHA); Ponderosa pine site index range is 60 -105 (Meyer 1961 (600) 100TA); Western larch site index range is 40 – 70 (Cochran 1985 (265) 50BHA); Lodgepole pine site index range is 60 – 90 (Alexander 1966 (520).

State and transition model



State 1
Reference State

Community 1.1
Reference PC

Moderately open stand of DF mixed with WL, LPP, and PP Regeneration: All species. WL and LPP more capable at higher elevations. PP more prominent at lower elevations. Understory dominated by low shrubs. Pinegrass scarce. Age: 100 + years

Resilience management. 1.1A – Frequent ground fires keep regeneration down and maintain moderately open stand keeping reference plant community.

Dominant plant species

- Douglas-fir (*Pseudotsuga menziesii*), tree
- western larch (*Larix occidentalis*), tree
- lodgepole pine (*Pinus contorta*), tree
- ponderosa pine (*Pinus ponderosa*), tree
- whortleberry (*Vaccinium myrtillus*), shrub
- buffaloberry (*Shepherdia*), shrub
- Oregon boxleaf (*Paxistima myrsinites*), shrub
- spirea (*Spiraea*), shrub
- pinegrass (*Calamagrostis rubescens*), grass

Community 1.2
Lack of Fire

Douglas-fir dominates overstory with scattered WL, PP remnants Douglas-fir most abundant regeneration mixed with WL,PP, LPP Understory low shrubs Age: 100 + years

Pathway 1.1B
Community 1.1 to 1.2

Time. Lack of frequent ground fire. Overstory stand becomes dominated by Douglas-fir and regeneration grows. Stands become denser.

Pathway 1.2A
Community 1.2 to 1.1

Patchy mixed severity fires open up stand followed by frequent ground fires to maintain reference plant community.

Additional community tables

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
Douglas-fir	*PSME*	55	85	–	–	–	–	–	
ponderosa pine	*PIPO*	60	105	–	–	–	–	–	
western larch	*LAOC*	40	70	–	–	–	–	–	
lodgepole pine	*PICO*	60	90	–	–	–	–	–	

Inventory data references

The following USFS plant associations are included in this ecological site:
Douglas-fir/low huckleberry (PSME/VAMY) Central Zone Wenatchee National Forest
Douglas-fir/huckleberry (PSME/VACCI) – North Zone Okanogan National Forest

Both plant associations have moderate acreage in their respective areas.

Other references

Field Guide for Forest Plant Associations of the Wenatchee National Forest. Lillybridge et al. PNW-GTR-359. October 1995

Forest Plant Associations of the Okanogan National Forest. R-Ecol-132B. Williams, Lillybridge. September 1983

Washington Natural Heritage Program. Ecosystems of Washington State, A Guide to Identification, Rocchio and Crawford, 2015 - Northern Rocky Mt. Dry-Mesic Montane Mixed Conifer Forest (D. Fir – Pine)

USDA, NRCS Forest-Soil Eco classifications.

Contributors

Gary Kuhn
Frank Gariglio
Kelley Paups-Lefferts

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:**

---

17. **Perennial plant reproductive capability:**