Ecological site F006XA002WA
Mesic Xeric Hill Slopes and Terraces
(Ponderosa Pine Hot Dry Grass)

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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

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 hills and mountains, and glacial outwash terraces. The soils are dominantly in the Mollisols taxonomic order with minor areas of Alfisols and Entisols . Soil parent materials are dominantly colluvium and residuum from igneous, sedimentary, and metamorphic rock, glacial outwash, and glacial till, with a mixture of volcanic ash and loess in the upper part. Taxonomic soil climate is primarily a mesic temperature regime and xeric moisture regime with average annual precipitation of about 17 inches. Other LRU'S where the site occurs: CRA 6.4 - Chelan Tephra Hills CRA 6.5 - Chiwaukum Hills and Lowlands

Classification relationships

Forest Service Plant Associations: CPG141 (WEN) – Ponderosa pine/bluebunch wheatgrass (PIPO/PSSP) CDG322 (WEN) – Douglas-fir/bluebunch wheatgrass (PSME/PSSP) CD-G3-11 (OKAN) – Ponderosa pine-Douglas-fir/beardless bluebunch wheatgrass (PSME-PIPO/AGIN) CDS637 – Douglas-fir/snowberry/bluebunch wheatgrass (PSME/SYAL/PSSP) CDG134 – Douglas-fir/pinegrass-bluebunch wheatgrass (PSME/CARU-PSSP)

Associated sites

F006XA007WA	**Warm Frigid Xeric Mountain Slopes (Douglas-fir Warm Dry Shrub/Herb)** On cooler, moister sites.

F006XB004WA	**Mesic Xeric Foothills and Mountain Slopes (Ponderosa Pine Hot Dry Shrub Grass)** Associated in Okanogan and Chelan counties. Is a little cooler and moister.

Similar sites

F006XB004WA	**Mesic Xeric Foothills and Mountain Slopes (Ponderosa Pine Hot Dry Shrub Grass)** This site contains antelope bitterbrush in the understory.

Table 1. Dominant plant species

Tree	(1) *Pinus ponderosa*
Shrub	Not specified
Herbaceous	(1) *Pseudoroegneria spicata*

Physiographic features

This ecological site occurs mainly on plateaus, and back slopes, shoulders and foot slopes of hills and mountains, and glacial outwash terraces. It is found between 1,100 feet and 6,500 feet in elevation on all aspects. Slope gradients generally range from 8 to 65 percent but can be found on slopes up to 90 percent.

Table 2. Representative physiographic features

Landforms	(1) Plateau > Terrace (2) Mountains > Mountain slope (3) Foothills > Hillslope
Flooding frequency	None
Ponding frequency	None
Elevation	550 – 1,160 m
Slope	10 – 70 %
Water table depth	80 – 200 cm
Aspect	W, NW, N, NE, E, SE, S, SW

Table 3. Representative physiographic features (actual ranges)

Flooding frequency	Not specified
Ponding frequency	Not specified
Elevation	340 – 1,980 m
Slope	0 – 90 %
Water table depth	Not specified

Climatic features

Mean Annual precipitation
Total Range: 11 - 40 inches
Central tendency: 13 - 20 inches

Mean Annual Air Temperature
Total Range: 4 - 11 C (39 - 52 F)
Central tendency: 6 - 9 C (43 - 48 F)

Frost-free period (days)
Total range: 80 - 155

Table 4 Representative climatic features

Frost-free period (characteristic range)	110-150 days
Freeze-free period (characteristic range)	
Precipitation total (characteristic range)	330-510 mm
Frost-free period (actual range)	80-160 days
Freeze-free period (actual range)	
Precipitation total (actual range)	280-1,020 mm

Influencing water features

Soil features

This ecological site is associated with several soil mapunit components. The components are dominantly Haploxerolls in the Mollisols taxonomic order, with minor areas of Argixerolls. Soils range from shallow to very deep and have average available water capacity of about 4.2 inches (10.7 cm) in the 0 to 40-inches (0-100 cm) depth range. Soil parent material is dominantly colluvium and residuum from granitic, volcanic, metamorphic, and sedimentary rock, glacial outwash, and glacial till, with minor amounts of volcanic ash and loess.

Dominant Soil Series: Donavan, Peka, Swakane, Vanbrunt, Winthrop

Parent Materials:
Kind – colluvium, residuum, glacial outwash, glacial till, minor amounts of volcanic ash and loess
Origin – granitic, volcanic, metamorphic, and sedimentary rock

Water Table Depth: Total range: 30 to greater than 80 inches
Central tendency: greater than 80 inches

Figure 1. Map of soil mapunits with a major component linked to the Ponderosa Pine Warm Dry Grass Ecological Site

Table 5. Representative soil features

Surface texture	(1) Ashy loam (2) Ashy sandy loam
Family particle size	(1) Coarse-loamy (2) Loamy-skeletal (3) Sandy-skeletal
Drainage class	Well drained
Depth to restrictive layer	30 – 150 cm
Surface fragment cover <=3"	0 – 30 %
Surface fragment cover >3"	0 – 20 %
Available water capacity (0-101.6cm)	2.03 – 22.61 cm
Calcium carbonate equivalent (Depth not specified)	0 – 10 %
Electrical conductivity (Depth not specified)	Not specified
Sodium adsorption ratio (Depth not specified)	0 – 10

Soil reaction (1:1 water) (0-25.4cm)	5.3 – 7.3
Subsurface fragment volume <=3" (Depth not specified)	0 – 50 %
Subsurface fragment volume >3" (Depth not specified)	0 – 30 %

Table 6. Representative soil features (actual values)

Drainage class	Moderately well drained to somewhat excessively drained
Depth to restrictive layer	30 – 150 cm
Surface fragment cover <=3"	0 – 30 %
Surface fragment cover >3"	0 – 20 %
Available water capacity (0-101.6cm)	2.03 – 22.61 cm
Calcium carbonate equivalent (Depth not specified)	0 – 10 %
Electrical conductivity (Depth not specified)	0 mmhos/cm
Sodium adsorption ratio (Depth not specified)	0 – 10
Soil reaction (1:1 water) (0-25.4cm)	5.3 – 7.3
Subsurface fragment volume <=3" (Depth not specified)	0 – 50 %

Subsurface fragment volume >3" (Depth not specified)	0 – 30 %

Ecological dynamics

This reference site is located on very warm dry slopes with Ponderosa pine the only tree species with an understory of mainly bluebunch wheatgrass, Idaho Fescue, and some needle and thread grass. Average elevation range is 1800 – 3800 feet. Average precipitation range is 15 - 40 inches. Tree stocking is low with large open grown Ponderosa pine and small amounts of sapling/pole size pine in understory. Frequent ground fires every 10-15 years kept pine regeneration low and perpetuated this condition with a dominant grass understory. With fire exclusion a mosaic of pine cohorts underneath the large pine survive, but rarely form a closed canopy. In addition, some woodland shrubs may establish, and an occasional Douglas-fir is restricted to microsites. Soils are mainly sandy loams or loamy sands. The main/modal plant association in this ecological site is Ponderosa pine/bluebunch wheatgrass. Other plant associations this ecological site includes are PSME/PSSP, PIPO-PSME/AGIN, PSME/SYAL/PSSP, and PSME/CARU-PSSP. Douglas-fir will be more prominent at higher elevations and woodland shrubs can be present in the understory. On most sites Douglas-fir will be subdominant to pine.

State and transition model

Additional community tables

Table 7. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 8. Community 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 9. Community 1.3 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 10. Community 1.4 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 11. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 12. Community 3.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Inventory data references

Relationship to Other Established Classifications: United States National Vegetation Classification (2008) – A3447 Ponderosa Pine / Herbaceous Understory Central Rocky Mt. Forest & Woodland Alliance Washington Natural Heritage Program. Ecosystems of Washington State, A Guide to Identification, Rocchio and Crawford, 2015 – Northern Rocky Mountain Ponderosa Pine Woodland and Savanna Level III and IV Ecoregions of WA, US EPA, June 2010 – 77e Okanogan Pine/Fir Hills, 77f Chelan Tephra Hills USDA NRCS WA Common Resource Areas. CRA 6.3 Okanogan Pine/Fir Hills. CRA 6.4 Chelan Tephra Hills This ecological site includes the following USDA Forest Service Plant Associations: PIPO/PSSP, and PIPO-PSME/PSSP.

Other references

Forest Vegetation of Eastern Washington and Northern Idaho. Washington State University, College of Agriculture, Tech. Bulletin 60, R. Daubenmire and J. Daubenmire, 1968
Fire Ecology of the Forest Habitat Types of Northern Idaho. USFS Intermountain Research Station, GT Report INT – GTR – 363, Smith and Fischer, 1997.
NRCS Nat. Forestry Manual, 1998
Forest Plant Associations of the Okanogan Nat. Forest. R6-Ecol-132b-1983. Williams, Lillybridge. Sept. 1983

Forested Plant Associations of the Wenatchee Nat. Forest. PNW-GTR-359, Lillybridge et. al. October 1995
NRCS Soil and Site Index data for MLRA B6 in form of excel spreadsheets.
NRCS Range 5 forage production summary plots, 1992 Chiliwist CRM, 1993 Riverside CRM

Contributors

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Approval

Kirt Walstad, 4/01/2025

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	04/01/2025
Approved by	
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):**

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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):**

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14. **Average percent litter cover (%) and depth (in):**

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):**

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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:**
