Ecological site F009XY005WA
Frigid Xeric Loamy Basalt Mountains and Plateaus Douglas-fir Cool 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): 009X–Palouse and Nez Perce Prairies

Almost all of MLRA 9 lies within the Walla Walla Plateau Section of the Columbia Plateaus Province of the Intermontane Plateaus. The area is characterized by an undulating basalt plateau that has been highly dissected. The major streams have cut deep, steep-walled canyons. The plateau is nearly level to steeply sloping, and its surface is moderately dissected or strongly dissected. Slopes are mostly hilly and steep. Some areas in the southeastern portion of this MLRA are in the Blue Mountain Section of the Columbia Plateaus Province. Small areas on the eastern edge of the area are in the Northern Rocky Mountains Province of the Rocky Mountain System.

Classification relationships

Ecological Site Description (ESD) Section l: Ecological Site Characteristics Ecological Site Identification and Concept Site ID: F009XY005WA Site name: Frigid Xeric Loamy Basalt Mountains and Plateaus, Douglas-fir Cool Dry Grass. (“DF-CDG”) Plant association: PSMEG/CARU series Major land resource area (MLRA): 9 - Palouse & Nez Perce Prairie LRU – Common Resource Area (CRA): 9.3 – Palouse and Nez Perce Prairies - Dissected Loess Uplands 9.4 – Palouse and Nez Perce Prairies - Deep Loess Foothills Relationship to other identified systems: The modal plant association of the ecological site is aligned to the following classification systems: • U.S. National Vegetation Classification Standard (NVCS) Central Rocky Mountain Douglas-fir -Pine Forest Group (G210). • NVS Central Rocky Mountains Douglas-fir - Ponderosa Pine / Herbaceous Understory Alliance (A-3395). • Washington State’s Natural Heritage Program’s “Northern Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest” -- NatureServe/WNHP code CEGL000429. • USDA Forest Service Ecological Sub-region M332G “Blue Mountains”. • LANDFIRE Bps model 10450. • Ecoclass Seral Stage Code CDG112 (Blue-Ochoco PA, 1991). Included Plant Associations: No other plant associations are associated with this ecological site, it is comprised of just the singular PSME/CARU association.

Ecological site concept

The Frigid Xeric Loamy Basalt Mountains and Plateaus, Douglas-fir Cool Dry Grass ecological site (ES) is mainly found in Asotin County, but occurs in Garfield and Columbia County as well. It is the least extensive of the forested ecological sites. The singular plant association is Douglas-fir/pinegrass: Pseudotsuga menziesii/ Calamagrostis rubescens (PSMEG/CARU), Ecoclass id is CDG112, and Blue/Ochoco is the base plant association reference.

Associated sites

F009XY004WA	Warm-Frigid Xeric Loamy Foothills of Basalt Mountains and Plateaus Douglas-fir Warm Dry Shrub

Similar sites

F009XY004WA	Warm-Frigid Xeric Loamy Foothills of Basalt Mountains and Plateaus Douglas-fir Warm Dry Shrub

Figure 1.

Table 2. Dominant plant species

Tree	(1) *Pseudotsuga menziesii* (2) *Pinus ponderosa*
Shrub	Not specified
Herbaceous	(1) *Calamagrostis rubescens* (2) *Carex geyeri*

Physiographic features

This site occurs predominately on backslopes of hills and mountains of basalt plateaus. The landscape is part of the Columbia basalt plateaus.

Physiographic Division: Intermontane Plateau
Physiographic Province: Columbia Plateau
Physiographic Section: Blue Mountain Section

Landscapes: mountains and hills
Landform: mountain and hill slopes, broad ridges and basalt plateaus

Table 3. Representative physiographic features

Landforms	(1) Mountains > Mountain slope (2) Hills > Hillslope (3) Ridge (4) Plateau
Flooding frequency	None
Ponding frequency	None
Elevation	760 – 1,370 m
Slope	0 – 40 %
Aspect	W, NW, N, NE, E, SE, S, SW

Table 4. Representative physiographic features (actual ranges)

Flooding frequency	Not specified

Ponding frequency	Not specified
Elevation	Not specified
Slope	0 – 90 %

Climatic features

Taxonomic soil climate is primarily a frigid temperature regime and xeric moisture regime.

Table 5 Representative climatic features

Frost-free period (characteristic range)	90-130 days
Freeze-free period (characteristic range)	90-140 days
Precipitation total (characteristic range)	460-610 mm
Frost-free period (actual range)	60-140 days
Freeze-free period (actual range)	80-150 days
Precipitation total (actual range)	430-1,020 mm
Frost-free period (average)	80 days
Freeze-free period (average)	120 days
Precipitation total (average)	640 mm

- (1) POMEROY [USC00456610], Pomeroy, WA
- (2) MEACHAM [USW00024152], Pendleton, OR
- (3) ELGIN [USC00352597], Elgin, OR

Influencing water features

N/A

Wetland description

N/A

Soil features

The Frigid Xeric Loamy Basalt Mountains and Plateaus, Douglas-fir Cool Dry Grass ecological site is associated with several soil mapunit components. The components are dominantly Vitrandic and Ultic taxonomic subgroups of Argixerolls great groups of the Mollisol taxonomic order. Soils are dominantly moderately deep to very deep and have average available water capacity (AWC) of about 7.0 inches (17.8 cm) in the 0 to 40 inches (0 to 100 cm) depth range.

Soil parent material is dominantly loess over colluvium or residuum from basalt with influence of volcanic ash deposits in upper horizon.

The associated soils are Cloverland, Klickson, Larkin and similar soils.

Dominate soil surface is silt loam to gravelly ashy loam.

Dominant particle-size class is fine-silty, but includes loamy-skeletal

Table 6. Representative soil features

Parent material	(1) Loess – basalt
Surface texture	(1) Silt loam (2) Gravelly, ashy loam
Family particle size	(1) Fine-silty (2) Loamy-skeletal
Drainage class	Moderately well drained to well drained
Depth to restrictive layer	150 cm
Surface fragment cover <=3"	Not specified
Surface fragment cover >3"	Not specified
Available water capacity (0-101.6cm)	7.87 – 21.08 cm
Calcium carbonate equivalent (Depth not specified)	Not specified
Electrical conductivity (Depth not specified)	Not specified
Sodium adsorption ratio (Depth not specified)	Not specified

Soil reaction (1:1 water) (0-25.4cm)	5.6 – 7.3
Subsurface fragment volume <=3" (Depth not specified)	0 – 30 %
Subsurface fragment volume >3" (Depth not specified)	0 – 30 %

Ecological dynamics

Open, park-like stands characterized the late seral development state of this ecological site. In this representative plant community phase, widely spaced, older mature Ponderosa pine (Pinus ponderosa) dominated the upper canopy layer, with both mature Douglas-fir (Pseutotsuga menziesii) and limited western larch (Larix occidentalis) in the mid and upper layer(s) of the forest. Low severity ground fires were frequent, occurring at typical intervals of 20 to 35 years, which maintained these mature forests in a “park-like” appearance. Fires were started by natural lightning (mainly in summer), and by Native Americans (mainly in the spring and fall). Mixed and stand replacement fires are less frequent than surface fires, but they both occurred under natural, historic conditions.

Pinegrass (Calamagrosis rubescens) and elk sedge (Carex geyeri) dominate the understory vegetation of this ecological site. These grasses were present along with lesser amounts of low and moderate growing shrub species. Shrub growth was kept in check from the impacts of the repetitive surface and mixed severity fires. Oregon grape (Berberis repens), baldhip rose (Rosa gymnocarpa), birchleaf spirea (Spirea betulifolia), and an occasional common snowberry (Symphoricarpos albus) and pinemat manzanita (Arcotostiaphylos nevadensis) were some of the shrubs encountered in pre-European forests operating under natural conditions.

Very limited amounts of grand fir (Abies grandis) could be found reproducing and growing in shaded pockets on more moist micro-sites, especially where ground fire had been absent for a longer period of time, but it was historically restricted in expression over most of this ESD due to climatic restrictions and by the species vulnerability to fire kill. Low levels of early seral lodgepole pine (Pinus contorta) could also occur at times.

The Douglas-fir potential vegetation “series” (a series is named for the dominant fine scale climax tree species) occupy positions which are transitional from the warmer and dryer moisture gradient from the Ponderosa pine (Pinus ponderosa) series, progressing to the moister and cooler grand-fir (Abies grandis) series. Vegetative transitions are often gradual in the absence of abrupt changes in soil types, aspect, or other features that exert strong influence on the expression of the potential natural plant community (PNC).

The Douglas-fir/pinegrass (PSME/CARU) plant association is the only potential vegetation type (PVT) in this particular ecological site. This plant association is collectively a part of the extensive and broad “Dry Mixed Conifer Forest” group of the northwestern United States (this group also includes other Douglas-fir plant association(s), and the warmer and drier Grand fir associations).

Ponderosa pine is the dominant early seral forested conifer species of the ecological site under pre-European historic conditions. Ponderosa pine, a long-lived species (averaging 300 years, but capable of up to a 750-year life span), establishes in the early successional stage following favorable disturbance episodes, and typically persists in the overstory into the climax ecological plant community phase. Western larch (also an early seral species) is similar to Ponderosa pine in terms of fire adaptation, longevity and seral status; however, it would occur less frequently in this ecological site due to climatic moisture limitations.
The increase in moisture for this ecological site (compared to the dryer Ponderosa pine series) allows Douglas-fir (a mid-seral species) to establish under partial shade given an adequate seed source, with the natural progression in age and size classes under favorable conditions. In the late pole size class, typically around 40 years of age, Douglas-fir trees begin to acquire fire resistance similar to that of Ponderosa pine, developing a thick, corky bark that protects individual Douglas-fir trees from low intensity surface fires. Western larch exhibits similar protective bark attributes, along with an open growing crown (i.e. low foliage volumes) that makes this species less vulnerable to consumption or scorch damage in the event of a crown fire. The very limited number of grand fir (late seral) trees that were able to germinate and persist into the older age and size classes would gain resistance to surface fire as their root systems grew deeper into the soil, and as their bark thickened, especially near the ground surface.

In addition to the direct impacts of wildfire, other abiotic disturbance factors that can affect all tree species include injury from direct lightning strikes, wind events, and weather extremes (e.g. snow, ice and drought damage).

Ponderosa pine is prone to damage or outright mortality from bark beetles, pine engraver, mistletoe, and other adapted insects and diseases. Douglas-fir is often killed or weakened by Douglas-fir beetle and other wood borers, tussock moth and western spruce

budworm. These agents often cause “secondary effect” post-fire mortality when lower severity fire stresses, but does not outright kill, individual mature Douglas-fir. The stress is often in the form of foliar reduction or cambial scorch. This is also referred to as delayed mortality.

Endemic bark beetle often results in patchy mortality, whereas epidemic outbreaks cause larger impact mortality. Root disease, age, overstocking, and other biotic and abiotic stressors will also impact the health and well-being of individual Douglas-fir trees, often leading to mortality. Western larch is susceptible to damage from dwarf mistletoe, needlecast and various fungi. Larch casebearer, sawfly, spruce budworm and tussock moth are common defoliators of larch.

Human caused fire exclusion within the past 100 years (the Post-European period) has drastically changed the structural expression of the present forest in this ecological site, resulting in an increase in the proportion of mid and limited late serial tree species, a reduction of Ponderosa pine recruitment in the understory, and corresponding increases in crown density and in fuel loading and continuity.

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 (%)

Table 13. Community 4.1 plant community composition

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

Table 14. Community 5.1 plant community composition

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

Other information

Appendix 1 Tree-Size Class Tree size classes are based on the diameter measurement taken at the “Diameter Breast Height” (abbreviated as DBH). DBH is the diameter of a tree (the bole) measured at 4.5 feet above ground, on the uphill side if on sloping ground. It is a measurement of the outside of the tree bark. The DBH is given in inches. The following Tree size class(s) are referred to in this ecological site: Class Name DBH Range Seedling 0-1” Sapling 1-5” Pole 5-9” Sawtimber: > 9” ? Small Sawtimber 9-16” ? Large Sawtimber 16-21” ? Very Large Sawtimber > 21” Note: Some classification systems denote “mature and over mature” at 20 to 30” DBH and larger. This system is likely derived from an economic production basis rather than on forest health size/age thresholds.

Inventory data references

Data was collected from forestry references, and vegetative experience from within the NRCS field professionals.

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Approval

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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	03/31/2025
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):**

   _____

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):**

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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:**
