Ecological site F009XY003WA
Warm Dry Ridges Hills and Canyons Ponderosa Pine Dry Shrub and 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

Major land resource area (MLRA): 9 - Palouse & Nez Perce Prairie LRU – Common Resource Areas (CRA): 9.1 - Channeled Scablands 9.3 - Dissected Loess Uplands 9.5 - Warm Canyons and Dissected Uplands Relationship to Other Established Classifications: United States National Vegetation Classification (2008) – A3446 Ponderosa Pine/Shrub Understory Central Rocky Mt. Forest & Woodland Alliance. PIPO/PUTR/FEID is identified as Association CEGL000195, and PIPO/PUTR/PSSP is CEGL000197. Description of Ecoregions of the United States, USFS PN # 1391, 1995 - M332 Middle Rocky Mountain Steppe– Coniferous Forest –Alpine Meadow Province USDA NRCS WA Common Resource Areas. CRA 9.3 (Dissected Loess Uplands) and 9.5 (Warm Canyons and Dissected Uplands.) Level III Ecoregions of WA, US EPA, June 2010 – 10. Columbia Plateau, and 11. Blue Mountains. This ecological site includes the following USDA Forest Service Plant Associations: PIPO/PUTR/PSSP. (Lillybridge et. al. 1995) and PIPO/PUTR/FEID (Steele et. al, 1981)

Ecological site concept

The Warm Dry Ridges Hills and Canyons, Ponderosa Pine Dry Shrub and Grass ecological site (ES) is found in Lincoln, Whitman, Columbia and Walla-Walla Counties. It consists of Ponderosa Pine (Pinus ponderosa)/Antelope bitterbrush (Purshia tridentate)/ Idaho fescue (Festuca idahoensis) plant association (PIPO/PUTR/FEID), along with the Ponderosa Pine/Antelope bitterbrush (Purshia tridentate)/bluebunch wheatgrass (Pseudoroegneria spicata) plant association (PIPO/PUTR/PSSP)

Associated sites

F009XY002WA	**Mesic Xeric Loamy Hills Ponderosa Pine Warm Dry Grass**
F009XY001WA	**Mesic Xeric Loamy Hills and Canyons Ponderosa Pine Moderately Warm Dry Shrub**

Similar sites

F009XY002WA	**Mesic Xeric Loamy Hills Ponderosa Pine Warm Dry Grass**

F009XY001WA	**Mesic Xeric Loamy Hills and Canyons Ponderosa Pine Moderately Warm Dry Shrub**

Figure 1.

Table 2. Dominant plant species

Tree	(1) *Pinus ponderosa*
Shrub	(1) *Purshia tridentata*
Herbaceous	Not specified

Physiographic features

This site occurs predominately on outwash plains and terraces, but also on backslopes of hills. The landscape is part of the Columbia basalt plateaus and Northern Rocky foothills. They occur on treads, riser and some backslopes in all slope shapes.

Physiographic Division: Intermontane Plateau and Northern Rocky Mountain System
Physiographic Province: Columbia Plateau and Northern Rocky Mountains
Physiographic Sections: Walla Walla Plateau

Landscapes: Northern rocky mountain valleys and channeled scablands
Landform: outwash plains and terraces

Table 3. Representative physiographic features

Landforms	(1) Valley > Outwash plain (2) Terrace
Flooding frequency	None
Ponding frequency	None
Elevation	460 – 760 m
Slope	10 – 40 %
Aspect	Aspect is not a significant factor

Table 4. Representative physiographic features (actual ranges)

Flooding frequency	Not specified
Ponding frequency	Not specified

Elevation	Not specified
Slope	0 – 60 %

Climatic features

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

Table 5 Representative climatic features

Frost-free period (characteristic range)	110-130 days
Freeze-free period (characteristic range)	150-170 days
Precipitation total (characteristic range)	460-510 mm
Frost-free period (actual range)	100-140 days
Freeze-free period (actual range)	150-170 days
Precipitation total (actual range)	410-560 mm
Frost-free period (average)	130 days
Freeze-free period (average)	160 days
Precipitation total (average)	460 mm

- (1) DAYTON 1 WSW [USC00452030], Dayton, WA
- (2) POMEROY [USC00456610], Pomeroy, WA

Influencing water features

N/A

Wetland description

N/A

Soil features

This ecological site components are dominantly Vitrandic taxonomic subgroups of Haploxerolls and Haploxerepts great group of the Mollisols and Inceptisols taxonomic order. Psamments great group of the Entisols taxonomic order occurs in limited amount. Soils are dominantly very deep and have average available water capacity of about 2.5 inches (6.4 cm) in the 0 to 40 inches (0 to 100 cm) depth range.

Soil parent material is dominantly glaciofluvial deposits with minor amounts of ash and loess in the upper part.

The associated soils are Bong, Springdale, Marble and similar soils.

Dominate soil surface is sandy loam to gravelly ashy coarse-sandy loam.

Dominant particle-size class is sandy and sandy-skeletal, but includes loamy-skeletal

Table 6. Representative soil features

Parent material	(1) Glaciofluvial deposits
Surface texture	(1) Sandy loam (2) Ashy, gravelly coarse sandy loam
Family particle size	(1) Sandy (2) Sandy-skeletal (3) Loamy-skeletal
Drainage class	Well drained to excessively drained
Depth to restrictive layer	150 cm
Surface fragment cover <=3"	0 – 30 %
Surface fragment cover >3"	Not specified
Available water capacity (Depth not specified)	2.29 – 10.67 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 – 40 %
Subsurface fragment volume >3" (Depth not specified)	0 – 20 %

Ecological dynamics

The Ponderosa pine dry shrub and grass ecological site (ES) is comprised of the modal Ponderosa Pine (Pinus ponderosa)/Antelope bitterbrush (Purshia tridentate)/ Idaho fescue (Festuca idahoensis) plant association (PIPO/PUTR/FEID), along with the Ponderosa Pine/Antelope bitterbrush (Purshia tridentate)/bluebunch wheatgrass (Pseudoroegneria spicata) plant association (PIPO/PUTR/PSSP).

Collectively these two plant associations are referred to as Ponderosa pine/Antelope bitterbrush types in this MLRA. This ES is best described as an open pine/woodland site with low overall occupancy of Ponderosa pine in most plant community phases.

This ecological site is the driest conifer forest in eastern Washington, occurring in the transition between the steppe grassland and those ponderosa pine habitat types which are more fully occupied under increasing favorable moisture and temperature regimes (for example, the “Warm Dry Ponderosa pine” type).

Forests in this ecologic site consisted of nearly pure, self-replacing stands of Ponderosa pine. Historic stands are described as open, with overstory canopy coverage typically 40 percent or lower. The fire regime of the ecologic site was dominated by surface fires, which occurred historically on a mean fire return interval (MFRI) of approximately 8 years. Surface fires were the most common type of wildfire event in this ES, accounting for approximately 75 percent of all fires. Fire ignition sources came from naturally occurring lightning strikes, as well as from intentional fires started by indigenous tribal persons.

Fires were, and still are, often accompanied by windy conditions and can also be influenced by the neighboring steppe fuel characteristics. At times, relatively isolated individuals or small clumps of mature ponderosa pine would experience crown touching.
Ponderosa pine is the only conifer in this ecologic site (e.g. it is a “climax dominant” species), although Douglas-fir (Pseudotsuga menziesii) may be found in limited extent on very favorable microsites.

Ponderosa pine is well adapted to frequent fire having a thick, platy bark which begins to develop in the sapling size class, and by developing natural fire-pruned lower branches as a result of beneficial low intensity non-lethal surface fires when they occur in the smaller pole size class. Other fire adaptations include a mature open crown configuration coupled with high foliar moisture retention and protective bud formations, deep rooting structure, and the overall longevity of individual Ponderosa pine trees.

Following stand replacement events, Ponderosa pine recruitment is dependent on viable cone/seed production, coupled with a period of favorable germination and establishment conditions which will enable the seedlings to become established. Reproduction from seed occurs occasionally, and at irregular intervals (“episodic” reproduction by definition). Ponderosa pine regenerates best on mineral soils, under abundant sunlight.
Over the larger landscape level scale, Ponderosa pine forests exhibited a mosaic of densely populated stands of various ages and heights.

Ponderosa pine is subject to a variety of biotic and abiotic sources of injury and mortality. Animals such as rabbits, gophers, squirrels, along with porcupines, damage seedlings, saplings and pole sized trees. Deer will often browse the terminal and lateral branches of young plants. Western and mountain pine beetle will infest stands of various ages and densities of Ponderosa pine, and may become epidemic in scope when forest health is adversely impacted by fire stress, age, or from the stress of over-stocking within crowded patches of pine. Ipps beetles will attack Ponderosa pine, especially when green slash is carried overwinter and into spring and early summer by events such as windstorms.

Dwarf mistletoe is the most common disease in the Ponderosa pine dry shrub and grass ecological site. It is especially prevalent in this grass-dominated site and will reduce growth and vigor of pine from a relatively young age forward.

Abiotic damage comes from the impact of wildfire, and from wind as well as from the structural damage caused by heavy, wet snowfall especially in sapling and pole size classes.

Antelope bitterbrush is a long-lived shrub of medium height. It is highly susceptible to fire kill but plants may sprout after a wildfire, depending on the ecotype and severity of the fire. Young or older plants will not typically respond well in terms of sprouting. Antelope bitterbrush will be more abundant when fire return intervals stretch out to decades, but when fire is excluded from the site for long periods of time the plants will become decadent and begin to fade from the plant community. As the bitterbrush recedes, a greater expression of ponderosa pine will occur in the overall plant community mix. Shorter fire return intervals will correspond with an increase in the abundance of understory grass species with lesser amounts of newly established pine.

Antelope bitterbrush re-seeds well after mixed fire episodes from seed dispersion by birds, rodents and ants to adjacent disturbed patches. The seed is encapsulated in a hard shell which requires cool-moist stratification to break down the protective capsule which then releases the dry fruit to the soil.

Antelope bitterbrush is an important browse species for wildlife of all kinds, and especially during wintertime for big game species. It is important as well for various livestock animals during the grazing season. It is very palatable.

Under historic disturbance regimes, Idaho fescue was the dominant understory grass, accompanied by variety of adapted shrub species.

Present day Ponderosa pine/antelope bitterbrush forests are drastically altered from the historical conditions due to a multitude of factors, including fire exclusion, conversion to agriculture, grazing, and to a lesser extent orchards and urbanization conversions.

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 (%)

Other information

Tree-Size Class and Conifer Abbreviations Appendix 1 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. Abbreviations and codes for the following conifer tree(s) that occur in the MLRA: Common Conifer Species Cross Reference List Common Name Abbreviated Symbol ADP Code Grand fir GF ABGR Subalpine fir AF ABLA Western Larch WL LAOC Englemann Spruce ES PIEN Whitebark pine WB PIAL Lodgepole pine LP PICO Western white pine WP PIMO Ponderosa pine PP PIPO Douglas-fir DF PSME Western Redcedar RC THPL Mountain Hemlock MH TSME

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	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):**

   _____

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):**

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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:**
