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

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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 9.2 - Palouse Hills United States National Vegetation Classification (2008) – Alliance (A3446) Central Rocky Mountain Ponderosa Pine/Shrub Woodland and Association (CEGL000203) Ponderosa Pine/Snowberry Forest U. S. Forest Service (USDA). Ecoregions of the United States Province 331\lf 41-1, section 331A-Palouse Prairie. Washington Natural Heritage Program 2017 U.S. NVC: G213-Central Rocky Mountain Ponderosa Pine Open Woodland Group. Level III and IV Ecoregions of Washington, June 2010: Columbia Plateau (10); Palouse Hills (10h).

Ecological site concept

The Mesic Xeric Loamy Hills and Canyons, Ponderosa Pine Moderately Warm Dry Shrub ecological site (ES) is primarily found in Lincoln, Spokane, and Whitman Counties. It is characterized by widely spaced, older mature Ponderosa pine (Pinus ponderosa) dominating the upper canopy layer. Fire adapted shrub species occur in the understory, with snowberry (Symphoricarpos albus) on the warmer/dryer end of the ecological site, and ninebark (Physocarpus malvaceus) on the more moist/cooler end of the spectrum. Pinegrass (Calamagrosis rubescens) and Idaho fescue (Festuca idahoensis) are common understory grass species present.

Associated sites

F009XY002WA	**Mesic Xeric Loamy Hills Ponderosa Pine Warm Dry Grass**
F009XY003WA	**Warm Dry Ridges Hills and Canyons Ponderosa Pine Dry Shrub and Grass**

Similar sites

F009XY002WA	**Mesic Xeric Loamy Hills Ponderosa Pine Warm Dry Grass** Slightly warmer site

F009XY003WA	**Warm Dry Ridges Hills and Canyons Ponderosa Pine Dry Shrub and Grass**

Figure 1.

Table 2. Dominant plant species

Tree	(1) *Pinus ponderosa*
Shrub	(1) *Symphoricarpos albus*
Herbaceous	Not specified

Physiographic features

This site occurs predominately on hills, canyons, outwash plains and terraces. The landscape is part of the Columbia basalt plateaus and Northern Rocky foothills. They occur on summits, backslopes, and footslopes on 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: Hills, northern rocky mountain valleys and channeled scablands
Landform: hills, basalt plateaus, outwash plains and terraces

Table 3. Representative physiographic features

Landforms	(1) Hills > Hill (2) Outwash plain (3) Terrace (4) Plateau
Flooding frequency	None
Ponding frequency	None
Elevation	490 – 910 m
Slope	10 – 40 %
Aspect	N, NE

Table 4. Representative physiographic features (actual ranges)

Flooding frequency	Not specified
Ponding frequency	Not specified
Elevation	Not specified
Slope	0 – 70 %

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)	100-130 days
Freeze-free period (characteristic range)	120-140 days
Precipitation total (characteristic range)	460-610 mm
Frost-free period (actual range)	70-150 days
Freeze-free period (actual range)	110-140 days
Precipitation total (actual range)	410-710 mm
Frost-free period (average)	90 days
Freeze-free period (average)	130 days
Precipitation total (average)	530 mm

- (1) SPOKANE INTL AP [USW00024157], Spokane, WA
- (2) SPOKANE 17 SSW [USW00004136], Cheney, WA
- (3) POTLATCH 3 NNE [USC00107301], Potlatch, ID

Influencing water features

N/A

Wetland description

N/A

Soil features

The soil components are dominantly Vitrandic and Ultic taxonomic subgroups of Haploxerolls and Argixerolls great groups of the Mollisols taxonomic order. Soils are dominantly very deep but can get as shallow as moderately deep. Average available water capacity of about 5 inches (12.7 cm) in the 0 to 40 inches (0 to 100 cm) depth range.

Soil parent material is dominantly loess mixed with minor amounts of ash over colluvium and residuum derived from basalt.

The associated soils are Driscoll, Fourmound, Hardesty, Larkin and similar soils.

Dominate soil surface is ashy silt loam to cobbly loam.

Dominant particle-size class is fine to course-loamy but includes limited loamy-skeletal.

Table 6. Representative soil features

Parent material	(1) Loess – basalt (2) Colluvium – basalt
Surface texture	(1) Ashy silt loam (2) Cobbly loam
Family particle size	(1) Coarse-loamy (2) Loamy-skeletal
Drainage class	Moderately well drained to well drained
Depth to restrictive layer	150 cm
Surface fragment cover <=3"	0 – 20 %
Surface fragment cover >3"	0 – 50 %
Available water capacity (Depth not specified)	3.05 – 22.1 cm
Soil reaction (1:1 water) (0-25.4cm)	5.1 – 7.3
Subsurface fragment volume <=3" (Depth not specified)	0 – 30 %

Subsurface fragment volume >3" (Depth not specified)	0 – 60 %

Ecological dynamics

The Mesic Xeric Loamy hills and canyons, Ponderosa Pine Moderately Warm Dry Shrub ecological site is comprised primarily of the Ponderosa pine (Pinus ponderosa)/snowberry (Symphoricarpos albus) plant association. This particular plant association is the largest singular forested plant association in MLRA 9. The ecological site also includes the Ponderosa pine/snowberry/ quaking aspen (Populus tremuloides) and Ponderosa pine/ninebark (Physocarpus malvaceus) associations. This ecologic site was identified and mapped in Spokane, Lincoln, and Whitman Counties, and in the Coleville Indian Reservation soil surveys.

The acres associated with each plant association in this ecological site are as follows:
Ponderosa pine/snowberry (PIPO/SYAL) 128,774
Ponderosa pine/snowberry/quaking aspen (PIPO/SYAL/POTR) 834
Ponderosa pine/ninebark (PIPO/PHMA) 16,431
TOTAL: 146,039 Acres

This ecological site is located on loss hills, basalt plateaus, outwash plains and terraces, escarpments and other less common landforms. It also occurs infrequently on small remnant, relatively undisturbed soils within the channeled scablands of the Missoula geologic era flood events, where these forests often benefit from moisture seepage coming from nearby grass dominated shallow soils.

Ponderosa pine is the only forested conifer species of this ecological site, occurring in all seral stages as the early seral through late seral climax plant communities. The understory is comprised of low growing shrubs and grasses, including bluebunch wheatgrass (Pseudoroegneria spicata), Idaho fescue (Festuca idahoensis), and other less common grasses. Shrubs include snowberry, serviceberry (Amelanchier alnifolia), spirea (Spiraea betulifolia), woods rose (Rosa woodsia) and ninebark (which is found only in the PHMA association).

The modal pine/snowberry plant association is restricted to the dryer locations, and the ponderosa pine/ninebark association is generally located on the more moist and cooler northerly aspects. The quaking aspen phase is only identified on the Coleville reservation, and is very limited in extent.

Upland forests are warm and dry and exist in an ecotone position that is transitional between the hotter and drier Ponderosa pine/antelope bitterbrush savanna, pinegrass/bunchgrass ecosystems, and the cooler and more moist mixed conifer forests that are gradually able to support increasing levels of Douglas-fir and Western larch along with the early seral Ponderosa pine.

The Mesic Xeric Loamy Hills and Canyons, Ponderosa Pine Moderately Warm Dry Shrub ecological site is best described as a fire-maintained edaphic climax, expressed in the conifer portion of the vegetation by multiple age (and size) classes. The mean annual return interval (MARI) for surface fire was longer compared with other dry Ponderosa pine forests, and mixed and replacement events were not uncommon although they still occurred at longer intervals compared with surface fires.

This ecologic site, especially the snowberry association, had very light fuel loads in the pre-settlement time period which impacted fire expression and post fire recovery. Snowberry and ninebark recover rapidly following surface disturbance, and for that reason these sites are not expressed as true savanna type forests (which are relatively open conifer stands with a grass dominated understory).

In the early successional stages, the ESD is comprised of seedlings, saplings, and poles, which progresses in time to older age and size classes of dominant/co-dominant and mature/over-mature stands of trees. Disturbance events are likely to occur at any successional stage, but overall wildfire was the main disturbance element in the pre-settlement period. Mature canopy coverage was open to medium, with a typical range of 40 to 60 percent coverage.

These forests are typically un-even in age. On a larger scale, this ecological site is characterized by a heterogeneous spatial pattern across the landscape, including some small “patch” openings occupied by grass and shrub species, with or without recruitment of Ponderosa pine seedlings.

The vegetation community was conditioned to relatively frequent fire disturbances, responding and recovering with a variety of plant adaptive strategies. The grass and low shrub species survived mainly from resprouting. Surface fires would create areas of exposed mineral soils, often allowing additional sunlight to reach the forest floor. This type of seedbed condition is a prerequisite for seedling establishment of Ponderosa pine (assuming seed is available).

Naturally occurring fires in the pre-European settlement period (i.e. the historic reference) were caused by late summer lighting strikes. In addition, many fires were deliberately ignited by indigenous peoples; the early adoption of prescribed burning. Human-caused fires, commonly expressed as surface fires, were typically ignited in late spring or early fall to alter the understory plant community for a variety of purposes.

In addition to the direct impacts of wildfire, disturbance factors that resulted in the demise of mature pine included injury from lightning strikes, wind events, weather extremes, and the collective influence of various damage agents such as bark beetles, pine engraver, mistletoe, and other adapted insects and diseases. Tree age and stand stocking levels often predispose stands and individual trees to mortality. Overall, bark beetles of the genus Dendroctonus (western and mountain pine beetle) are the most destructive biological agent in terms of biotic mortality.

The long-term perpetuation of this relatively dry conifer forest type in MLRA 9 depends on the successful regeneration of Ponderosa pine as seedlings, some of which eventually grow to provide replacement for the mature component of overstory pine across the landscape. Pine recruitment is limited to a short dispersal distance away from the seed tree source because the seed is relatively heavy. Viable seed crops occur intermittently, and a succession of favorable growing season conditions is required for a new cohort of pine to develop. Ponderosa pine recruitment can be a tenuous process but is offset to a large degree by the longevity attribute of the species.

Many of these areas on favorable slopes have been converted to cropland, and on other areas they have been converted or utilized for livestock production (grazing or pasture/hay production). Overgrazing by livestock has resulted in an invasion of unwanted species such as Kentucky bluegrass (Poa pratensis) and Canada bluegrass (Poa compressa). Closer to Spokane many areas have been converted to urban use, with the resultant fragmentation of wildlife habitat and the reduction of other natural benefits of the native forest.

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 1.1 forest overstory composition

Common Name	Symbol	Scientific Name	Nativity	Height M	Canopy Cover (%)	Diameter Cm	Basal Area (square M/hectare)
Tree							
ponderosa pine	PIPO	*Pinus ponderosa*	Native	–	–	–	–
quaking aspen	POTR5	*Populus tremuloides*	Native	–	–	–	–

Table 9. Community 1.1 forest understory composition

Common Name	Symbol	Scientific Name	Nativity	Height (m)	Canopy Cover (%)
Grass/grass-like (Graminoids)					
bluebunch wheatgrass	PSSP6	*Pseudoroegneria spicata*	–	–	–
pinegrass	CARU	*Calamagrostis rubescens*	–	–	–
Geyer's sedge	CAGE2	*Carex geyeri*	–	–	–
Idaho fescue	FEID	*Festuca idahoensis*	–	–	–
Forb/Herb					
heartleaf arnica	ARCO9	*Arnica cordifolia*	–	–	–
Shrub/Subshrub					
Saskatoon serviceberry	AMAL2	*Amelanchier alnifolia*	–	–	–
creeping barberry	MARE11	*Mahonia repens*	–	–	–
ninebark	PHYSO	*Physocarpus*	–	–	–
antelope bitterbrush	PUTR2	*Purshia tridentata*	–	–	–
Woods' rose	ROWO	*Rosa woodsii*	–	–	–
white spirea	SPBE2	*Spiraea betulifolia*	–	–	–
common snowberry	SYAL	*Symphoricarpos albus*	–	–	–

Table 10. Community 1.2 plant community composition

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

Table 11. Community 1.3 plant community composition

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

Table 12. Community 1.4 plant community composition

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

Table 13. Community 2.1 plant community composition

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

Table 14. Community 3.1 plant community composition

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

Table 15. Community 4.1 plant community composition

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

Other information

Washington National Heritage Program (NHP) 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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The U.S. National Vegetation Classification System (USNVC)

Washington National Heritage Program (NHP)

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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	02/12/2025
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:**
