Ecological site F009XY002WA
Mesic Xeric Loamy Hills Ponderosa Pine Warm Dry Grass

Last updated: 4/01/2025
Accessed: 08/28/2026

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 9.12 - Moist Loess Islands 9.2 - Palouse Hills 9.3 - Dissected Loess Uplands (very limited acres) 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 Description of Ecoregions of the United States, USFS PN # 1391, 1995 - M332 Middle Rocky Mt. Forest-Steppe-Coniferous Forest-Alpine Meadow Province Level III and IV Ecoregions of WA, US EPA, June 2010 - 15r Okanogan – Colville Xeric Valleys & Foothills and 15s Spokane Valley Outwash Plains This ecological site includes the following USDA Forest Service Plant Associations: PIPO/PSSP, PIPO/FEID, and PIPO-PSME/PSSP.

Ecological site concept

The Mesic Xeric Loamy hills, Ponderosa Pine Warm Dry Grass ecological site (ES) is primarily found in Ferry, Lincoln, Spokane, and Whitman Counties, but limited in Columbia, Garfield and Asotin Counties. The ecological site is comprised of the modal Ponderosa pine (Pinus ponderosa)/Idaho fescue (Festuca idahoensis) plant association, as well as the Ponderosa pine/bluebunch wheatgrass (Pseudoroegneria spicata) and the less extensive Ponderosa pine/pinegrass (Calamagrostis rubescens) associations.

Associated sites

F009XY001WA	**Mesic Xeric Loamy Hills and Canyons Ponderosa Pine Moderately Warm Dry Shrub** Is slightly cooler.
F009XY003WA	**Warm Dry Ridges Hills and Canyons Ponderosa Pine Dry Shrub and Grass**

Similar sites

F009XY001WA	**Mesic Xeric Loamy Hills and Canyons Ponderosa Pine Moderately Warm Dry Shrub** Is slightly cooler.

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	Not specified
Herbaceous	(1) *Festuca idahoensis*

Physiographic features

This site occurs predominately on backslopes hills and basalt plateaus. The landscape is part of the Columbia basalt plateaus and Northern Rocky foothills. They occur on treads, noseslopes 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 and Blue Mountain Section

Landscapes: Hills, northern rocky mountain valleys and channeled scablands
Landform: hills, canyons, outwash plains and terraces

Table 3. Representative physiographic features

Landforms	(1) Hills > Hill (2) Canyon (3) Outwash plain (4) Terrace
Flooding frequency	None
Ponding frequency	None
Elevation	610 – 1,220 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)	110-130 days
Freeze-free period (characteristic range)	120-130 days
Precipitation total (characteristic range)	460-560 mm
Frost-free period (actual range)	70-150 days
Freeze-free period (actual range)	110-140 days
Precipitation total (actual range)	410-610 mm
Frost-free period (average)	90 days
Freeze-free period (average)	130 days
Precipitation total (average)	510 mm

- (1) SPOKANE 17 SSW [USW00004136], Cheney, WA
- (2) COLFAX [USC00451586], Colfax, WA
- (3) POTLATCH 3 NNE [USC00107301], Potlatch, ID

Influencing water features

N/A

Wetland description

N/A

Soil features

The components correlated to this ecological site 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 glaciofluvial deposits over residuum.

The associated soils are Bricken, Dragoon, Marblespring, Phoebe, Seaboldt and similar soils.

Dominant soil surface is ashy silt loam and ashy sandy loam to gravelly loamy coarse sand.

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

Table 6. Representative soil features

Parent material	(1) Loess (2) Glaciofluvial deposits
Surface texture	(1) Ashy silt loam (2) Ashy sandy loam (3) Gravelly loamy coarse sand
Drainage class	Moderately well drained to excessively drained
Depth to restrictive layer	150 cm
Surface fragment cover <=3"	0 – 40 %
Surface fragment cover >3"	0 – 30 %
Available water capacity (Depth not specified)	7.11 – 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 – 40 %
Subsurface fragment volume >3" (Depth not specified)	0 – 40 %

Ecological dynamics

The Mesic Xeric Loamy hills, Ponderosa Pine Warm Dry Grass ecological site is comprised of the modal Ponderosa pine (Pinus ponderosa)/Idaho fescue (Festuca idahoensis) plant association, as well as the Ponderosa pine/bluebunch wheatgrass (Pseudoroegneria spicata) and the less extensive Ponderosa pine/pinegrass (Calamagrostis rubescens) associations. This ecologic site was identified and mapped in Asotin, Lincoln, and Spokane 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/Idaho fescue (PIPO/FEID) 17,006*
Ponderosa pine/bluebunch wheatgrass (PIPO/PSSP) 15,890
Ponderosa pine/pinegrass (PIPO/CARU) 1,034
TOTAL: 33,930 Acres
* Another assessment of the data shows this ecologic site at 43,274 acres. The final ESD (not provisional) will need to rectify the difference.

The reference site is on warmer and drier slopes within the MLRA. Ponderosa pine stands are nearly pure and self-replacing. Ponderosa pine makes up all seral stages; in early seral through the mid seral and into the climax plant community. An occasional Douglas-fir (Pseudotsuga menziesii) may be encountered, but only on favorable microsites. Tree stocking is low, resulting in an open canopy structure in the mid and late stages of forest development. Age classes are variable, and small amounts of sapling/pole size cohorts typically exist in the understory or in patch openings of various sizes.

Frequent surface fires dominated these forests in the pre-European time period, occurring with an average fire return interval (FRI) of 2 to 10 years. Surface fires returning in such a short time period seriously hinder young Ponderosa pine seedling recruitment and development, while at the same time promoting a robust expression of grasses.

The understory is comprised of low growing shrubs and grasses, including bluebunch wheatgrass, Idaho fescue, and lesser amounts of needle and thread (Stipa comata) and rough fescue (Festuca campestris). Shrubs include very limited amounts of dwarf rose (Rosa gymnocarpa), spirea (Spiraea betulifolia), rose (Rosa woodsia) and some serviceberry (Amelanchier alnifolia). Forbs species include silvery lupine (Lupinus argenteus), basalmroot (Balsamorhiza serrata), pussytoes (Antennaria spp.), hawkweed (Hieracium albertinum), and common yarrow (Achillea millefolium lanulosa).

The modal pine/Idaho fescue association is encountered on sites with the most effective moisture in the ecological site, although the advantage is slight. This fescue types occur in favorable positions such as on lower slopes and more level positions across the landscape. The pine/bluebunch wheatgrass association is restricted to the slightly dryer and warmer locations; however, both the Idaho fescue and bluebunch wheatgrass types are often in close association.

The pine/pinegrass association is included in this ecological site because it shares common historical fire attributes and the nearly pure Ponderosa pine stand expression of the dominant fescue and bluebunch wheatgrass types. It is limited in extent. The pinegrass type is slightly more favorable in climate expression than the dominant two, although it is still warm and dry in the overall context within the ecologic site. This pinegrass association will occupy slightly higher elevational positions, is more productive and is more apt to have small expressions of Douglas-fir and perhaps western larch (Larix occidentalis).

Upland forests in this ecological site are warm and dry and exist in an ecotone position that is transitional between the hotter and drier Ponderosa pine/antelope bitterbrush (Prushia tridentata) 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 early seral Ponderosa pine. The forests in this particular warm-dry grass ecological site are classified as savanna types, representing a transition between grasslands and a more typical upland mixed conifer forest.

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 aged. On a larger scale, this ecological site is characterized overall by a heterogeneous spatial pattern across the landscape, including some small “patch” openings occupied by grass and limited shrub species, with or without recruitment of Ponderosa pine seedlings.

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 which were important to the local native population.

Surface fires would create areas of exposed mineral soils for a short period of time. This seedbed condition is a prerequisite for seedling germination and establishment of Ponderosa pine. The low canopy coverage of the site allowed ample sunlight to reach the forest floor, also aiding in recruitment. Those young seedlings that escaped another quick round of surface fire would develop to the sapling and pole stages where they would rapidly acquire thick fire-resistant bark. Surface fires after this point was often beneficial in terms of naturally thinning thick patches of advanced regeneration.

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.

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.

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

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. 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 * Subalpine fir is also abbreviated a “SAF”

Inventory data references

Data was collected from forestry references, and vegetative experience from within the NRCS field professionals. NRCS Soil and Site Index data for selected soil survey areas within MLRA 9 in form of excel spreadsheets.

Other references

Biophysical Classification- Habitat Groups and Description of Northern Idaho and Northwestern Montana, Lower Clarkfork and Adjacent Areas. Zack, 1997, Revised 2005

Clausnitzer, R. R., and B. A. Zamora. 1987. Forest habitat types of the Colville Indian Reservation. Unpublished report prepared for the Department of Forest and Range Management, Washington State University, Pullman. 1100 p.

Cooper, Stephen V.; Neiman, Kenneth E.; and Roberts, David W. 1991. Forest Habitat Types of Northern Idaho: A Second Approximation. Gen. Tech. Rep. INT-236. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station. 135 p.

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.

Forested Plant Associations of the Colville Nat. Forest, Williams et al. PNW-GTR-360-1995

Fryer, Janet L. 2016. Fire regimes of Northern Rocky Mountain ponderosa pine communities. In: Fire Effects Information System (FEIS), [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Missoula Fire Sciences Laboratory (Producer). [2020, August 10].

Johnson, CG, Jr.; Clausnitzer, R.R. 1992. Plant Association of the Blue and Ochoco Mountains. Tech. Publ. R6-ERW-TP-036-92. Portland, OR; U.S. Department of Agriculture, Forest Service, Pacific Northwest Region, Wallow-Whitman National Forest. 164 p.

McDonald, G. I.; Harvey, A. E.; Tonn, J. R. 2000. "Fire, Competition and Forest Pests: Landscape Treatment to Sustain Ecosystem Function", in Neuenschwander, Leon F.; Ryan, Kevin C., tech. eds. Proceedings from the Joint Fire Science Conference and Workshop: crossing the millennium: integrating spatial technologies and ecological principles for a new age in fire management; the Grove Hotel, Boise, Idaho, June 15-17, 1999. Moscow, Idaho: University of Idaho, 2000: 195-211.

Meyer, Walter H. 1938 (rev 1961). Yield of even-aged stands of ponderosa pine. U.S. Department of Agriculture, Forest Service Technical Bulletin 630. 59 p.

Powell, D.C.; Johnson, C.G.; Crowe, E.A.; Wells, A.; Swanson, D.K. 2007. Potential vegetation hierarchy for the Blue Mountains section of northeastern Oregon, southeastern Washington, and west-central Idaho. Gen. Tech. Rep. PNW-GTR-709. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 87 p.

Simpson, Mike; Dickinson, James, Owens, Dave. 2005 (draft rev. 2017). Biophysical Setting (BpS) Model 10531, Northern Rocky Mountain Ponderosa Pine Woodland and Savanna-Mesic. U.S. Department of Agriculture, Forest Service (LANDFIRE).

The U.S. National Vegetation Classification System (USNVC)

Soil Survey of Asotin County, Washington (Survey Area # 603): 1984. United States Department of Agriculture, Soil Conservation Service. 376 p.

Soil Survey of Lincoln County, Washington (Survey Area # 043): 1981. United States Department of Agriculture, Soil Conservation Service. 93 p.

Soil Survey of Spokane County, Washington (Survey Area # 063): United States Department of Agriculture, Natural Resources Conservation Service. 2016. Soil Survey of Spokane County, Washington. http://soils.usda.gov/survey/printed_surveys/3451 p.

Washington National Heritage Program (NHP)

Contributors

Steve Campbell
Gary Kuhn
Carri Gaines

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):**

   _____

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:**
