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

Last updated: 11/21/2023
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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**

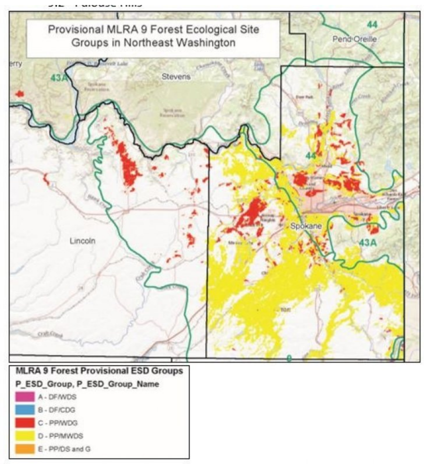


Figure 1.

Table 1. 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 2. Representative physiographic features

Landforms	(1) Hills > Hill (2) Outwash plain (3) Terrace (4) Plateau
Flooding frequency	None
Ponding frequency	None
Elevation	488–914 m
Slope	8–35%
Aspect	N, NE

Table 3. Representative physiographic features (actual ranges)

Flooding frequency	Not specified
Ponding frequency	Not specified
Elevation	Not specified
Slope	0–65%

Climatic features

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

Table 4. Representative climatic features

Frost-free period (characteristic range)	100-130 days
Freeze-free period (characteristic range)	119-139 days
Precipitation total (characteristic range)	457-610 mm
Frost-free period (actual range)	70-145 days
Freeze-free period (actual range)	114-144 days
Precipitation total (actual range)	406-711 mm
Frost-free period (average)	93 days
Freeze-free period (average)	129 days
Precipitation total (average)	533 mm

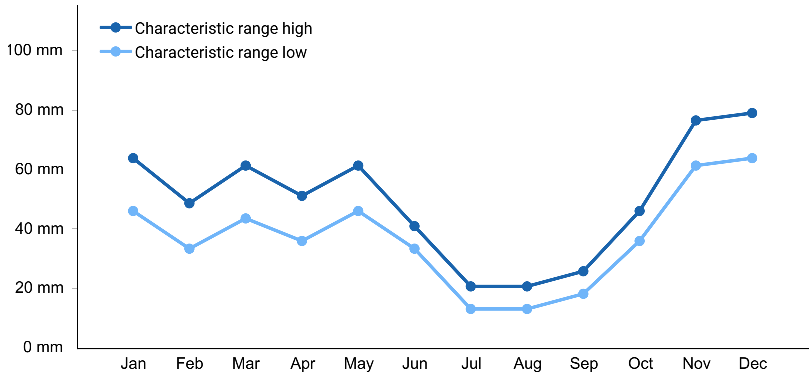


Figure 2. Monthly precipitation range

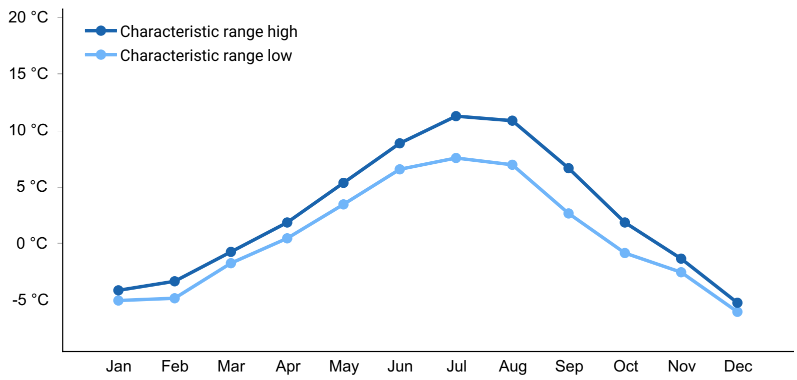


Figure 3. Monthly minimum temperature range

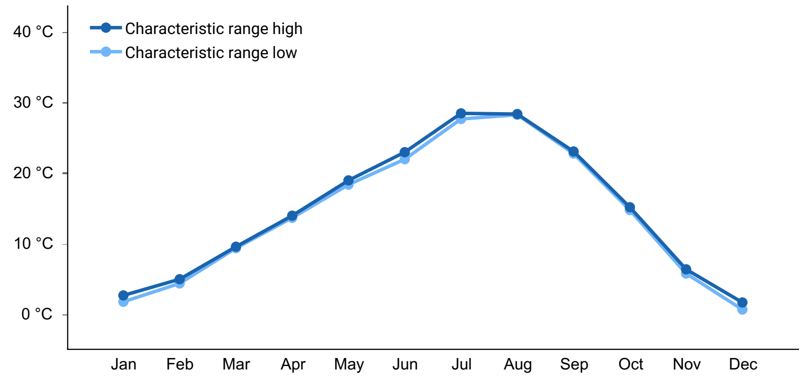


Figure 4. Monthly maximum temperature range

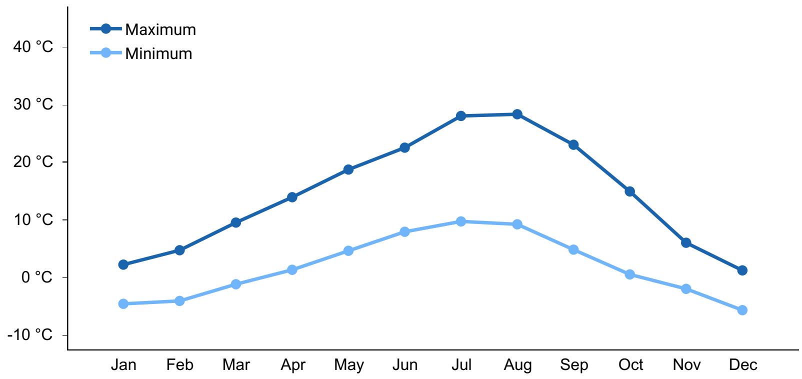


Figure 5. Monthly average minimum and maximum temperature

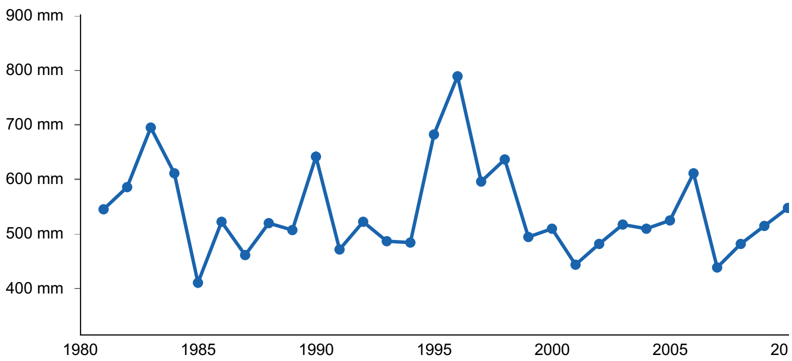


Figure 6. Annual precipitation pattern

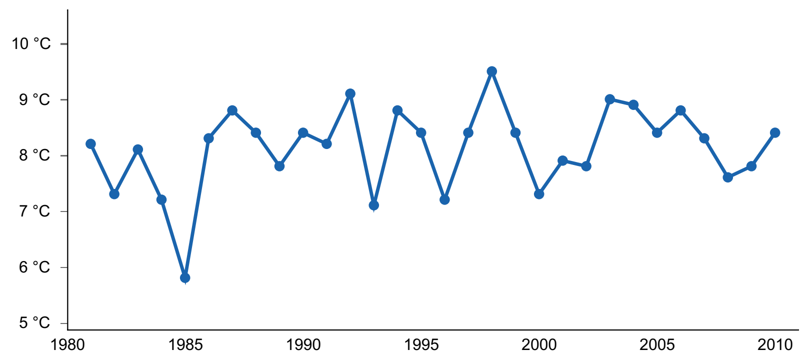


Figure 7. Annual average temperature pattern

Climate stations used

- (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 5. 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	152 cm
Surface fragment cover <=3"	0–15%
Surface fragment cover >3"	0–45%
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)	0–25%
Subsurface fragment volume >3" (Depth not specified)	0–55%

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.

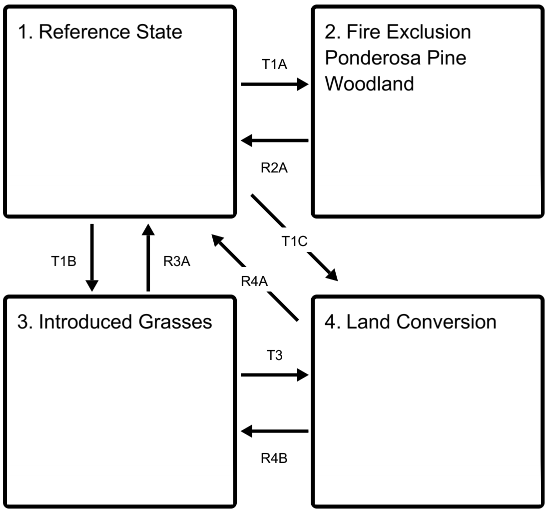
In addition to the direct impacts of wildfire, disturbance factors that resulted in the demise of mature pine included injury from lightning strikes, wind events, weather extremes, and the collective influence of various damage agents such as bark beetles, pine engraver, mistletoe, and other adapted 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

Ecosystem states



T1A - Long term fire exclusion (75-100+) years.

T1B - Introduced cool season grasses invading

T1C - Site converted to annual cropland or pasture/hayland.

R2A - Treatment practices commonly used to rehabilitate forest lands and reduce fuels is applied.

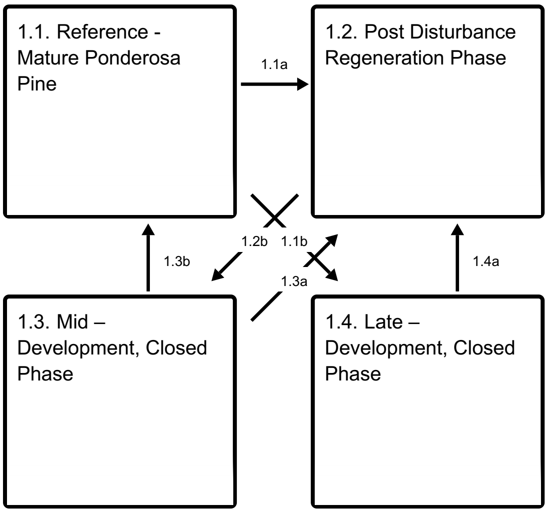
R3A - Re-seeding, afforestation practices, protect from grazing.

T3 - Site converted to annual cropland or pasture/hayland.

R4A - Re-seeding, grazing protection. Afforestation practices applied as necessary.

R4B - Re-seeding, grazing protection. Afforestation practices applied as necessary.

State 1 submodel, plant communities



1.1a - “mixed” stand replacement fire events, and from single tree to cluster mortality of mature pine trees that have succumbed to incidences such as beetle kill, mistletoe, windthrow, and storm damage.

1.1b - With time and the absence of major disturbance events,

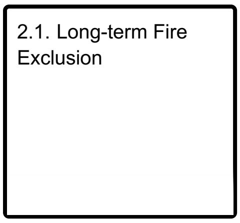
1.2b - The stand develops relatively intact and grows from seedling/sapling to pole/small sawtimer size classes.

1.3b - Stands have thinned as size classes increased, primarily from the natural exclusion processes and stress induced mortality

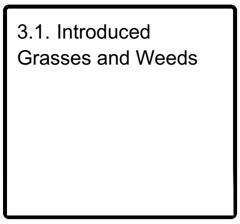
1.3a - Fires are severe eliminating the majority of all Ponderosa pine and starts the regeneration phase.

1.4a - A fire event severe enough to eliminate the majority of the overstory, or less severe but “mixed” in nature in order to create random patch structures, occurs

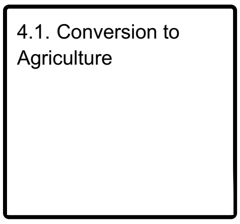
State 2 submodel, plant communities



State 3 submodel, plant communities



State 4 submodel, plant communities



State 1
Reference State

The Reference State has a variable but predictable plant expression across the landscape. In the larger context, these forests tended to be heterogeneous and spatially complex. A wide array of wildlife species benefited from the edge effects created by the spatial intersections within the larger landscape, and by naturally occurring snags and large woody debris. The Ponderosa pine forest is comprised of pure, self-replacing stands that function under the ecological parameters that were described in the section entitled “Ecological Dynamics of the Site.” Fire is the most important disturbance agent in the Reference State. The fire regime of the Historic Reference Community phase is summarized as follows: Fire Regime Group Fire Interval (years) I 6 – 15 Replacement Mixed Low Fire Severity (%—probability of occurrence) 15 18 77 Mean Fire Return Interval (MFRI- years) 125 35 15 Primary Source: BpS model 910531 Also referenced by FEIS “Fire Regime/Blue Mountains” publication, Fire Ecology of N. Idaho Habitat types, and FEIS Fire Regimes of N. Rocky Mountain Ponderosa pine communities. Fire Regime Groups: I: 0-35 year frequency, surface severity; II: 0-35 year frequency, replacement severity; III: 35-100+ year frequency, mixed severity; IV: 35-100+ year frequency, replacement frequency; V: 200+ year frequency, replacement severity Fire Severity Classes: Replacement, >75% kill or top kill of the upper canopy layer; Mixed 26-75%, and low severity, < 25% Across the overall landscape stand structure was expressed by a combination of small patch openings, clumpy (overstocked) tree groups in the younger size classes, and as well-spaced mature overstory trees encompassing larger stand groups. These mosaic patterns could occur over the landscapes in a scale of upwards of tens of thousands of acres. Disturbances from fire and other biotic and abiotic sources impacted much smaller areas within the larger landscape, on the order of thousands of acres. Following a disturbance event that eliminated or significantly reduced the number of established Ponderosa pine within a given forest stand, the key to re-establishing and sustaining the reference state was dependent on the successful recruitment of Ponderosa pine seedlings from adjacent sources, or from remnant surviving seed trees. Larger sized patches, isolated from seed sources and devoid of remnant Ponderosa pine of any size class, may tend to revert to long-term grass/shrub with very sparse pine occupancy. The Reference Plant Community was a relatively low-density mature Ponderosa pine stand. The various common successional stages are shown on the state and transition diagram. Those conditions occur in shifting locations across the overall larger landscape over long periods of time.

Characteristics and indicators. Production Interpretations of the Ponderosa pine/snowberry and Ponderosa pine/ninebark Reference State ESD: Site index (SI) and the resulting derivation of the Culmination of Mean Annual Increment (CMAI) are different indicators of site quality, as well as an indicator of potential yield and of the general economic rotation age of a site. Site index is a common unit of measure for forest trees and stands. It is a simple measure of the age and height of dominant and codominant trees, usually referenced to 50 or 100 years of age. Site index is an indicator of site quality with implications of forest productivity. Additional information on SI and CMAI are provided in the table shown immediately below. Ponderosa pine is the only conifer, and therefore the only commercial tree species in this ESD. Site index value ranges depend on local soil-site characteristics. The combination of these soil-site characteristics is recognized within the defined attributes of established NRCS forested soil series and phases. The NRCS site index interpretations is summarized as follows: Site Quality & Productivity Plant Association Conifer Symbol Site Index-Low Site Index-High CMAI* CMAI Age of CMAI SI ADP Code Curve Basis Low High Ponderosa Pine PIPO/SYAL PIPO 60 122** 53 134 50/40 600 100TA Ponderosa Pine PIPO/PHMA PIPO 85 90 54 89 100/78 600 100TA * cubic foot per acre per year (ft3/ac/yr.) ** a wide span of values in the SYAL phase: the lower values were on Gibbs, Stutler, Speigle, Northstar and Formound soils,and the higher values are represented by Larkin, Driscoll and Jacket soils.

Community 1.1
Reference - Mature Ponderosa Pine

This mid to late-seral phase is the dominant representation of the historical plant community and is sustained by plant adaptations to naturally occurring non-lethal fires. It is typically un-even in age.

Forest understory. Herbage and Forage Estimations:

Information collected during the development of the “Plant Associations of the Wallowa-Snake Province” (Wallowa-Whitman NF, 1987), indicate that the PIPO/SYAL plant association produced an average of 600 pounds/acre, air dried annual herbage in the study area. Two thirds of the annual herbage amount came from bunchgrass (forage) production, according to that publication. The ninebark phase is limited in available forage data, but likely was more productive than the modal snowberry plant association.

Total herbage production, and especially forage production, will vary significantly depending on canopy coverage and the recent fire occurrence(s) on any given site, in addition to the annual variance attributed primarily to precipitation and temperature.

Community 1.2
Post Disturbance Regeneration Phase

Figure 8. Scattered natural regeneration of Ponderosa pine seedlings.

Pine seedlings/saplings establish in small-size patch openings created from disturbance events that reduced or eliminated portions of the overstory canopy layer. Seedling recruitment commonly comes from seed production in the years following the event, but also from viable seed banks that were on the ground before the disturbance occurred or from surviving regeneration that pre-dated the disturbance. Favorable weather conditions are necessary for seedlings to establish and develop. Limitations of seed dispersion, distance from seed trees, seriously hinder Ponderosa pine re-establishment in larger patch sizes. (Note that Ponderosa pine seedlings will become established underneath overstory Ponderosa pine canopy layers, but their development pathway will be impacted by the competition and shade relationships of the overstory stand.) Ground fires eliminate the majority of young reproduction, setting back the development of the stand to the regeneration phase. The process of seedling establishment is once again dependent on sporadic cone production, coupled with favorable weather until an ecologic threshold stocking level of Ponderosa pine seedlings is achieved. This can be a short-term and repetitive process until the sapling/pole stage is reached.

Community 1.3
Mid –Development, Closed Phase

Figure 9. Dense or "clumpy" patch of Ponderosa pine poles and small sawtimber sized stems.

The stand reaches the size class(s) of poles to small sawtimber size individuals (5 to 20 inch DBH). At this stage, Ponderosa pine is well suited to survive low intensity surface fire. In the transition phase between the sapling and pole-size class, understory surface fires begin to facilitate a beneficial "thinning" effect in dense stocking conditions (i.e., some trees succumb to the fire while others survive). In other instances, without beneficial surface fire, the stand will exhibit clumpy attributes and experience increased "intraspecific" stand stress as the stand grows. This is the beginning of stem exclusion. Reoccurring ground fire near the middle and later stages of this phase can provide beneficial self-pruning of the lower limbs of individual trees, which reduces the subsequent ladder fuel risk for those trees into the future.

Community 1.4
Late –Development, Closed Phase

Over a longer period of time an older stand has developed as described in Community Pathway 1.1B. Along the way, large individual Ponderosa pine has succumbed to various disturbance agents such as western pine beetle, lightning strikes, and wind breakage, leading to mortality. The density of trees has continuously been reduced. At the same time, tree diameter(s) have continued to expand as stocking/density stressors continue to influence the stand. Persistent snags and the development of down wood is at an optimum level. Beneath the dominant and co-dominant overstory layer, a limited expression of younger cohorts of Ponderosa pine can exist. This phase may exhibit the characteristics of an "old growth" stand if it progresses and remains intact over time, but this old growth community type is relatively rare in the ecological site.

Pathway 1.1a
Community 1.1 to 1.2

Reference - Mature Ponderosa Pine

Post Disturbance Regeneration Phase

Fine scale patch openings develop from disturbance events. Causes of overstory mortality include "mixed" stand replacement fire events, and from single tree to cluster mortality of mature pine trees that have succumbed to incidences such as beetle kill, mistletoe, windthrow, and storm damage.

Pathway 1.1b
Community 1.1 to 1.4

With time and the absence of major disturbance events, the stand develops into a mature/ over-mature cohort. The threat of mountain pine beetle increases, and individual trees within the canopy are at greater risk of insect and disease mortality which in turn create gaps in the overstory. Additional sunlight will reach the surface and impact the vegetation at that location.

Pathway 1.2b
Community 1.2 to 1.3

Post Disturbance Regeneration Phase

Mid –Development, Closed Phase

The stand develops relatively intact and grows from seedling/sapling to pole/small sawtimer size classes.

Pathway 1.3b
Community 1.3 to 1.1

Mid –Development, Closed Phase

Reference - Mature Ponderosa Pine

The stand develops to the mature phase. Stands have thinned as size classes increased, primarily from the natural exclusion processes as well as from stress induced bark beetle mortality (chiefly mountain pine beetle).

Pathway 1.3a
Community 1.3 to 1.2

Mid –Development, Closed Phase

Post Disturbance Regeneration Phase

Fires occur which are severe enough to eliminate the majority of all Ponderosa pine size classes, and again sets back the development of the site to the regeneration phase.

Pathway 1.4a
Community 1.4 to 1.2

A fire event severe enough to eliminate the majority of the overstory, or less severe but “mixed” in nature in order to create random patch structures, occurs. The stand or impacted areas within the overall stand are set back to the conditions in plant community phase 1.2, in which necessary seed source/seed establishment components must be present in order to achieve adequate Ponderosa pine regeneration.

State 2
Fire Exclusion Ponderosa Pine Woodland

Since the arrival of Euro-American settlers to the region in the late 1880’s, the character and function of these forests have changed. Logging, grazing, conversion to other uses, and fire exclusion have impacted the natural processes of this fire-dependent ecosystem. Depending on the severity and degree of impact, alternative states (which function outside of the parameters of the Reference State), have developed. Fire exclusion for over 50 years allows Ponderosa pine stands to dominate cover, and form multi-aged medium to dense woodlands. In most cases mixed severity to stand replacing fires will not revert site back to a pine/savanna condition (State 1).

Community 2.1
Long-term Fire Exclusion

Condition favorable to the development of this alternative state began to occur within the Reference State around the turn of the twentieth century. The impacts of fire exclusion, a management goal of post-European settlers, allowed many stands to progress without the natural occurrence of fire, especially frequently occurring and beneficial fire episodes. Fire suppression shifted the age expression and density of the younger stands, and changed the composition of understory vegetation, leading to reduced spatial variation. Fuel levels and fuel stratum layers increased, shifting the fire regime/condition class toward a greater likelihood of stand replacement fire episodes.

State 3
Introduced Grasses

The plant composition in this state is variable with cool-season introduced grasses encroaching from adjacent homesteads and pastures. One annual species of special note that can cause a drastic shift in grass species is cheatgrass (*Bromus tectorum*). It invades from overgrazed or heavily disturbed pastures and can out compete the native bunchgrasses changing to a shrub/cheatgrass site.

Community 3.1
Introduced Grasses and Weeds

This state developed with the introduction and invasion of introduced grasses and noxious weeds, most notably

Kentucky and Canada bluegrasses which migrate from adjacent areas due to excessive grazing pressure. These conditions were more likely to develop on areas which were in close proximity to developed farm and pasture lands, and to other converted or abused lands. Shrub species declined.

State 4
Land Conversion

This ecological site over time has had human settlement encroachment, and some of the site extent was converted to homesteads, pastures and cropland.

Community 4.1
Conversion to Agriculture

Some areas on less steep slopes have been converted to cropland, or to pasture or hayland uses. Note: Significant urban conversion of this forest type has occurred, but this impact is not specifically addressed in this ecologic site. Urban conversion is a permanent loss of the extent of this ecologic site, and not a true state/transition ecologic process. Additionally, there are limited restoration opportunities for land converted to urban uses.

Transition T1A
State 1 to 2

Long term fire exclusion (75-100+) years.

Transition T1B
State 1 to 3

Introduced cool season grasses invading sites near homesteads, pastureland, and other converted land. This includes cheatgrass invasion of overgrazed sites, as well as other excessive disturbance(s) of the native vegetation.

Transition T1C
State 1 to 4

Site converted to annual cropland or pasture/hayland.

Restoration pathway R2A
State 2 to 1

Treatment practices commonly used to rehabilitate forest lands and reduce fuels is applied. Restoration practices that reduce excessive fuel loads and reduce overstory crown bulk density, as well as treatment of overstocked clumpy areas, are beneficial. Tree planting in larger, un-stocked areas where Ponderosa pine and other native seed sources are absent, as well as the introduction of prescribed burning, can contribute to increased resiliency and a return to natural ecologic integrity.

Restoration pathway R3A
State 3 to 1

Site preparation and re-seeding with native forest vegetation is applied, followed by grazing protection. Afforestation practices applied as necessary. Practices that enable the site to revert to native understory species, for example tree and/or native grass planting in properly prepared seedbed conditions, have the potential to restore the function of native Ponderosa pine communities in this ESD. Tree planting efforts taken to reestablish the natural forest attributes of the site are referred to as “afforestation.” Proper grazing management must be established.

Transition T3
State 3 to 4

Site converted to annual cropland or pasture/hayland.

Restoration pathway R4A
State 4 to 1

Site preparation and re-seeding with native forest vegetation is applied, followed by grazing protection. Afforestation practices applied as necessary. Practices that enable the site to revert to native understory species, for example tree and/or native grass planting in properly prepared seedbed conditions, have the potential to restore the function of native Ponderosa pine communities in this ESD. Tree planting efforts taken to reestablish the natural forest attributes of the site are referred to as “afforestation.” Proper grazing management must be established.

Restoration pathway R4B
State 4 to 3

Re-seeding, grazing protection. Afforestation practices applied as necessary.

Additional community tables

Table 6. 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 7. 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*	–	–	–

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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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	05/20/2024
Approved by	Kirt Walstad
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:**