USDA Natural Resources Conservation Service

Ecological site F043AY537ID
Skeletal Canyons and Hills 23-25" PZ Mesic Eastern Columbia Plateau Embayments

Last updated: 10/14/2020
Accessed: 05/13/2025

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): 043A–Northern Rocky Mountains

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Description of MLRAs can be found in: United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land Resource Regions and Major Land Resource Areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296.

Available electronically at: http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/ref/?cid=nrcs142p2_053624#handbook

LRU notes

Found in LRU 43A07 (Eastern Columbia Plateau Embayments) and LRU 43A08 (Western Bitterroot Foothills). Climate parameters were obtained from PRISM and other models for the area. Landscape descriptors are derived from USGS DEM products and their derivatives.

Classification relationships

Relationship to Other Established Classifications:
United States National Vegetation Classification (2008) – A3446 Ponderosa Pine / Shrub 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 - M333 Northern 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/SYAL, PIPO/PHMA, and PIPO/SYOR. (Williams et. al. 1995)

Ecological site concept

This ESD in distinguished by an overstory of ponderosa pine and an understory shrub component of ninebark, oceanspray, and/or snowberry. It occurs on foothills, mountainsides, and valley walls. Soils are shallow to moderately deep and have a no water table within 30 inches of the surface during any part of the year. They have <3 inches of available water capacity within 40 inches of the surface and are well drained. This ESD fits into the National Vegetation Standard’s Central Rocky Mt. Pinus ponderosa / Shrub Understory alliance.

Table 1. Dominant plant species

Tree	(1) *Pinus ponderosa*
Shrub	(1) *Symphoricarpos albus* (2) *Physocarpus malvaceus*
Herbaceous	(1) *Calamagrostis rubescens* (2) *Achillea millefolium*

Physiographic features

Physiographic Features
Landscapes: Mountains, Plateaus, Valleys
Landform: hills, ridges, mountain slopes, structural benches, escarpments

Elevation (m): Total range = 585 to 1140 m
(1,920 to 3,740 feet)
Central tendency = 720 to 890 m
(2,360 to 2,920 feet)

Slope (percent): Total range = 0 to 70 percent
Central tendency = 12 to 35 percent

Aspect: 55-215-360
Central tendency: 155-215-295

Table 2. Representative physiographic features

Landforms	(1) Foothills > Hillslope (2) Mountains > Mountain slope (3) Plateau > Escarpment (4) Mountains > Ridge
Flooding frequency	None
Ponding frequency	None
Elevation	719–890 m
Slope	12–35%
Aspect	W, SE, S, SW

Table 3. Representative physiographic features (actual ranges)

Flooding frequency	None
Ponding frequency	None
Elevation	585–1,140 m
Slope	0–70%

Climatic features

Climatic Features
Frost-free period (days): Total range = 105 to 130 days
Central tendency = 110 to 120 days

Mean annual precipitation (cm): Total range = 425 to 1075 mm
(18 to 42 inches)
Central tendency = 560 to 765 mm
(22 to 30 inches)

MAAT (C): Total range = 6.6 to 9.1 C
(44 to 48 F)
Central tendency = 7.6 to 8.3 C
(46 to 47 F)

Climate Stations: none

Influencing water features

Water Table Depth (cm): none present

Flooding:
Frequency: None
Duration: None

Ponding:
Frequency: None
Duration: None

Soil features

Representative Soil Features

This ecological subsite is associated with several soil series. The soils are Lacy, Lenz, Skalan, Spokane, Bobbitt, and Cassyhill. The soil components are members of the following soil subgroups: Vitrandic Haploxerolls, Lithic Ultic Argixerolls, Ultic Haploxeralfs, Vitrandic Argixerolls, and Lithic Ultic Haploxerolls. These soils have developed in highly mixed Mazama tephra deposits, loess, and residuum, from granitic, basalt, or metasedimentary rock. The soils are shallow to moderately deep and have a no water table within 30 inches of the surface during any part of the year. They have <3 inches of available water capacity within 40 inches of the surface. The soils are well drained.

Table 4. Representative soil features

Parent material	(1) Volcanic ash (2) Loess (3) Residuum–basalt (4) Residuum–granite and gneiss (5) Residuum–metasedimentary rock
Surface texture	(1) Stony loam (2) Very gravelly, ashy silt loam (3) Stony silt loam
Drainage class	Well drained
Permeability class	Moderate
Depth to restrictive layer	48 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	4.06 cm
Calcium carbonate equivalent (0-101.6cm)	0%
Electrical conductivity (0-101.6cm)	0 mmhos/cm
Soil reaction (1:1 water) (0-152.4cm)	6.4

Subsurface fragment volume <=3" (25.4-152.4cm)	15%
Subsurface fragment volume >3" (25.4-152.4cm)	40%

Table 5. Representative soil features (actual values)

Drainage class	Well drained
Permeability class	Moderately slow to moderately rapid
Depth to restrictive layer	25–107 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0–3%
Available water capacity (0-101.6cm)	3.05–6.6 cm
Calcium carbonate equivalent (0-101.6cm)	0%
Electrical conductivity (0-101.6cm)	0 mmhos/cm
Soil reaction (1:1 water) (0-152.4cm)	5.1–7.3
Subsurface fragment volume <=3" (25.4-152.4cm)	5–35%
Subsurface fragment volume >3" (25.4-152.4cm)	0–80%

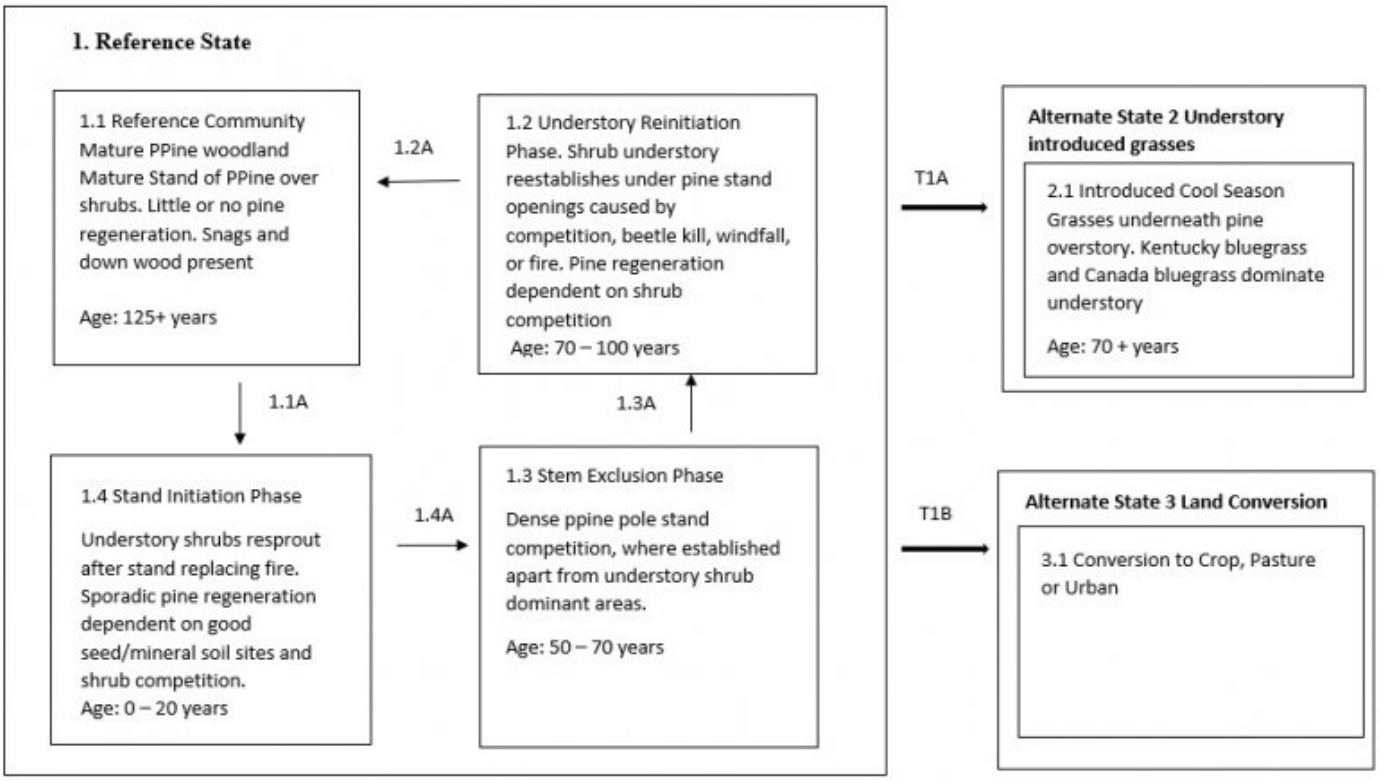
Ecological dynamics

Ecological Dynamics of the Site
This site is located on foot slopes and side slopes of hills, canyons and low mountains. It is on sites with more moisture than the pine/dry grass sites. Most of this site occurs under 2800’ of elevation. Reference state is characteristic of mature pine stands over snowberry, serviceberry, spirea, chokecherry, woods rose, nutka rose, and ninebark. Redstem ceanothus may be present as evidence of past fires. Fire disturbance is sporadic and currently in the mixed severity or stand replacing regimes. It would not be considered in the pine/savanna category due to lack of frequent ground fires. Overstory canopy cover of these mature pine stands will range from 40 – 60%. These mature pine stands will be subject to bark beetle kill, windfall, and fire. The understory shrubs will resprout quickly and pine regeneration will be dependent on pine seed placement and shrub competition.
The pine/snowberry plant association will be located on the drier topographic locations and the pine/ninebark plant association will be located on northern aspects. These sites have been subject to overgazing, introduced grass seeding and land conversion. Kentucky bluegrass and Canada bluegrass have invaded many of these sites dominating the understory. Sites on less sloping terrain may have been converted to crops, pasture, or urban land.

State and transition model

State and Transition Diagram

State Transition Model – Ecological Site
Mesic, Xeric Hills and Canyons (Ponderosa pine/Shrub)
Ponderosa Pine/Snowberry – Ninebark



State 1
Mature Ponderosa pine Woodland

This state is relatively stable with long fire intervals maintaining a mature stand of ponderosa pine over a host of shrubs. Pine regeneration after any type of disturbance creating understory gaps will be variable due to shrub competition. Western pine beetle kill and windfall will create snags and down wood.

Characteristics and indicators. Mature pine stand with canopy coverage from 40 – 60% allowing dense understory coverage of shrubs with snowberry the most abundant and ninebark on moister sites. Little or no pine regeneration present due to shrub competition. Fire return intervals could be 100+ years. With minimal disturbance this phase maintained for long periods.

Community 1.1
Reference Community

Mature pine stand with canopy coverage from 40 – 60% allowing dense understory coverage of shrubs with snowberry the most abundant and ninebark on moister sites. Little or no pine regeneration present due to shrub competition. Fire return intervals could be 100+ years. With minimal disturbance this phase maintained for long periods.

Dominant plant species

- ponderosa pine (*Pinus ponderosa*), tree
- common snowberry (*Symphoricarpos albus*), shrub
- Saskatoon serviceberry (*Amelanchier alnifolia*), shrub
- white spirea (*Spiraea betulifolia*), shrub
- chokecherry (*Prunus virginiana*), shrub
- Woods' rose (*Rosa woodsii*), shrub
- mallow ninebark (*Physocarpus malvaceus*), shrub
- Cascara buckthorn (*Frangula purshiana*), shrub
- redstem ceanothus (*Ceanothus sanguineus*), shrub
- bluebunch wheatgrass (*Pseudoroegneria spicata*), grass
- pinegrass (*Calamagrostis rubescens*), grass
- blue wildrye (*Elymus glaucus*), grass
- bluegrass (*Poa*), grass
- common yarrow (*Achillea millefolium*), other herbaceous
- strawberry (*Fragaria*), other herbaceous
- sweetcicely (*Osmorhiza berteroi*), other herbaceous
- Geyer's sedge (*Carex geyeri*), other herbaceous

Community 1.2
Understory Reinitiation

Shrub understory reestablishes from openings created with pine stand mortality from stand competition, beetle kill, root rot, or windfall. Snags and downed wood occur on site. Little or no pine regeneration due to shrub competition.

Community 1.3
Stem Exclusion

Dense pole stage pine stand. Experiences mortality from stand competition. Shrub dominated areas may exist interspersed within the pine stand.

Community 1.4
Stand Initiation

Stand replacing fire. Shrubs reestablish quickly. Pine regeneration dependent on seed year, moisture, and exposed

mineral soil. A pine-shrub mosaic may develop dependent on pine – shrub completion dynamics.

Pathway 1.1A
Community 1.1 to 1.4

Stand replacing fire where mineral soil exposed for pine regeneration. Shrubs reestablish quickly to compete with pine establishment.

Pathway 1.2A
Community 1.2 to 1.1

Time. Mature stand maintained with minimal disturbance

Pathway 1.3A
Community 1.3 to 1.2

Shrub understory reestablishes from openings created with pine stand mortality from stand competition, beetle kill, root rot, or windfall. Snags and downed wood occur on site. Little or no pine regeneration due to shrub competition.

Pathway 1.4A
Community 1.4 to 1.3

Dense pine stands develop in areas of good pine regeneration after fire.

State 2
Introduced Grasses

This state developed from past overgrazing or other disturbance and where Kentucky bluegrass and/or Canada bluegrass invaded from adjacent areas. Shrub coverage is low. A mature stand of pine usually exists.

Community 2.1
Reference

This state developed from past overgrazing or other disturbance and where Kentucky bluegrass and/or Canada bluegrass can invade from adjacent areas. Shrub coverage is low. Domestic spp may have been broadcast into sward to increase forage production. A mature stand of pine often exists.

Dominant plant species

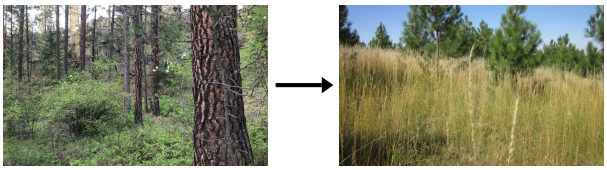
- ponderosa pine (*Pinus ponderosa*), tree
- common snowberry (*Symphoricarpos albus*), shrub
- bluegrass (*Poa*), grass
- smooth brome (*Bromus inermis*), grass
- orchardgrass (*Dactylis glomerata*), grass

State 3
Land Conversion

Much of this Ecological Site is located at lower elevations where humans (Native and European) settled. These

areas were converted to homesteads, pastures, and cropland. In recent times urban expansion has converted these sites to housing developments, shopping malls, and/or business centers.

Transition T1A
State 1 to 2

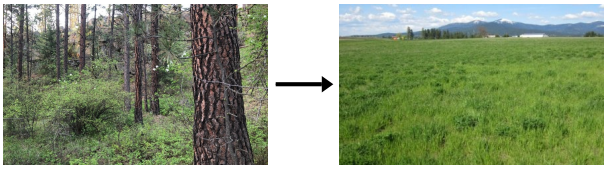


Mature Ponderosa pine Woodland

Introduced Grasses

Invasion of introduce cool season grasses from overgrazing or seeding.

Transition T1B
State 1 to 3



Mature Ponderosa pine Woodland

Land Conversion

Land converted to crop, pasture or urban land

Restoration pathway R2A
State 2 to 1

Introduced Grasses

Mature Ponderosa pine Woodland

Intense site preparation to kill cool season introduced grasses. Native shrub and grass seeding needed if native vegetation is sparse.

Additional community tables

References

. 1998. NRCS National Forestry Manual.

. 2017. NRCS Soil and Site Index data for NE WA and N. Idaho.

Cooper, S.V., K.E. Neiman, R. Steele, and D.W. Roberts. 1991. Forest Habitat types of Northern Idaho, A Second Approximation.

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Smith and Fischer. 1997. Fire Ecology of the Forest Habitat Types of Northern Idaho.

Williams, C.K., B.F. Kelley, B.G. Smith, and T.R. Lillybridge. October, 1995. Forested Plant Associations of the Colville National Forest.

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

Approval

Curtis Talbot, 10/14/2020

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	05/13/2025
Approved by	Curtis Talbot
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:**