USDA Natural Resources Conservation Service

Ecological site F043AY513WA
Cool-Frigid, Xeric, Loamy Mountainsides, ashy surface (Douglas-Fir/Cool Dry Grass) Pseudotsuga menziesii - Calamagrostis rubescens

Last updated: 3/19/2020
Accessed: 05/12/2025

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.

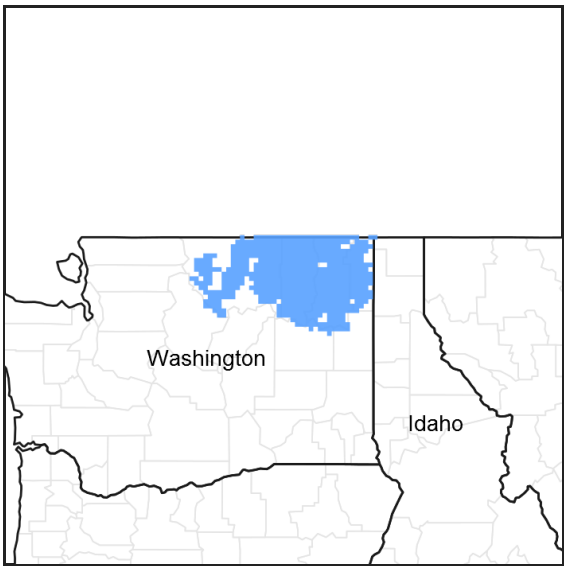

Figure 1. Mapped extent

Areas shown in blue indicate the maximum mapped extent of this ecological site. Other ecological sites likely occur within the highlighted areas. It is also possible for this ecological site to occur outside of highlighted areas if detailed soil survey has not been completed or recently updated.

MLRA notes

Major Land Resource Area (MLRA): 043A–Northern Rocky Mountains

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.

LRU notes

Most commonly found in LRU 43A01 (Okanogan Plateau). This LRU is composed predominantly of glaciated slopes of foothills and mountains west of the Republic Graben and Sanpoil River. The LRU is in the portion of the Northern Rocky Mountains that was subjected to continental glaciation. The soils tend to be loamy andisols, mollisols and inceptisols with mixed to thick ash surfaces. Till, outwash and glacially scoured granitics are the dominant parent materials. Soil climate is a frigid or cryic temperature regime and xeric moisture regime with average annual precipitation around 450 mm (18 inches) and an average annual air temperature around 6.3 degrees C (43 degrees F). Elevation ranges from about 560 to 1530 m (2,540 to 5,020 feet).

Classification relationships

Relationship to Other Established Classifications:

United States National Vegetation Classification (2008) - A3395 Douglas fir- P. 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 Mt. Dry-Mesic Montane Mixed Conifer Forest (D. Fir – Pine)

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 - 15x Okanogan Highland Dry Forest. 15w Western Selkirk Maritime Forest. 15r Okanogan – Colville Xeric Valleys & Foothills.

This ecological site includes the following USDA Forest Service Plant Associations: PSME/CARU (Douglas-fir Series). (Williams et. al. 1995)

Ecological site concept

This site consists of hillslopes and mountain slopes with the following characteristics: loamy soil materials; a water table (perched or apparent) more than 75 cm (30 in) below the soil surface during the April to October period; a volcanic ash mantle more than 18cm (7 inches) thick; cumulative available water capacity to 100 cm (40 inches) of more than 7.5 cm (3 inches); PSME/CARU habitat type.

Table 1. Dominant plant species

Tree	(1) *Pseudotsuga menziesii var. glauca* (2) *Larix occidentalis*
Shrub	Not specified
Herbaceous	(1) *Calamagrostis rubescens* (2) *Carex geyeri*

Physiographic features

Physiographic Features
Landscapes: Mountains, Foothills
Landform: sideslopes, foot slopes, outwash terraces

Elevation: Total range = 415 to 1850 m
(1,360 to 6,070 feet)
Central tendency = 950 to 1310 m
(3,100 to 4,300 feet)

Slope (percent): Total range = 0 to 75 percent
Central tendency = 15 to 40 percent

Aspect (degrees):
250-40-200
Central tendency = 345-40-130

Table 2. Representative physiographic features

Geomorphic position, terraces	(1) Tread
Landforms	(1) Mountains > Mountain slope (2) Foothills > Hillslope (3) Foothills > Outwash terrace
Flooding frequency	None

Ponding frequency	None
Elevation	945–1,311 m
Slope	15–40%
Aspect	NW, N, NE, E, SE

Table 3. Representative physiographic features (actual ranges)

Flooding frequency	Not specified
Ponding frequency	Not specified
Elevation	415–1,850 m
Slope	0–75%

Climatic features

Climatic Features
Frost-free period (days): Total range = 80 to 130 days
Central tendency = 95 to 110 days

Mean annual precipitation: Total range = 275 to 845 mm
(11 to 33 inches)
Central tendency = 420 to 590 mm
(16 to 23 inches)

MAAT: Total range = 2.5 to 9.5 C
(36 to 48 F)
Central tendency = 5.2 to 6.9
(41 to 44 F)

Climate Stations: CHIWAWA RIVER, METHOW, METHOW 2, METHOW 2 W, TONASKET 11 WSW, UPPER PINE CREEK, Aeneas, Leecher, Little Pend NWR, Pal Moore Orchard

Table 4. Representative climatic features

Frost-free period (characteristic range)	95-110 days
Freeze-free period (characteristic range)	
Precipitation total (characteristic range)	406-584 mm
Frost-free period (actual range)	80-130 days
Freeze-free period (actual range)	
Precipitation total (actual range)	279-838 mm

Influencing water features

Water Table Depth: 58 cm to >200 cm (median = >200cm)
(23 to >80 inches; median =>80 inches)

Flooding:
Frequency: None

Duration: None

Ponding:
Frequency: None
Duration: None

Soil features

Representative Soil Features

This ecological subsite is associated with several soil series (e.g. Nevine, Molson, bamber, Stepstone, Goddard). The soil components can be grouped into: Typic Vitrixerands, Andic Haploxerepts, and Humic Vitrixerands. These soils have developed in Mazama tephra deposits over till, glaciolacustrine material, outwash and residuum and colluvium from granitic and metasedimentary rock. The tephra layers are important for forest productivity in that they retain large amounts of water compared to other parent materials, have high cation exchange capacity and high availability of organically bound plant nutrients. The soils range from moderately deep to very deep and have adequate available water capacity to a depth of 1 m. The soils are mostly well-drained.

Parent Materials:
Kind: Tephra (volcanic ash)
Origin: mixed
Kind: till, residuum and colluvium, and outwash
Origin: Granitic, Metamorphic and Volcanic rock

Surface Texture:
(1)Ashy Fine sandy loam
(2)Ashy Silt loam
(3)Ashy Loam

Fragment content of surface: 0 to 28 percent (median = 7%)

Subsurface Texture Group: Loamy
Fragment content of subsurface (10 to 150cm, weighted avg.): 0 to 42 percent (median = 15%)
Most components lack surface fragments
Drainage Class: Well drained (<1% Moderately Well drained components)
Saturated Hydraulic conductivity: Moderately high to Very High (above restrictions)
Soil Depth: 64% of components have some kind of restriction within 150 cm
Lithic contacts when present are at 68 to 147cm (median = 85cm)
Paralithic contacts when present are at 74 to 107cm (median = 90 cm)
Densic contacts when present are at 69 to 127cm (median = 94 cm)
Calcium Carbonate Equivalent (percent): 0
Soil Reaction (1:1 Water): 6.1 to 7.3
Available Water Capacity (total in 100cm): 8.15-21.48cm (median = 10.31cm)

Table 5. Representative soil features

Parent material	(1) Volcanic ash (2) Till (3) Outwash (4) Residuum–granite and gneiss (5) Colluvium–granite and gneiss
Surface texture	(1) Ashy fine sandy loam (2) Ashy silt loam (3) Ashy loam
Drainage class	Well drained

Permeability class	Moderately rapid
Depth to restrictive layer	152–203 cm
Soil depth	152–203 cm
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	10.29 cm
Calcium carbonate equivalent (0-152.4cm)	0%
Soil reaction (1:1 water) (0-152.4cm)	Not specified
Subsurface fragment volume <=3" (10.2-152.4cm)	15%

Table 6. Representative soil features (actual values)

Drainage class	Moderately well drained to well drained
Permeability class	Moderate to rapid
Depth to restrictive layer	69–203 cm
Soil depth	69–203 cm
Surface fragment cover >3"	0–9%
Available water capacity (0-101.6cm)	8.13–21.46 cm
Calcium carbonate equivalent (0-152.4cm)	0%
Soil reaction (1:1 water) (0-152.4cm)	6.1–7.3
Subsurface fragment volume <=3" (10.2-152.4cm)	0–42%

Ecological dynamics

A description of vegetation dynamics and a state and transition model can be found in Ecological Site Group EX043AESG04

State and transition model

Table 7. Representative site productivity

Common Name	Symbol	Site Index Low	Site Index High	CMAI Low	CMAI High	Age Of CMAI	Site Index Curve Code	Site Index Curve Basis	Citation
ponderosa pine	*PIPO*	90	108	85	118	40	–	–	
Rocky Mountain Douglas-fir	*PSMEG*	71	79	63	79	100	–	–	
Rocky Mountain Douglas-fir	*PSMEG*	62	69	60	76	123	–	–	
western larch	*LAOC*	60	70	54	73	50	–	–	

Approval

Scott Woodall, 3/19/2020

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	05/12/2025
Approved by	Scott Woodall
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:**