

Ecological site F043AY547ID

Fragipan Foothills

24-30" PZ Frigid

Eastern Columbia Plateau Embayments

Last updated: 3/11/2025

Accessed: 08/31/2026

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): 043A–Northern Rocky Mountains

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

LRU notes

Most commonly found in LRU 44A07 (Eastern Columbia Plateau Embayments). Also found in adjacent areas of 43A09 (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) – A3362 *Abies grandis* – *Pseudotsuga menziesii* Central Rocky Mountain Forest & Woodland Alliance Washington Natural Heritage Program. Ecosystems of Washington State, A Guide to Identification, Rocchio and Crawford, 2015 – Northern Rocky Mountain Mesic Montane Mixed Conifer Forest 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, 15y Selkirk Mountains, 15v Northern Idaho Hills and Low Relief Mountains. This ecological site includes the following USDA Forest Service Plant Association: ABRG/PHMA, (Williams et. al. 1995)

Ecological site concept

This ESD is distinguished by an overstory of grand fir and Douglas-fir and an understory shrub component of ninebark, oceanspray, snowberry and /or twinflower. It occurs on mountainsides. These soils have developed in thin or mixed Mazama tephra deposits over loess and Tertiary age alluvium from mixed sources. The soils are moderately deep or deep to a fragipan and have adequate available water capacity to a depth of 40 inches. The soils are moderately well-drained. They have a water table within 30 inches of the surface during the winter months but are usually dry from June to November. This ESD fits into the National Vegetation Standard's Grand Fir - Douglas-fir Central Rocky Mountain Forest & Woodland Alliance and Washington State's Natural Heritage Program's Northern Rocky Mt. Mesic Montane Mixed Conifer Forest.

Table 1. Dominant plant species

Tree	(1) <i>Pseudotsuga menziesii</i> var. <i>glauca</i> (2) <i>Abies grandis</i>
Shrub	(1) <i>Physocarpus malvaceus</i> (2) <i>Symphoricarpos albus</i>

Herbaceous	(1) <i>Galium trifidum</i> (2) <i>Bromus vulgaris</i>
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Physiographic features

Physiographic Features

Landscapes: Foothills, Plateaus

Landform: hillslopes, broad interfluves

Elevation (m): Total range = 690 to 1050 m
(2,265 to 3,445 feet)

Central tendency = 825 to 915 m
(2,705 to 3,000 feet)

Slope (percent): Total range = 0 to 35 percent
Central tendency = 5 to 15 percent

Aspect: none dominant

Table 2. Representative physiographic features

Landforms	(1) Foothills > Hillslope (2) Plateau > Interfluve
Flooding frequency	None
Ponding frequency	None
Elevation	820 – 910 m
Slope	10 – 20 %
Water table depth	70 cm
Aspect	Aspect is not a significant factor

Table 3. Representative physiographic features (actual ranges)

Flooding frequency	None
Ponding frequency	None
Elevation	690 – 1,050 m
Slope	0 – 40 %

Water table depth	40 – 200 cm
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Climatic features

Climatic Features

Frost-free period (days): Total range = 95 to 135 days

Central tendency = 110 to 120 days

Mean annual precipitation (cm): Total range = 515 to 1020 mm

(20 to 40 inches)

Central tendency = 705 to 830 mm

(28 to 33 inches)

MAAT (C): Total range = 6.5 to 8.9

(44 to 48 F)

Central tendency = 7.4 to 8.0

(45 to 46 F)

Climate Stations: (CoOp stations) Deary, Plummer 3 WSW, Potlatch 1 SE, Princeton 5 SE

Influencing water features

Water Table Depth: perched water table at 14 to 25 inches (median = 18 inches) during Dec-Apr

at 26 to 80 inches from Apr-May (median = 26 inches)

generally dry after mid-June

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. Santa, Carlinton, Pold, and Teakean). The soil components are: Vitrandic Fragixeralfs, Aquic Vitrixerands, and Vitrandic Paleixeralfs. These soils have developed in thin or mixed Mazama tephra deposits over loess and Tertiary age alluvium from mixed sources. The soils are moderately deep or deep to a fragipan and have adequate available water capacity to a depth of 1 m. The soils are moderately well-drained.

Table 4. Representative soil features

Parent material	(1) Volcanic ash (2) Alluvium (3) Loess (4) Colluvium – metamorphic rock
Surface texture	(1) Ashy silt loam

Drainage class	Moderately well drained
Permeability class	Very slow to slow
Depth to restrictive layer	80 cm
Surface fragment cover >3"	Not specified
Available water capacity (0-101.6cm)	15.24 cm
Calcium carbonate equivalent (0-152.4cm)	Not specified
Electrical conductivity (0-152.4cm)	Not specified
Soil reaction (1:1 water) (0-152.4cm)	6.2
Subsurface fragment volume <=3" (25.4-152.4cm)	Not specified
Subsurface fragment volume >3" (25.4-152.4cm)	Not specified

Table 5. Representative soil features (actual values)

Drainage class	Moderately well drained
Permeability class	Very slow to slow
Depth to restrictive layer	50 – 150 cm
Surface fragment cover >3"	0 %

Available water capacity (0-101.6cm)	12.7 – 19.3 cm
Calcium carbonate equivalent (0-152.4cm)	0 %
Electrical conductivity (0-152.4cm)	0 mmhos/cm
Soil reaction (1:1 water) (0-152.4cm)	5.1 – 6.8
Subsurface fragment volume <=3" (25.4-152.4cm)	0 – 20 %
Subsurface fragment volume >3" (25.4-152.4cm)	0 %

Ecological dynamics

Ecological Dynamics of the Site

This site is the warmest extent where grand fir can be an overstory component. As the temperature gradient gets warmer Douglas-fir and ponderosa pine habitat types occur. Above this temperature gradient (cooler) subalpine fir habitats exist. Relative to moisture this is the driest grand fir habitat type. As moisture increases grand fir/herb, cedar, and cedar-hemlock habitat types occur. Fire disturbance is a major factor in mature stand development. Frequent fires create an open stand of western larch, ponderosa pine, and Douglas-fir with a mixed understory of shrubs, grass, and herbs. Mixed severity fires create a patchy forest overstory with shrubs and grass understory. Fire exclusion allows grand fir to establish and become an overstory component with Douglas-fir. Stands in this condition are subject to stand replacing fires. Root rot can become a problem in these older stands dominated by Douglas-fir and grand fir.

The moisture end of this ES lies in Northern Idaho where grand fir is more prominent in stand composition and western larch can be a major stand component. As this ES extends westward into Washington, grand fir is near its ecological limit and is a minor stand component. Douglas-fir and ponderosa pine are the major tree species. In this warmer environment this ES looks very similar to the Douglas-fir/ninebark ES.

State and transition model

Additional community tables

Table 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 7. Community 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 8. Community 1.3 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 9. Community 1.4 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 10. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 11. Community 3.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 12. Community 4.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 13. 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
Rocky Mountain Douglas-fir	PSMEG	75	110	71	160	90	—	—	
Rocky Mountain Douglas-fir	PSMEG	64	107	65	158	90	—	—	
ponderosa pine	PIPO	98	120	99	141	40	—	—	
grand fir	ABGR	70	85	95	124	110	—	—	
western larch	LAOC	66	85	66	103	50	—	—	
western larch	LAOC	50	70	63	70	70	—	—	

References

. 1998. NRCS National Forestry Manual.

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

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Approval

Kirt Walstad, 3/11/2025

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	12/18/2020
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:
