# Ecological site F043AY541ID
# Fragipan Foothills
# 19-24" PZ Frigid
# Eastern Columbia Plateau Embayments

Last updated: 4/10/2025
Accessed: 04/21/2026

## 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

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## LRU notes

Most commonly found in LRU 43A07 (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) - A3392 Douglas fir- P. 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 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/PHMA, PSME/PHMA-LIBOL and PSME/SYAL (Douglas-fir Series). (Williams et. al. 1995)

## Ecological site concept

This ESD in distinguished by an overstory of ponderosa pine and Douglas-fir and an understory shrub component of ninebark, oceanspray, and snowberry. It occurs on hillslopes of loess mantled plateaus and foothills. These soils have developed in mixed Mazama tephra, loess and other silty deposits over older sediments. The soils are moderately deep to a fragipan and have adequate available water capacity to a depth of 40 inches. The soils are moderately well-drained. This ESD fits into the National Vegetation Standard's Central Rocky Mt. Ponderosa Pine – Douglas-fir Dry shrub alliance and Washington State's Natural Heritage Program's Northern Rocky Mt. Dry Mesic Montane Mixed Conifer Forest.

**Table 1. Dominant plant species**

| | |
|---|---|
| Tree | (1) *Pseudotsuga menziesii var. glauca*<br>(2) *Pinus ponderosa* |
| Shrub | (1) *Symphoricarpos albus*<br>(2) *Physocarpus malvaceus* |

| | |
|---|---|
| Herbaceous | (1) *Maianthemum racemosum ssp. racemosum*<br>(2) *Arnica cordifolia* |

### Physiographic features

Physiographic Features
Landscapes: Foothills, Plateaus
Landform: hillslopes, loess hills

Elevation (m): Total range = 680 to 1030 m
(2,230 to 3,380 feet)
Central tendency = 815 to 900 m
(2,675 to 2,950 feet)

Slope (percent): Total range = 0 to 30 percent
Central tendency = 4 to 15 percent

Aspect:
Total range: 65-230-20
Central Tendency : 140-230-310

**Table 2. Representative physiographic features**

| | |
|---|---|
| Landforms | (1) Foothills > Hillslope<br>(2) Plateau > Loess hill |
| Flooding frequency | None |
| Ponding frequency | None |
| Elevation | 820 – 900 m |
| Slope | 0 – 20 % |
| Water table depth | 50 cm |
| Aspect | W, NW, SE, S, SW |

**Table 3. Representative physiographic features (actual ranges)**

| | |
|---|---|
| Flooding frequency | None |
| Ponding frequency | None |
| Elevation | 680 – 1,030 m |

| | |
|---|---|
| Slope | 0 – 30 % |
| Water table depth | 40 – 90 cm |

### Climatic features

Climatic Features
Frost-free period (days): Total range = 90 to 135 days
Central tendency = 90 to 120 days

Mean annual precipitation (cm): Total range = 520 to 1000 mm
(20 to 39 inches)
Central tendency = 655 to 805 mm
(26 to 32 inches)
MAAT (C Total range = 7.7 to 8.3
(47 to 51 F)
Central tendency = 7.7 to 8.3
(49 to 50 F)

Climate Stations: Fraser

### Influencing water features

Water Table Depth: perched water table at 14 to 37 inches (median = 18 inches) during winter
Generally dry after May

Flooding:
Frequency: None
Duration: None

Ponding:
Frequency: None
Duration: None

### Soil features

This ecological subsite is associated with several soil series (e.g. Taney, Santa, Carlinton, and Pold). The soil components can be grouped into: Vitrandic Argixerolls, Vitrandic Fragixeralfs, and Aquic Vitrixerands. These soils have developed in mixed Mazama tephra, loess and other deposits over older sediments. The soils are moderately deep to a fragipan and have adequate available water capacity to a depth of 40 inches. The soils are moderately well-drained.

**Table 4. Representative soil features**

| | |
|---|---|
| Parent material | (1) Volcanic ash<br>(2) Loess<br>(3) Alluvium |
| Surface texture | (1) Ashy silt loam<br>(2) Silt loam |
| Drainage class | Moderately well drained |

| | |
|---|---|
| Depth to restrictive layer | 80 cm |
| Surface fragment cover >3" | Not specified |
| Available water capacity (0-101.6cm) | 17.02 cm |
| Calcium carbonate equivalent (0-101.6cm) | Not specified |
| Electrical conductivity (0-101.6cm) | Not specified |
| Soil reaction (1:1 water) (0-152.4cm) | 5.8 |
| 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 |
| Depth to restrictive layer | 50 – 100 cm |
| Surface fragment cover >3" | 0 % |
| Available water capacity (0-101.6cm) | 14.48 – 20.07 cm |
| Calcium carbonate equivalent (0-101.6cm) | 0 % |

| | |
|---|---|
| Electrical conductivity (0-101.6cm) | 0 mmhos/cm |
| Soil reaction (1:1 water) (0-152.4cm) | 10 – 7.3 |
| Subsurface fragment volume <=3" (25.4-152.4cm) | 0 % |
| Subsurface fragment volume >3" (25.4-152.4cm) | 0 % |

## Ecological dynamics

Ecological Dynamics of the Site
The reference state occurred before European settlement when frequent low intensity fires created open stands of large ponderosa pine with a grass dominated understory of pinegrass. Patches of Douglas-fir regeneration will be present. On the lower foothills this ecological site occurs on north and east slopes. On upper mountainous terrain it will occur on southern and western aspects. Sites escaping frequent fire will have a patchy mosaic of older large trees with patches of regeneration, pole stands of ponderosa pine and Douglas-fir, and a mixture of shrubs, grasses and forbs. Bark beetle and root disease mortality will create snags and woody debris. Severe stand replacing fires can result in ceanothus shrub fields dominating for several years until natural regeneration of pine and Douglas-fir reclaim the site. In other less severe burned areas, grass and sedge species will dominate along with sprouting shrubs like ninebark, oceanspray, and snowberry.
Lack of fire or fire exclusion crosses a threshold and the site goes to another state. State 2 results in homogenous multi-storied stands of ponderosa pine and Douglas-fir with dense understories of regeneration and/or shrubs. Snags and wood debris are lacking. These stands are highly susceptible to stand replacing fires. Much of the acreage of this ecological site is in this condition. Timber stand improvement and fuel removal treatments along with prescribed fire can restore this site to a more open patchy landscape more resistant to severe fire.
In Alternative State 3 severe fire has damaged soil nutrient capacity with shrub fields of ceanothus species dominating the site for 50+ years. This condition more commonly occurring on south and west facing slopes. Restoration activities must be scrutinized on a site by site basis.
In Alternative State 4 some of the lower landscape portions of this ecological site have been converted to introduced grass pastures or annual cropland. Restoring this site to the reference state takes major inputs in site preparation, tree planting, vegetation control, fuels management and other silvicultural treatments.

## 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 (%) |
|---|---|---|---|---|---|

**Table 7. Community 1.2 plant community composition**

| Group | Common Name | Symbol | Scientific Name | Annual Production () | Foliar Cover (%) |
|---|---|---|---|---|---|

**Table 8. Community 1.3 plant community composition**

| Group | Common Name | Symbol | Scientific Name | Annual Production () | Foliar Cover (%) |
|---|---|---|---|---|---|

**Table 9. Community 1.4 plant community composition**

| Group | Common Name | Symbol | Scientific Name | Annual Production () | Foliar Cover (%) |
|---|---|---|---|---|---|

**Table 10. Community 2.1 plant community composition**

| Group | Common Name | Symbol | Scientific Name | Annual Production () | Foliar Cover (%) |
|---|---|---|---|---|---|

**Table 11. Community 3.1 plant community composition**

| Group | Common Name | Symbol | Scientific Name | Annual Production () | Foliar Cover (%) |
|---|---|---|---|---|---|

## 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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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, 4/10/2025

## 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 | 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:**

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):**

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14. **Average percent litter cover (%) and depth ( in):**

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):**

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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:**

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17. **Perennial plant reproductive capability:**

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