

Ecological site F043AY545ID

Ashy Basalt Hills and Canyons

19-24" PZ Frigid

Clearwater Canyons

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

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 43A08 (Clearwater Canyons). Also found in adjacent areas of 43A07 (Eastern Columbia Plateau Embayments). 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 is distinguished by an overstory of ponderosa pine and Douglas-fir and an understory shrub component of ninebark, oceanspray, and snowberry. It occurs on foothills, mountainsides, and canyon walls. These soils have developed in mixed Mazama tephra and loess over residuum and colluvium from basalt rock. They are deep and very deep and have adequate available water capacity to a depth of 1 m. The soils are well-drained and do not have a water table within 30 inches of the surface at any time during the year. 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) <i>Pseudotsuga menziesii</i> var. <i>glauca</i> (2) <i>Pinus ponderosa</i>
Shrub	(1) <i>Symphoricarpos albus</i> (2) <i>Physocarpus malvaceus</i>

Herbaceous	(1) <i>Maianthemum racemosum</i> ssp. <i>racemosum</i> (2) <i>Arnica cordifolia</i>
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Physiographic features

Physiographic Features

Landscapes: Canyonlands, Plateaus, Foothills

Landform: canyon walls, hillslopes, structural benches, escarpments, ridges

Elevation (m): Total range = 305 to 1115 m

(1,000 to 3,655 feet)

Central tendency = 625 to 840 m

(2,050 to 2,755 feet)

Slope (percent): Total range = 0 to 110 percent

Central tendency = 25 to 60 percent

Water Table Depth: >80 inches

Flooding:

Frequency: None

Duration: None

Ponding:

Frequency: None

Duration: None

Aspect:

Total Range: 235-30-175

Central Tendency: 335-30-110

Table 2. Representative physiographic features

Landforms	(1) Plateau > Escarpment (2) Foothills > Hillslope (3) Foothills > Ridge (4) Canyonlands > Canyon wall (5) Canyonlands > Structural bench
Flooding frequency	None
Ponding frequency	None
Elevation	630 – 840 m
Slope	30 – 60 %
Water table depth	200 cm

Aspect	NW, N, NE, E, SE
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Table 3. Representative physiographic features (actual ranges)

Flooding frequency	None
Ponding frequency	None
Elevation	310 – 1,110 m
Slope	0 – 100 %
Water table depth	200 cm

Climatic features

Climatic Features

Frost-free period (days): Total range = 85 to 170 days

Central tendency = 80 to 135 days

Mean annual precipitation (cm): Total range = 435 to 985 mm

(17 to 39 inches)

Central tendency = 605 to 760 mm

(24 to 30 inches)

MAAT (C): Total range = 7.0 to 11.5

(48 to 56 F)

Central tendency = 8.4 to 9.6

(50 to 52 F)

Climate Stations: none

Influencing water features

Water Table Depth: >80 inches

Soil features

Representative Soil Features

This ecological subsite is associated with several soil series (e.g. Klickson, Cavendish, Setters, Agatha, Suloaf, Uptmor, and Larabee). The soil components can be grouped into: Vitrandic Argixerolls, Ultic Argixerolls, Ultic Haploxerafs, Vitrandic Haploxerafs, and Ultic Palexerolls. These soils have developed in mixed Mazama tephra and loess over residuum and colluvium from basalt rock. They are deep and very deep and have adequate available water capacity to a depth of 1 m. The soils are well-drained.

Parent Materials:

Kind: Tephra (volcanic ash) mixed with loess and other material

Origin: mixed

Kind: residuum and colluvium

Origin: Basalt rock

Surface Texture:

(1) Ashy Silt loam

- (3) Silt loam
- (4) Gravelly Ashy Silt loam
- (5) Cobbly Ashy Silt loam

Fragment content of surface: 0 to 31 percent (median = 10%)

3" dia.: Min - 0; Median - 8; Max – 15 percent

=3" dia.: Min - 0; Median - 0; Max – 18 percent

Subsurface Texture Group: Loamy

Fragment content of subsurface: 0 to 85 percent (median = 35%)

3" dia.: Min - 0; Median - 21; Max – 50 percent

=3" dia.: Min - 0; Median - 10; Max – 60 percent

Surface Fragments: none

Drainage Class: Well drained

Permeability: Moderate

Soil Depth: Deep and Very Deep (median = Very Deep)

Lithic and Paralithic contacts where present – 40-60 inches (median = 44 inches)

Calcium Carbonate Equivalent (percent): 0

Soil Reaction (1:1 Water): 5.1 to 7.3

Available Water Capacity (total in 40 inches): 3.8-4.9 inches (median = 3.9 inches)

Table 4. Representative soil features

Parent material	(1) Volcanic ash (2) Loess (3) Colluvium – basalt (4) Residuum – basalt
Surface texture	(1) Ashy silt loam (2) Silt loam (3) Gravelly, ashy silt loam (4) Cobbly, ashy silt loam
Drainage class	Well drained
Permeability class	Moderate
Depth to restrictive layer	150 cm
Surface fragment cover >3"	Not specified
Available water capacity (0-101.6cm)	9.91 cm

Calcium carbonate equivalent (0-152.4cm)	Not specified
Electrical conductivity (0-152.4cm)	Not specified
Soil reaction (1:1 water) (0-152.4cm)	6.5
Subsurface fragment volume <=3" (25.4-152.4cm)	20 %
Subsurface fragment volume >3" (25.4-152.4cm)	10 %

Table 5. Representative soil features (actual values)

Drainage class	Well drained
Permeability class	Moderately slow to moderate
Depth to restrictive layer	100 – 200 cm
Surface fragment cover >3"	0 %
Available water capacity (0-101.6cm)	9.65 – 12.45 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 – 7.3

Subsurface fragment volume ≤3" (25.4-152.4cm)	0 – 50 %
Subsurface fragment volume >3" (25.4-152.4cm)	0 – 60 %

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 (%)
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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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References

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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:

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:
