USDA Natural Resources Conservation Service

Ecological site F043AY524WA
Frigid, Udic, Loamy, Foothills/Mountainsides, ashy surface (Western Hemlock/Moist Forbes) Tsuga heterophylla / Clintonia uniflora , Tsuga heterophylla / Asarum caudatum

Last updated: 10/14/2020
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.

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

Most commonly found in LRU 43A04 (Selkirk Mountains). 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), A3612 Western Hemlock – Western Redcedar Cool-Mesic Central Rocky Mountain Forest & Woodland Alliance.

Washington Natural Heritage Program. Ecosystems of Washington State, A Guide to Identification, Rocchio and Crawford, 2015 - Northern Rocky Mt. Mesic Montane Mixed Conifer Forest (Cedar-Hemlock)

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 – 15y Selkirk Mountains, 15w Western Selkirk Maritime Forest.
This ecological site includes the following USDA Forest Service Plant Associations Western Hemlock Series: TSHE/CLUN, TSHE/ASCA. (Williams et. al. 1995)

Ecological site concept

This ecological site among the most productive in terms of forest production and biodiversity. It can occur all on aspects in this mountainous area. It extends to the drier western portion of MLRA 43A where it would be found on

north aspects or moist drainages and toe slopes. Soils are loamy with >7 inches of volcanic ash mantling the surface, water tables at >30 inches deep, and moderate to high available water holding capacity.

Table 1. Dominant plant species

Tree	(1) *Tsuga heterophylla* (2) *Thuja plicata*
Shrub	(1) *Coptis occidentalis* (2) *Linnaea borealis ssp. longiflora*
Herbaceous	(1) *Clintonia uniflora* (2) *Goodyera oblongifolia*

Physiographic features

Physiographic Features
Landscapes: Mountains, Foothills, Valleys
Landform: sideslopes, foot slopes, toe slopes

Elevation (m): Total range = 390 to 1720 m
(1,280 to 5,640 feet)
Central tendency = 800 to 1170m
(2,625 to 3,840 feet)

Slope (percent): Total range = 0 to 80 percent
Central tendency = 15 to 40 percent

Water Table Depth (cm):
>200 cm
(>80 inches)

Flooding:
Frequency: None
Duration: None

Ponding:
Frequency: None
Duration: None

Aspect:
235-25-175
Central tendency: 325-25-130

Table 2. Representative physiographic features

Landforms	(1) Mountains > Mountain slope (2) Foothills > Hillslope
Flooding frequency	None
Ponding frequency	None
Elevation	800–1,170 m
Slope	15–40%
Aspect	NW, N, NE, E, SE

Table 3. Representative physiographic features (actual ranges)

Flooding frequency	None
Ponding frequency	None
Elevation	390–1,719 m
Slope	0–80%

Climatic features

Climatic Features
Frost-free period (days): Total range = 80 to 135 days
Central tendency = 100 to 115 days

Mean annual precipitation (cm): Total range = 370 to 540 mm
(15 to 21 inches)
Central tendency = 430 to 510 mm
(17 to 20 inches)

MAAT (C): Total range = 7.3 to 8.8
(45 to 48 F)
Central tendency = 7.8 to 8.1
(46 to 47 F)

Climate Stations:

WA: GERMOME, SULLIVAN LAKE RS
ID: BENTON DAM, BENTON SPRING, BISMARK RS, CABINET GORGE, CLARK FORK 1 ENE

Influencing water features

Soil features

Representative Soil Features

This ecological subsite is associated with several soil series (e.g. Ahren, Aits, Berray, Bonner, Bouldercreek, Boundary, Brodeer, Caribouridge, Courvash, Dewberry, Dodgecreek, Fernline, Garveson, Glaciercreek, Hartill, Highfalls, Hubub, Huckle, Hugus, Hun, Jaypeak, Moscow, Moso, Noxlin, Pearsoncreek, Pend Oreille, Rathdrum, Redlock, Smackout, Smackout variant, Stevie, Threemile, Typic Udivitrands, Vassar, Vay, Zee). The soils are Dystrochrepts, Dystroxerepts, Dystryudepts, Eutrudepts, Haploxeralfs, Haploxerepts, Hapludalfs, Paleudalfs, Udivitrands, Vitrixerands. These soils have developed in Mazama tephra deposits over till, glaciolacustrine material, outwash and residuum and colluvium from various rock types. 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, outwash, alluvium, colluvium, residuum

Origin: granite, gneiss, schist, phyllite, quartzite, metasedimentary, limestone, shale, siltite

Surface Texture:
(1)Ashy Silt Loam
(2)Ashy Loam

Fragment content of surface (hard fragments): 0 to 24 percent (median = 8%)

Subsurface Texture Group: Loamy
Fragment content of subsurface (25 to 100cm): 0 to 85 percent (median = 26%)
Most components lack surface fragments
Drainage Class: Well drained (small number excessively drained)
Saturated Hydraulic conductivity: Moderately low to Very High (median = High)
Soil Depth: 66 to >200 cm
Calcium Carbonate Equivalent (percent): 0
Soil Reaction (1:1 Water): 5.0 to 8.5
Available Water Capacity (total in 100cm): 8.6-20.28cm (median = 11.36cm)

Table 4. Representative soil features

Parent material	(1) Volcanic ash (2) Till (3) Outwash (4) Residuum–granite and gneiss (5) Colluvium–granite and gneiss (6) Residuum–metasedimentary rock (7) Colluvium–metasedimentary rock
Surface texture	(1) Ashy silt loam (2) Ashy loam
Drainage class	Well drained
Permeability class	Moderately rapid to rapid
Depth to restrictive layer	0 cm
Available water capacity (0-101.6cm)	11.43 cm
Calcium carbonate equivalent (0-152.4cm)	0%
Soil reaction (1:1 water) (0-152.4cm)	Not specified
Subsurface fragment volume <=3" (25.4-101.6cm)	26%

Table 5. Representative soil features (actual values)

Drainage class	Well drained to excessively drained
Permeability class	Slow to very rapid
Depth to restrictive layer	66–0 cm
Available water capacity (0-101.6cm)	8.64–20.32 cm
Calcium carbonate equivalent (0-152.4cm)	0%
Soil reaction (1:1 water) (0-152.4cm)	5–8.5
Subsurface fragment volume <=3" (25.4-101.6cm)	0–85%

Ecological dynamics

A description of vegetation dynamics and a state and transition model can be found in Ecological Site Group EX043AESG09

State and transition model

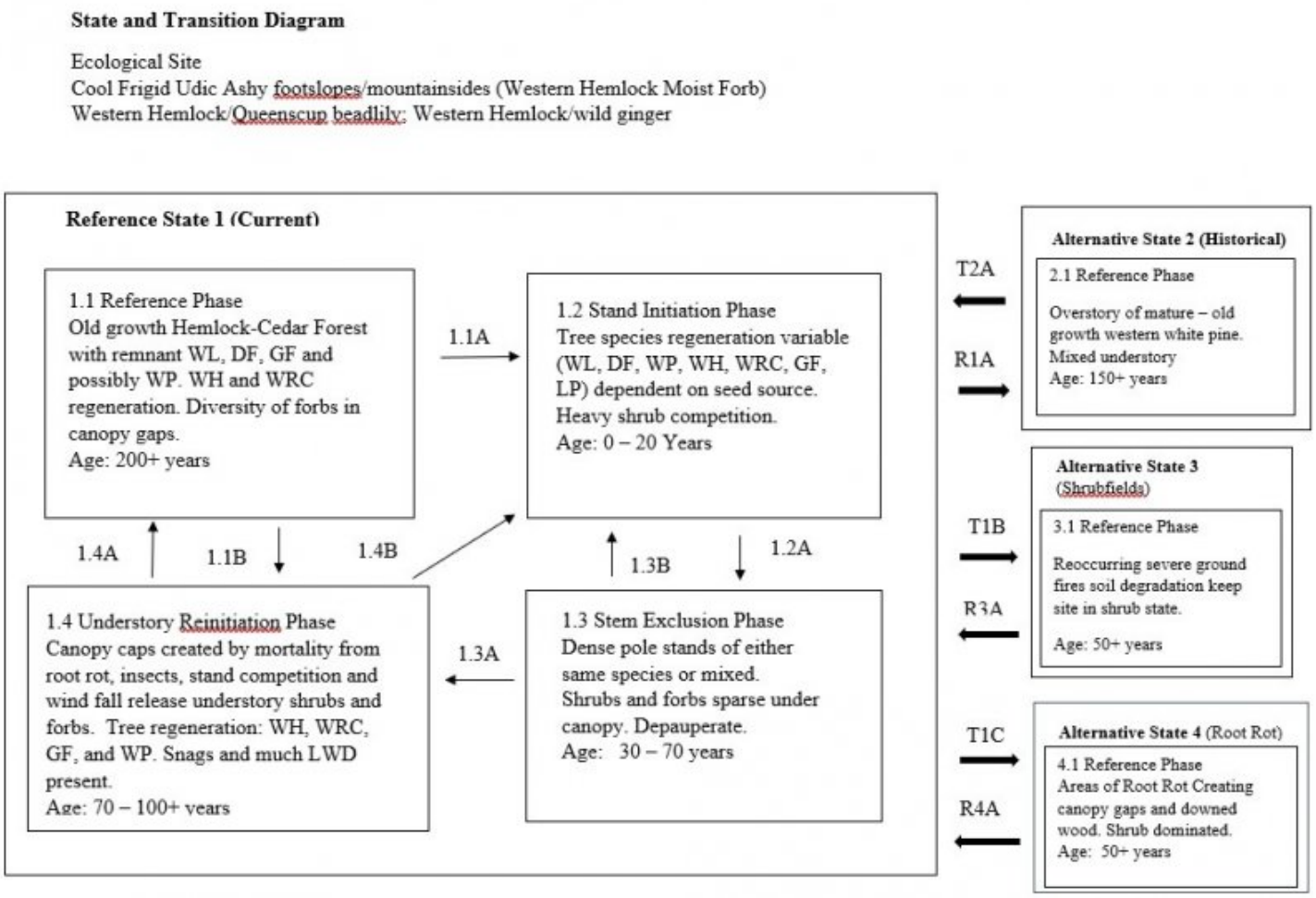

Figure 1. State and Transition Diagram Ecological Site Frigid Udic Loamy Foothills/Mountainsides, ashy surface (Western Hemlock/Moist Forbes)

Table 6. 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
western white pine	*PIMO3*	60	93	118	180	100	–	–	
grand fir	*ABGR*	60	98	76	149	100	–	–	
western larch	*LAOC*	56	85	74	132	70	–	–	
Rocky Mountain Douglas-fir	*PSMEG*	72	85	83	116	110	–	–	
Rocky Mountain Douglas-fir	*PSMEG*	66	100	71	97	90	–	–	

References

. 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.

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

. October, 1995. Idaho Department of Lands H.T. Groupings based on Forest HTs of Northern Idaho.

McDonald, G.L., A.E. Harvey, and J.R. Tonn. 2000. Fire, Competition, and Forest Pests: Landscape Treatment to Sustain Ecosystem Functions, The Joint Fire Science Conference and Workshop.. Pages 195–211 in Proceedings from the Joint Fire Science Conference and Workshop: crossing the millennium: integrating spatial technologies and ecological principles for a new age in fire management.

Miller and Gravelle. October, 2005. Species Selection Guidelines for Planting, Natural Regeneration and Crop Tree Selection on Potlatch Land in Northern Idaho, Forestry Technical Paper TP -2003-1.

Zack, A. 1994. Early Succession in Western Hemlock Habitat Types of Northern Idaho.

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	05/12/2025
Approved by	Curtis Talbot
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:**

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2. **Presence of water flow patterns:**

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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):**

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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:**
