USDA Natural Resources Conservation Service

Ecological site F044AY505WA
Frigid, Udic, Sandy Hill slopes and Outwash terraces (Western Hemlock/Moist Forbes) Tsuga heterophylla / Clintonia uniflora , Tsuga heterophylla / Asarum caudatum

Last updated: 9/07/2023
Accessed: 05/13/2025

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): 044A–Northern Rocky Mountain Valleys

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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

Found in LRU 44A02 (Pend Oreille-Kootenai Valleys). This ecological site is of very small extent. 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. Soils are sandy with some volcanic ash mixed in the surface. Water tables are greater than 30 inches deep, permeability is rapid or very rapid and available water holding capacity is low.

Associated sites

F043AY577ID	**Ashy Depressions 30-45" PZ Frigid Clearwater Mountains** Sites are on foot slopes and drainageways of mountains, narrow valley floors, and low terraces. Sites are moderately cool and very moist. Textures are loamy with a distinct layer of volcanic ash present at the surface. Overstory species include Thuja plicata and Abies grandis. The understory is typified by shrubs such as Acer glabrum, Rubus parviflorus and by the presence of fern species like Gymnocarpium dryopteris, and Adiantum pedatum.
F043AY584ID	**Poorly Drained Floodplain Step 30-45" PZ Frigid Western Bitterroot Foothills** Sites are found on large river floodplains. Sites are relatively warm and have high available moisture through subirrigation. They are prone to flooding unless protected. Textures are loamy and materials are mixed by alluvial activity. Sites are often a complex mosaic of trees; like Populus balsamifera ssp. Trichocarpa, and Populus tremuloides; shrubs like Cornus sericea, and Salix spp.; and herbs like Carex spp, and Deschampsia cespitosa.
F044AY504WA	**Frigid, Udic, Loamy Foothills and Drainageways, high water table (Western Hemlock/Moist Forbes) Tsuga heterophylla / Clintonia uniflora , Tsuga heterophylla / Asarum caudatum** Found on hill slopes, terraces and floodplains. Sites have loamy textures and a water table at 30-50cm during spring. Overstory species include Tsuga heterophylla, and Thuja plicata. The understory is typified by Coptis occidentalis, Linnaea borealis ssp. Longiflora, Clintonia uniflora, and Goodyera oblongifolia.

Similar sites

F043AY530WA	**Warm-Frigid, Dry-Udic, Sandy Outwash Terraces, mixed ash surface (Grand Fir Moist Herb) Abies grandis/Clintonia uniflora** Found warmer, drier sites on sandy outwash terraces. Overstory species are dominantly Abies grandis and Pseudotsuga menziesii var. glauca. The understory is typified by Acer glabrum, Linnaea borealis ssp. Longiflora Clintonia uniflora, and Coptis occidentalis.
F044AY504WA	**Frigid, Udic, Loamy Foothills and Drainageways, high water table (Western Hemlock/Moist Forbes) Tsuga heterophylla / Clintonia uniflora , Tsuga heterophylla / Asarum caudatum** Found on hill slopes, terraces and floodplains. Sites have loamy textures and a water table at 30-50cm during spring. Overstory species include Tsuga heterophylla, and Thuja plicata. The understory is typified by subshrubs and forbs including Coptis occidentalis, Linnaea borealis ssp. Longiflora, Clintonia uniflora and Goodyera oblongifolia.

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

Elevation (m): Total range = 535 to 570 m
(1,755 to 1,870 feet)
Central tendency = 540 to 550m
(1,770 to 1,800 feet)

Water Table Depth (cm):
less than 200 cm

(less than 80 inches)

Aspect:
70-95-165
Central tendency: 55-95-125

Table 2. Representative physiographic features

Landforms	(1) Foothills > Flood plain (2) Valley > Outwash terrace (3) Valley > Stream terrace (4) Mountains > Flood plain
Flooding frequency	None
Ponding frequency	None
Elevation	539–549 m
Slope	1–10%
Aspect	NE, E, SE

Table 3. Representative physiographic features (actual ranges)

Flooding frequency	None to occasional
Ponding frequency	None
Elevation	535–570 m
Slope	0–25%

Climatic features

Climatic Features

Mean annual precipitation (cm): Total range = 530 to 650 mm
(21 to 26 inches)
Central tendency = 575 to 605 mm
(23 to 24 inches)

MAAT (C): Total range = 7.6 to 8.2
(46 to 47 F)
Central tendency = 7.6 to 8.2
(46 to 47 F)

Climate Stations:
WA: none
ID: none

Table 4. Representative climatic features

Frost-free period (characteristic range)	135-140 days
Freeze-free period (characteristic range)	
Precipitation total (characteristic range)	584-610 mm
Frost-free period (actual range)	125-140 days
Freeze-free period (actual range)	
Precipitation total (actual range)	533-660 mm

Influencing water features

Water Table Depth (cm):
greater than 200 cm
(greater than 80 inches)

Soil features

Representative Soil Features

This ecological subsite is associated with one soil series (e.g. Bane). The soils are Typic Udifluvents. These soils have developed in alluvium from granite. The soils are very deep and have low available water capacity to a depth of 1 m. The soils are somewhat excessively drained.

Fragment content of surface (hard fragments): 0 to 10 percent (median = 5%)

Subsurface Texture Group: Loamy
Fragment content of subsurface (25 to 100cm): 10 to 62 percent (median = 25%)
Most components lack surface fragments
Saturated Hydraulic conductivity: High to Very High (median = High)
Soil Depth: greater than 200 cm
Available Water Capacity (total in 100cm): 4.50 to 7.00 cm (median = 6.72 cm)

Table 5. Representative soil features

Parent material	(1) Alluvium–granite
Surface texture	(1) Loamy fine sand
Drainage class	Somewhat excessively drained
Permeability class	Rapid
Available water capacity (0-101.6cm)	6.6 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)	5%

Table 6. Representative soil features (actual values)

Drainage class	Somewhat excessively drained
Permeability class	Rapid to very rapid
Available water capacity (0-101.6cm)	4.57–7.62 cm
Calcium carbonate equivalent (0-152.4cm)	0%
Soil reaction (1:1 water) (0-152.4cm)	6.5–6.9
Subsurface fragment volume <=3" (25.4-101.6cm)	0–10%

Ecological dynamics

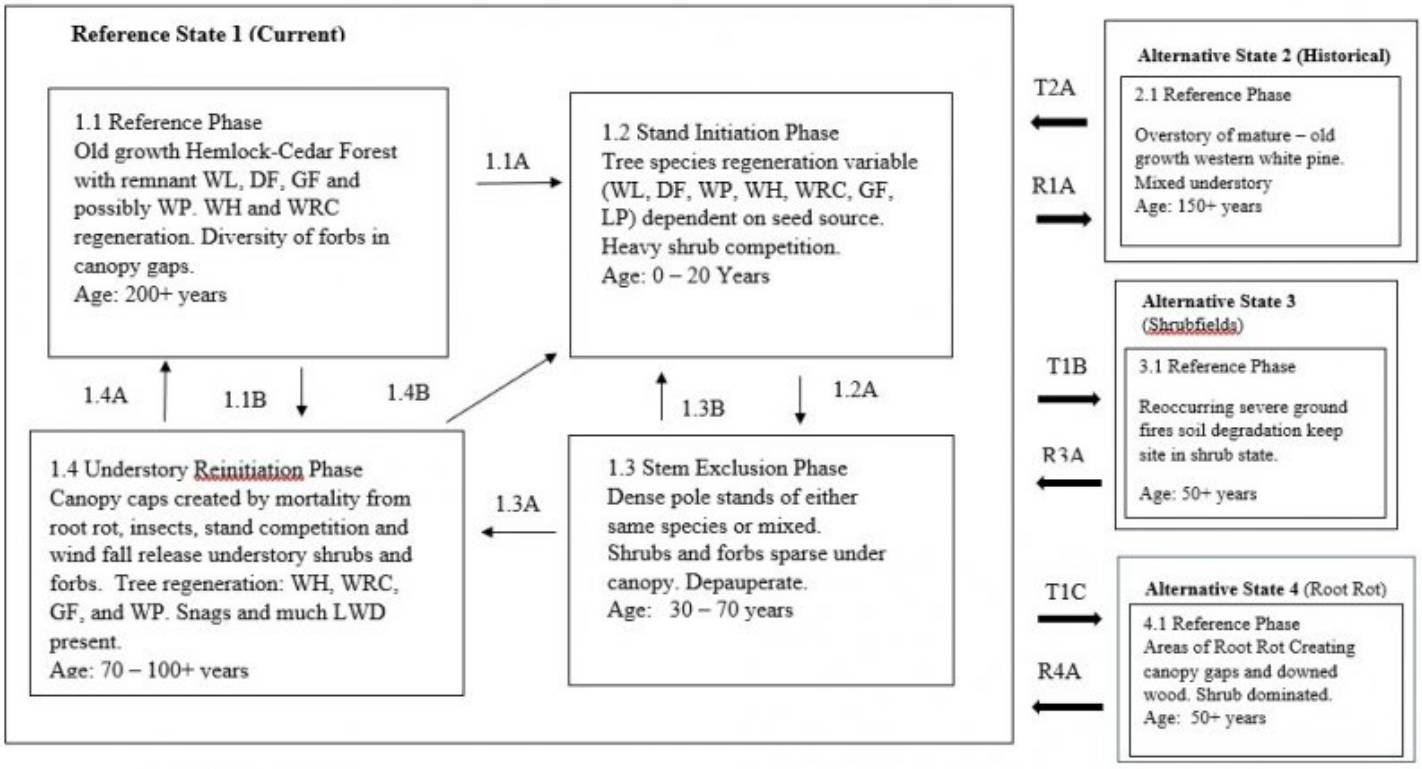
A description of vegetation dynamics and a state and transition model can be found in Ecological Site Group

EX043AESG09

State and transition model

State and Transition Diagram

Ecological Site
Cool Frigid Udic Ashy footslopes/mountainsides (Western Hemlock Moist Forb)
Western Hemlock/Queenscup beadlily: Western Hemlock/wild ginger



Legend

Pathways
1.1A Stand Replacing Fire. Succession of shrubs and tree regeneration following fire. Tree species regeneration dependent on seed source.

1.1B Reference Phase - Old Growth Hemlock-Cedar Forest Understory Re-initiation Overstory mortality from root rot, insects, and windthrow. Mixed severity fires could also create gaps for understory establishment, however, occur infrequently.

1.2A Time. Tree regeneration grows into dense pole stands excluding understory.

1.3B Stand replacing fire

1.3A Stem Exclusion Understory Re-initiation Time. Crown competition from dense pole to early mature stands. Root rot, bug kill, and wind fall create canopy gaps.

1.4A Understory Re-initiation Reference Phase - Old Growth Hemlock-Cedar Forest

1.4B Stand replacing fire

Transitions
T1A Loss of white pine dominance in seral and late seral overstory plant community due to white pine blister rust.

T1B Severe fire causing soil degradation or reoccurring fires in stand initiation phase.

T1C Root rot, mainly Armillaria, killing hemlock, Douglas-fir, and grand fir.

R1A landscape level planting of blister rust resistant white pine after large stand replacing fires or clearcut regeneration harvests.

R3A Site by site analysis to determine feasibility of tree planting.

R4A Where feasible, planting blister rust resistant white pine, western larch, and western redcedar in root rot pockets.

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
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.

. 2017. Idaho Department of Lands H.T. Groupings based on Forest HTs of Northern Idaho.

Cooper, S.V., K.E. Neiman, R. Steele, and D.W. Roberts. 1991. Forest Habitat types of Northern Idaho, A Second Approximation.

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.

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

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..

Contributors

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Approval

Kirt Walstad, 9/07/2023

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	05/13/2025
Approved by	Kirt Walstad
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:**