USDA Natural Resources Conservation Service

Ecological site F044AY504WA
Frigid, Udic, Loamy Foothills and Drainageways, high water table (Western Hemlock/Moist Forbes) Tsuga heterophylla / Clintonia uniflora , Tsuga heterophylla / Asarum caudatum

Last updated: 9/07/2023
Accessed: 05/17/2024

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

Most commonly found in LRU 44A02 (Pend Oreille-Kootenai Valleys). 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 loamy with volcanic ash mantling the surface, water tables are less than 30 inches deep, and have moderate to high available water holding capacity.

Associated sites

F043AY519WA	**Warm-Frigid, Xeric, Loamy Slopes, low AWC subsoils (Douglas-Fir/Warm Dry Shrub) Pseudotsuga menziesii / Physocarpus malvaceus - Symphoricarpos albus** Sites are on warm, dry aspects of hills and mountains. They are usually less about 30 inches deep with abundant rock fragments in the profile. Surfaces have some weak volcanic ash influence. Overstory species include Pseudotsuga menziesii var. glauca, and Pinus ponderosa. The understory is typified by Physocarpus malvaceus, Symphoricarpos albus, Calamagrostis rubescens, and Bromus vulgaris.
R043AY511ID	**Frigid Aquic Organic Depressions and Seeps (CAREX/SPHAG)** Found on floodplains and seeps at cooler higher elevation locations. Confined to depressions and other areas of water accumulation. Have mucky surface textures. Found where MLRA 44A transitions to MLRA 43A in upper reaches of valleys. Site vegetation is dominated by a mix of wetland adapted species including Salix, Carex, and Sphagnum
F043AY521WA	**Warm-Frigid, Moist- Xeric Loamy Foothills/Mountainsides, ashy surface (Grand Fir Warm Dry Shrub) Abies grandis - Pseudotsuga menziesii / Physocarpus malvaceus - Symphoricarpos albus** Found on lower Hill slopes, mountain slopes and terraces. Textures are loamy and sites lack a high water table. The soil surface has a distinct layer of volcanic ash material. Overstory species include Abies grandis and Pseudotsuga menziesii var. glauca. The understory is typified by Physocarpus malvaceus, Symphoricarpos albus, Calamagrostis rubescens, and Hieracium albiflorum.

Similar sites

F044AY505WA	**Frigid, Udic, Sandy Hill slopes and Outwash terraces (Western Hemlock/Moist Forbes) Tsuga heterophylla / Clintonia uniflora , Tsuga heterophylla / Asarum caudatum** Found on sheltered sites with sandy parent material. Associated with sandy alluvial fans in Pend Oreille River Valley. While sites lack a high water table, reduced evapotranspiration helps promote more moisture demanding plant community. 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.
F043AY525WA	**Frigid, Udic, Loamy Foothills/Mountainsides, mixed ash surface (Western Hemlock/Moist Forbes) Tsuga heterophylla / Clintonia uniflora , Tsuga heterophylla / Asarum caudatum** Found on higher, steeper hill and mountain slopes included in MLRA 43A. Sites lack high water table during spring. Overstory species include Tsuga heterophylla, and Thuja plicata. The understory is typified by subshrubs and forbs including Coptis occidentalis, Linna

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 = 450 to 1300 m
(1,475 to 4,265 feet)
Central tendency = 600 to 880m
(1,970 to 2,885 feet)

Water Table Depth (cm):
31 to 46 cm

(12 to 18 inches)

Aspect:
80-225-35
Central tendency: 150-225-300

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	600–879 m
Slope	0–15%
Water table depth	38 cm
Aspect	W, NW, SE, S, SW

Table 3. Representative physiographic features (actual ranges)

Flooding frequency	None to occasional
Ponding frequency	None
Elevation	450–1,300 m
Slope	0–40%
Water table depth	30–46 cm

Climatic features

Climatic Features

Mean annual precipitation (cm): Total range = 340 to 1255 mm
(13 to 49 inches)
Central tendency = 650 to 890 mm
(26 to 35 inches)

MAAT (C): Total range = 1.5 to 9.3
(37 to 48 F)
Central tendency = 4.9 to 9.3
(41 to 49 F)

Climate Stations:
WA: none
ID: PORTHILL, PRIEST RIVER, PRIEST RIVER 2, SANDPOINT KSPT, SANDPOINT EXP STN

Table 4. Representative climatic features

Frost-free period (characteristic range)	83-102 days
Freeze-free period (characteristic range)	127-138 days
Precipitation total (characteristic range)	635-838 mm
Frost-free period (actual range)	74-102 days
Freeze-free period (actual range)	123-139 days
Precipitation total (actual range)	559-864 mm

Frost-free period (average)	91 days
Freeze-free period (average)	132 days
Precipitation total (average)	737 mm

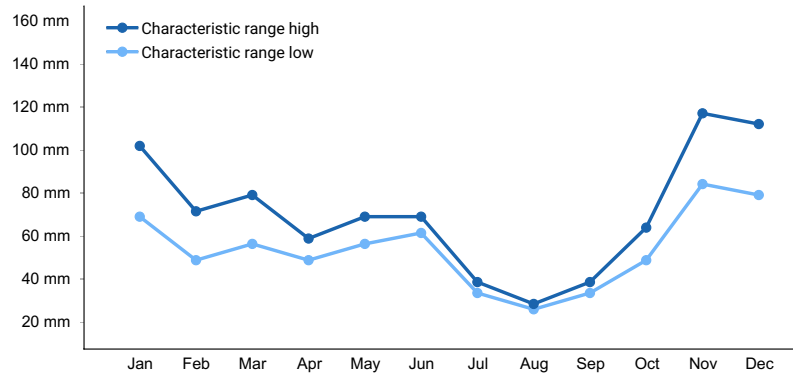


Figure 1. Monthly precipitation range

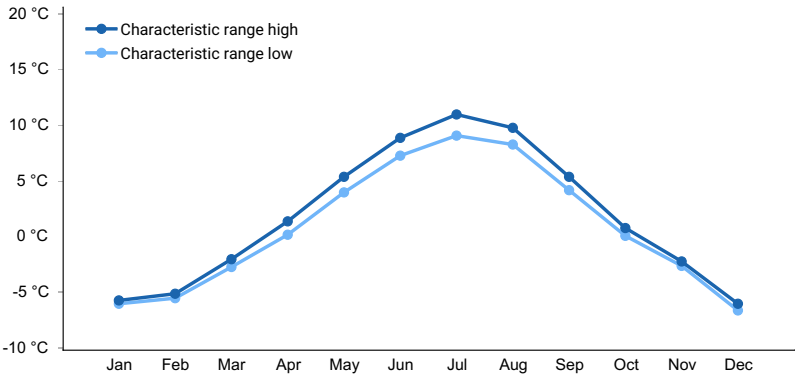


Figure 2. Monthly minimum temperature range

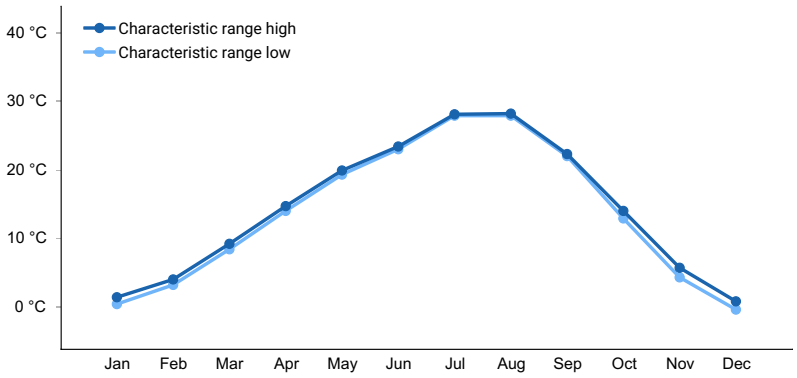


Figure 3. Monthly maximum temperature range

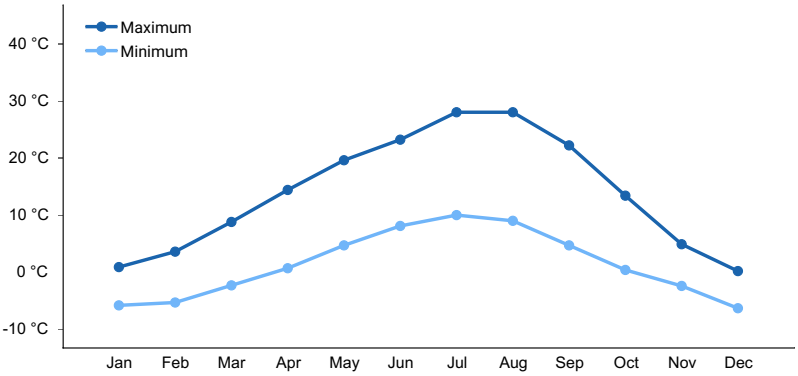


Figure 4. Monthly average minimum and maximum temperature

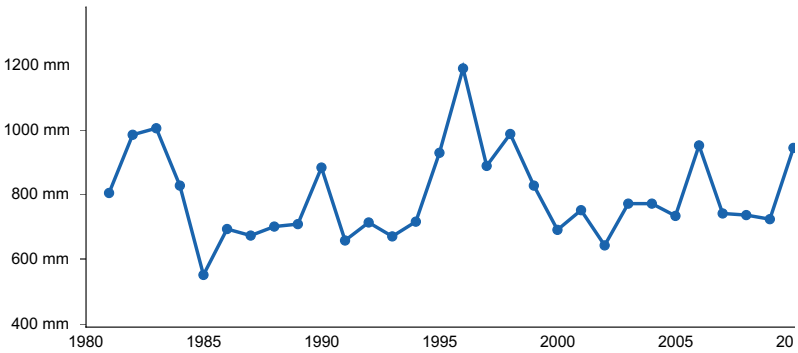


Figure 5. Annual precipitation pattern

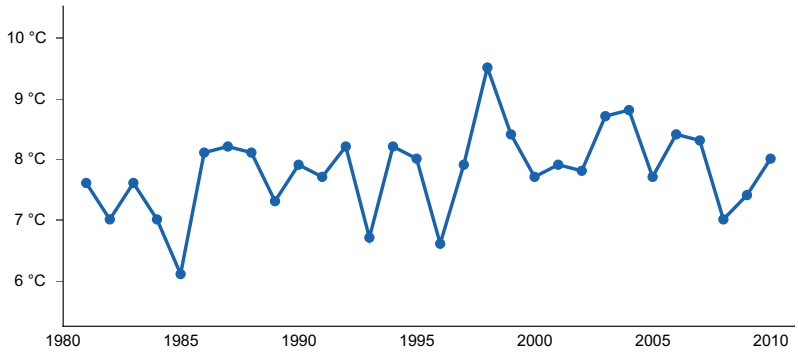


Figure 6. Annual average temperature pattern

Climate stations used

- (1) PORTHILL [USC00107264], Bonners Ferry, ID
- (2) SANDPOINT EXP STN [USC00108137], Sandpoint, ID
- (3) PRIEST RIVER EXP STN [USC00107386], Priest River, ID

Influencing water features

Water Table Depth (cm):
31 to 46 cm
(12 to 18 inches)

Soil features

Representative Soil Features

This ecological subsite is associated with several soil series (e.g. Cabinet, Glaciercreek, Ibex, Mission, Porthill). The soils are Endoaquepts, Eutrudepts, Fragixeralfs, Hapludalfs, Xerofluvents. These soils have developed in mixed Mazama tephra deposits over glaciolacustrine material, outwash and alluvium from mixed sources. The soils are

mostly moderately deep and have adequate available water capacity to a depth of 1 m. The soils are mostly moderately well drained with perched water tables.

Parent Materials:
Origin: granite, other unspecified

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

Subsurface Texture Group: Loamy
Fragment content of subsurface (25 to 100cm): 0 to 70 percent (median = 0%)
Most components lack surface fragments
Saturated Hydraulic conductivity: Moderately High to Very High (median = Moderately High)
Soil Depth: 30 to greater than 200 cm
Available Water Capacity (total in 100 cm): 7.78 to 18.61 cm (median = 8.22 cm)

Table 5. Representative soil features

Parent material	(1) Volcanic ash (2) Till (3) Outwash (4) Alluvium (5) Glaciolacustrine deposits
Surface texture	(1) Ashy silt loam (2) Ashy sandy loam
Drainage class	Moderately well drained
Permeability class	Moderate
Depth to restrictive layer	Not specified
Available water capacity (0-101.6cm)	8.13 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)	0%

Table 6. Representative soil features (actual values)

Drainage class	Moderately well drained to somewhat poorly drained
Permeability class	Moderate to very rapid
Depth to restrictive layer	76–508 cm
Available water capacity (0-101.6cm)	7.62–18.54 cm
Calcium carbonate equivalent (0-152.4cm)	0%
Soil reaction (1:1 water) (0-152.4cm)	5–8.4
Subsurface fragment volume <=3" (25.4-101.6cm)	0–70%

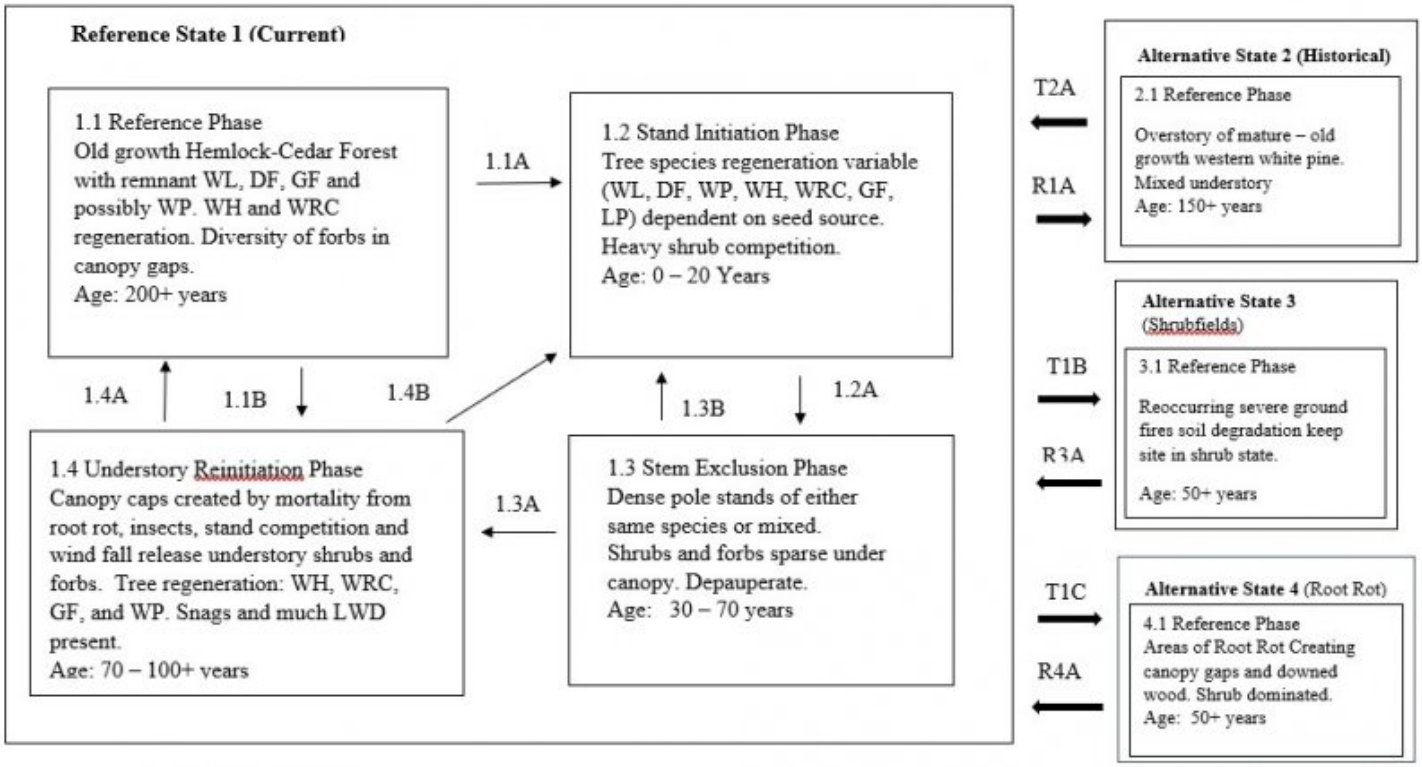
Ecological dynamics

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

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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	05/17/2024
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:**