

# **Ecological site F043AY581ID**

## **Cryic, Moist-Udic, Loamy, Mountain slopes, Low AWC (Subalpine Fir-Mountain Hemlock/ Cool Shrub-Beargrass) Subalpine Fir-Mountain Hemlock/ Menziesia -Beargrass**

Last updated: 10/14/2020  
Accessed: 05/03/2024

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### **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](http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/ref/?cid=nrcs142p2_053624#handbook)

### **LRU notes**

Most commonly found in LRU 43A10 (Clearwater Mountains). Also found in areas of 43A11 (Bitterroot Metasedimentary Zone). Climate parameters were obtained from PRISM and other models for the area. Landscape descriptors are estimated from USGS DEM products and their derivatives.

### **Classification relationships**

Relationship to Other Established Classifications:

United States National Vegetation Classification (2008) – A3614 *Abies lasiocarpa* – *Picea engelmannii* Rocky Mountain Forest & Woodland Alliance

Washington Natural Heritage Program. Ecosystems of Washington State, A Guide to Identification, Rocchio and Crawford, 2015 – Subalpine – Montane Mesic Forest

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 – 15r Okanogan-Colville Xeric Valleys and Foothills, 15w Western Selkirk Maritime Forest, 15x Okanogan Highland Dry Forest, 15y Selkirk Mountains.

This ecological site includes the following USDA Forest Service Plant Associations: *Abies lasiocarpa* Series; ABLA/MEFE and ABLA/XETE Habitat Types and *Tsuga mertensiana* Series; TSME/MEFE and TSME/XETE Habitat Types. (Cooper et al., 1987)

### **Ecological site concept**

This ESD is distinguished by an overstory of subalpine fir or mountain hemlock and an understory shrub component of menziesia and huckleberry. On some exposures shrubs are absent and beargrass dominates the understory. It occurs on upper slopes of mountainsides, and ridges. These soils have developed in mixed or thin Mazama tephra deposits over till or residuum and colluvium from granitic. The soils are very deep and have low available water capacity to a depth of 40 inches. The soils are well-drained or somewhat excessively drained. This ESD fits into the National Vegetation Classification's Subalpine Fir - Engelmann Spruce Rocky Mountain Moist Forest Alliance and Washington State Natural Heritage Program's Rocky Mountain Subalpine Mesic-Wet Spruce-Fir Forest.

**Table 1. Dominant plant species**

Tree	(1) <i>Abies lasiocarpa</i> (2) <i>Tsuga mertensiana</i>
Shrub	(1) <i>Menziesia ferruginea</i> (2) <i>Vaccinium membranaceum</i>
Herbaceous	(1) <i>Xerophyllum tenax</i> (2) <i>Goodyera oblongifolia</i>

## Physiographic features

Physiographic Features

Landscapes: Mountains,

Landform: mountain slopes, ridges, glacial-valley walls, cirque floors

Elevation (m): Total range = 1230 to 2305 m  
(4,035 to 7,560 feet)

Central tendency = 1650 to 1930 m  
(5,410 to 6,330 feet)

Slope (percent): Total range = 0 to 95 percent  
Central tendency = 30 to 55 percent

Aspect: Total range = 30-175-325  
Central tendency = 110-175-250

**Table 2. Representative physiographic features**

Landforms	(1) Mountains > Mountain slope (2) Mountains > Ridge (3) Mountains > Glacial-valley wall (4) Mountains > Cirque floor
Flooding frequency	None
Ponding frequency	None
Elevation	1,649–1,929 m
Slope	30–55%
Water table depth	203 cm
Aspect	SE, S, SW

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

Flooding frequency	None
Ponding frequency	None
Elevation	1,230–2,304 m
Slope	0–95%
Water table depth	203 cm

## Climatic features

### Climatic Features

Frost-free period (days): Total range = 35 to 75 days

Central tendency = 40 to 55 days

Mean annual precipitation (cm): Total range = 1040 to 2110 mm

(41 to 83 inches)

Central tendency = 1485 to 1780 mm

(58 to 70 inches)

MAAT (C): Total range = 4.4 to 6.8

(40 to 44 F)

Central tendency = 3.8 to 5.0

(39 to 41 F)

Climate Stations: none

## Influencing water features

Water Table Depth: >80 inches

Flooding:

Frequency: None

Duration: None

Ponding:

Frequency: None

Duration: None

## Soil features

### Representative Soil Features

This ecological site is associated with several soil components (e.g. Dystric Cryochrepts, Andic Cryochrepts, and Roman). The soil components can be grouped into: Vitrandic Dystric Cryochrepts, Andic Haplocrypts, and Andic Dystric Cryochrepts. These soils have developed in mixed or thin Mazama tephra deposits over till or residuum and colluvium from granitic. The soils are very deep and have low available water capacity to a depth of 40 inches. The soils are well-drained or somewhat excessively drained.

Fragment content of surface: 10 to 85 percent (median = 50%)

Content Fragments

**Table 4. Representative soil features**

Parent material	(1) Volcanic ash (2) Till (3) Colluvium–granite (4) Residuum–granite
Surface texture	(1) Medial silt loam (2) Sandy loam
Drainage class	Well drained
Permeability class	Moderately rapid

Depth to restrictive layer	203 cm
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	5.59 cm
Calcium carbonate equivalent (0-152.4cm)	0%
Electrical conductivity (0-152.4cm)	0 mmhos/cm
Soil reaction (1:1 water) (0-152.4cm)	6
Subsurface fragment volume <=3" (25.4-152.4cm)	10%
Subsurface fragment volume >3" (25.4-152.4cm)	36%

**Table 5. Representative soil features (actual values)**

Drainage class	Well drained to somewhat excessively drained
Permeability class	Moderate to moderately rapid
Depth to restrictive layer	51–203 cm
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	5.33–7.37 cm
Calcium carbonate equivalent (0-152.4cm)	0%
Electrical conductivity (0-152.4cm)	0 mmhos/cm
Soil reaction (1:1 water) (0-152.4cm)	5.1–6.5
Subsurface fragment volume <=3" (25.4-152.4cm)	5–50%
Subsurface fragment volume >3" (25.4-152.4cm)	0–75%

## Ecological dynamics

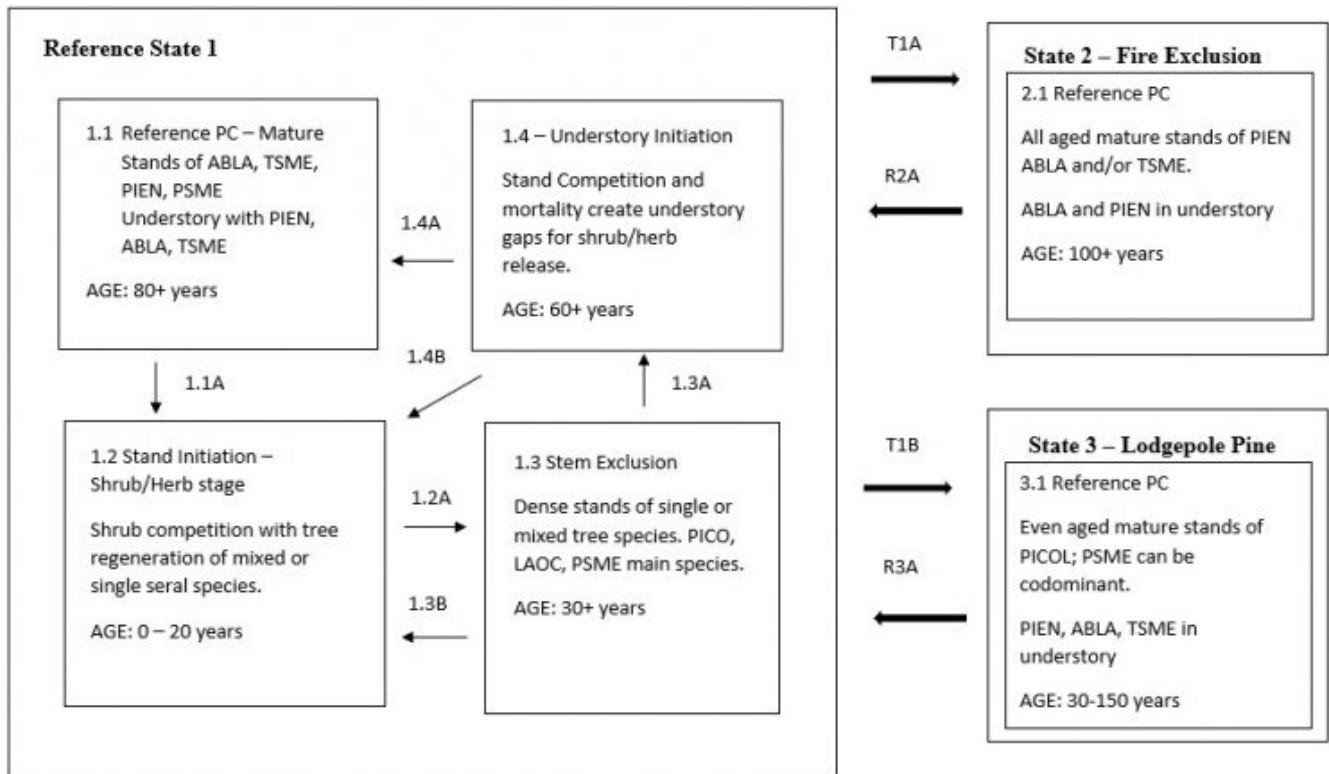
### Ecological Dynamics of the Site

The four main US Forest Service habitat types (HT) incorporated into this ecological site all are located high elevation mountain slopes and ridges. They can occur at lower elevations as ecotypes of their higher elevation sites due to cold air drainage and/or frosty conditions. The ABLA/MEFE (Subalpine fir/rustyleaf menziesia) and TSME/MEFE (Mountain hemlock/rustyleaf menziesia) HTs are moister than ABLA/XETE (ABLA/beargrass) or TSME/XETE (Mountain hemlock/beargrass) and capable of having more Engelmann spruce in the overstory and understory. In the ABLA/XETE and TSME/XETE HTs, subalpine fir will have higher presence in the overstory and understory with fire exclusion. Some stands are in early to mid-seral condition with Douglas-fir (PSME), western larch (LAOC), and lodgepole pine (PICO) as the main overstory component. Subalpine fir (ABLA), Mountain hemlock (TSME) and/or Engelmann spruce (PIEN) can be present in the understory. Historically western white pine (PIMO3) played an important role as a seral species.

## State and transition model

## State and Transition Model

Cryic, Moist-Udic, Loamy Mountain Slopes (Subalpine Fir-Mountain Hemlock/ Cool Shrub- Beargrass)



## State 1 Reference



Moist sites have substantial shrub cover, and often have a closed canopy. Climax stands are dominated by subalpine fir and mountain hemlock. Large spruces persist for centuries in old-growth stands. A variety of species, including climax species and spruce, occur in early succession. Seral lodgepole pine can dominate in several habitat types, but it dies out 120 to 160 years after stand establishment. Western larch is common on sites with good drainage.

## Community 1.1

## Reference

Overstory dominated by subalpine fir, Engelmann spruce and/or mountain hemlock. Where fire or site conditions have kept stands more open western larch, Douglas-fir, and lodgepole pine may be present. Understory will have subalpine fir, mountain hemlock, and Engelmann spruce where ground fires have been absent. Understory dominated by shrubs with sparse forbs.

### Dominant plant species

- subalpine fir (*Abies lasiocarpa*), tree
- mountain hemlock (*Tsuga mertensiana*), tree
- Engelmann spruce (*Picea engelmannii*), tree
- lodgepole pine (*Pinus contorta* var. *latifolia*), tree
- thinleaf huckleberry (*Vaccinium membranaceum*), shrub
- rusty menziesia (*Menziesia ferruginea*), shrub
- grouse whortleberry (*Vaccinium scoparium*), shrub
- Hitchcock's smooth woodrush (*Luzula glabrata* var. *hitchcockii*), grass
- common beargrass (*Xerophyllum tenax*), other herbaceous
- darkwoods violet (*Viola orbiculata*), other herbaceous
- western rattlesnake plantain (*Goodyera oblongifolia*), other herbaceous
- pipsissewa (*Chimaphila umbellata*), other herbaceous

## Community 1.2

### Stand Initiation, Shrub/Herb Phase

Stand replacing fires convert site back to shrub/herb phase with tree regeneration dependent on seed source and fire severity. Dense stands of lodgepole pine can be present if sufficient seed was available in the ground. Western larch can also establish quickly with sufficient seed source and bare soil. Mixed species stand could develop with all seral species present including Douglas-fir, larch, and lodgepole. Shrubs will re-sprout and compete with tree seedlings.

## Community 1.3

### Stem Exclusion

Dense stands of mixed or single tree species will develop and start to compete for space and nutrients.

## Community 1.4

### Understory Re-initiation

As stands mature mortality gaps occur from stand competition and insects create areas for understory release. Shrubs and herbs increase along with tree regeneration.

## Pathway 1.1A

### Community 1.1 to 1.2

Stand replacing fire moving site back to the shrub/herb phase.

## Pathway 1.2A

### Community 1.2 to 1.3

Time. Mixed or single seral species tree regeneration move out of the seedling/sapling phase into dense pole stands.

## Pathway 1.3B

### Community 1.3 to 1.2

Stand replacing fire back to the shrub/herb phase.

### **Pathway 1.3A**

#### **Community 1.3 to 1.4**

Stands move out of the pole stage through competition opening up canopy gaps for understory shrubs and herbs to increase. Tree regeneration will include shade tolerant subalpine fir and Engelmann spruce.

### **Pathway 1.4A**

#### **Community 1.4 to 1.1**

Stands mature into mixed stand of seral species with some subalpine fir, mountain hemlock or Engelmann spruce in overstory and understory.

### **Pathway 1.4B**

#### **Community 1.4 to 1.2**

Stand replacing fire converts site back to the shrub/herb phase

## **State 2**

### **Fire Exclusion**



Lack of fire allows shade tolerant species (subalpine fir, mountain hemlock) to dominate site. Scattered large individuals of Engelmann spruce may persist in stand. Shrubs include fools huckleberry, and blue huckleberry. Forbs include queencup beadlily, rattlesnake plantain, western meadowrue and beargrass. Shrubs such as fools huckleberry and blue huckleberry will increase in absence of fire.

## **State 3**

### **Lodgepole Pine**



Lodgepole seedlings dominate stand soon after fire. When the prefire stand supported pines with serotinous cones,

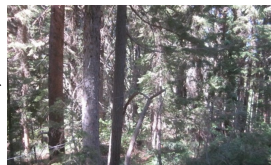
lodgepole pine seedlings often germinate in profusion the year after fire, with densities exceeding 10,000 per acre. When the prefire stand supported pines bearing mainly nonserotinous cones, restocking is slower. Douglas-fir regeneration is common on relatively warm sites. Engelmann spruce and subalpine fir also occur, but competition and shade from lodgepole seedlings suppress these species. Where fire return frequency is ~150 years PICO has potential to dominate reproduction and stand composition through several fire cycles.

### Transition T1A

#### State 1 to 2



Reference



Fire Exclusion

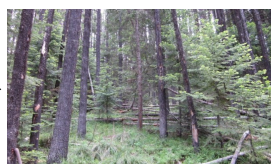
Fire exclusion for long time periods will lead to an overstory of subalpine fir or mountain hemlock and Engelmann spruce with both species also in the understory. On the moister sites Engelmann spruce will be more prominent.

### Transition T1B

#### State 1 to 3



Reference

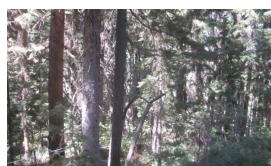


Lodgepole Pine

Stand replacing fir recurs over an interval <150 years. PICO is present as seed source in stand and successfully dominates regeneration.

### Restoration pathway R2A

#### State 2 to 1



Fire Exclusion

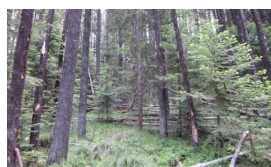


Reference

Overstory management and prescribed fire to increase seral species establishment.

### Restoration pathway R3A

#### State 3 to 1



Lodgepole Pine



Reference

Overstory management and fire suppression to increase species diversity

### Additional community tables

### References

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



Approximation.

Finklin, A.I. 1983. Climate of Priest River Experimental Forest, northern Idaho. Gen. Tech. Rep. INT-159. U.S. Department of Agriculture, Forest Service, Intermountain Forest and Range Experiment Station, Ogden, UT. 53.

Rocchio, J.F. and R.C. Crawford. 2015. Ecological systems of Washington State. A guide to identification. Washington Department of Natural Resources.. Natural Heritage Report.. Washington Department of Natural Resources, Natural Heritage Program, Olympia, WA. 1–397.

Smith and Fischer. 1997. Fire Ecology of the Forest Habitat Types of Northern Idaho.

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

Williams, C.K. and T.R. Lillybridge. 1983. Forested Plant Associations of the Okanogan National Forest R6-Ecol-132b-1983.

## 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	05/03/2024
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:**

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):**
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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:**

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