Ecological site F043AY574ID
Ashy Hills and Mountains
30-45" PZ Frigid
Western Bitterroot Foothills

Last updated: 5/05/2025
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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

This area is mainly in the Northern Rocky Mountains province of the Rocky Mountain System; a small part is in the Walla Walla Plateau section of the Columbia Plateaus province of the Intermontane Plateaus. Elevation is about 1,800 to 3,500 feet (550 to 1,065 meters) in the valleys and about 5,000 to 7,000 feet (1,525 to 2,135 meters) in the mountains. Steep-gradient rivers have cut deep canyons, and natural and manmade lakes are common in the area. Numerous rivers originate in or flow through this area, including, from west to east: the Sanpoil, Columbia, Pend Oreille, Kootenai, St. Joe, Thompson, and Flathead Rivers. The bedrock formations in MLRA 43A range from Precambrian to Cretaceous in age. They consist of shale, sandstone, siltstone, limestone, argillite, quartzite, gneiss, schist, dolomite, basalt, and granite. Pleistocene glaciers carved a rugged landscape and filled valleys with till and outwash. Parts of the area are covered in varying thicknesses of late-Quaternary loess, silt and fine sand particles transported via wind, as well as Holocene-aged volcanic ash (McDaniel and Hipple 2010). The average annual precipitation is 25 to 60 inches (635 to 1,525 millimeters) in most of this area, but it is as much as 111 inches (2,820 millimeters) in the mountains and as little as 10 to 15 inches (255 to 380 millimeters) in the western part. The average annual temperature is 32 to 51 degrees F (0 to 11 degrees C) in most of the area, decreasing with increasing elevation. In most of the area, the freeze-free period averages 133 days and ranges from 50 to 215 days. It is longest in the low valleys of Washington and decreases in length at higher elevations. Freezing temperatures occur every month of the year on high mountains, and some peaks have a continuous cover of snow and ice. Full descriptions 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: https://www.nrcs.usda.gov/resources/data-and-reports/major-land-resource-area-mlra

LRU notes

The Ashy Hills and Mountains 30-45” PZ Frigid Ecological Site most commonly occurs in Land Resource Unit (LRU) 09 (Western Bitterroot Foothills) and in areas of LRU 10 (Clearwater Mountains). The Western Bitterroot Foothills LRU lies south of the limit of continental glaciation in the Spokane-Pend Oreille Valleys, and north of the Clearwater-Lochsa River system. This region consists of hills or low mountain slopes, generally under 1,100 meters (3,600 feet) in elevation, that are mantled by volcanic ash and loess. These rich, forest-type soils support species such as grand fir, western redcedar, Douglas-fir, and ponderosa pine. Due to the gentler terrain, productive forests in this region are commonly logged. Less productive sites provide ecosystem services such as wildlife habitat, aesthetic value, and contribute to watershed health.

Classification relationships

MLRA 43A is located within the Rocky Mountain Range and Forest Region. MLRA 43A is divided into eleven Land Resource Units (LRUs) defined by differences in geology, climate, and topography. Each LRU is divided into ten climatic subsets, which differentiate sites on dominant temperature and precipitation zones. The Ashy Hills and Mountains 30-45” PZ Frigid Ecological Site is in LRU Subset F and is defined by a relative effective precipitation ranging from 30 to 45 inches and a frigid soil temperature regime. The Ashy Hills and Mountains 30-45” PZ Frigid Ecological Site is related to other established vegetation community 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. In addition, this ecological site includes communities related to the following USDA Forest Service Plant Associations Western Redcedar Series: THPL/CLUN, THPL/ASCA (Cooper et al.,

1991).

Ecological site concept

The Ashy Hills and Mountains Ecological Site occurs in areas influenced by moist and mild air masses from the Pacific. It occurs on positions within the landscape that accumulate runoff moisture, such as concavities on mountain and hill slopes. The soils developed in thick volcanic ash deposits and have a well-drained drainage class.

Associated sites

F043AY566ID	**Dry Ashy Hills and Mountains 30-45" PZ Frigid Clearwater Mountains** Occurs adjacent to Ashy Hills and Mountains site on convex landscape positions with higher runoff and lower relative effective precipitation.
F043AY577ID	**Ashy Depressions 30-45" PZ Frigid Clearwater Mountains** Occurs on similar landscapes to Ashy Hills and Mountains site. Typically occupies more concave positions that accumulate runoff moisture and have higher effective precipitation.

Similar sites

F043AY575ID	**Vitrandic Hills and Mountains 30-45" PZ Frigid Western Bitterroot Foothills** Occurs on similar landscape positions to Ashy Hills and Mountains on soils developed in thin volcanic ash deposits and belonging to Vitrandic soil taxonomic subgroups.
F043AY563ID	**Ashy Metasedimentary Mountains 30-45" PZ Frigid Bitterroot Metasedimentary Zone** Occurs on similar landscape positions and has similar climate to Ashy Hills and Mountains site. Primary difference is soils developed on metasedimentary materials.

Table 1. Dominant plant species

Tree	(1) *Thuja plicata* (2) *Abies grandis*
Shrub	(1) *Symphoricarpos albus* (2) *Acer glabrum*
Herbaceous	(1) *Clintonia uniflora* (2) *Maianthemum stellatum*

Physiographic features

The Ashy Hills and Mountains Ecological site occurs on mountain and foothill slopes at mid-elevations. It primarily exists on moderate slopes. Aspect becomes an important factor at the edges of the site's elevation range. On the lower end of the elevation range, this site tends to occupy northern aspects. On the higher end, this site occupies southern aspects.

Table 2. Representative physiographic features

Landforms	(1) Mountains > Mountain slope (2) Foothills > Hillslope (3) Valley > Stream terrace (4) Valley > Valley floor
Flooding frequency	None
Ponding frequency	None
Elevation	940 – 1,100 m
Slope	20 – 40 %
Water table depth	200 cm
Aspect	Aspect is not a significant factor

Table 3. Representative physiographic features (actual ranges)

Flooding frequency	None
Ponding frequency	None
Elevation	500 – 1,460 m
Slope	0 – 70 %
Water table depth	40 – 200 cm

Climatic features

The climate at this site is influenced by the dominant wind patterns of the Pacific Northwest. Winds blowing from the west bring airmasses from the Pacific Ocean into the Rocky Mountain region. This maritime influence results in a humid environment where the majority of precipitation falls as light, steady rain throughout the fall, winter, and spring months. At higher elevations the precipitation falls as snow, resulting in deep snowpacks. Rain on snow events are common in winter. Winter temperatures average 19 to 35 degrees Fahrenheit. Summers are hot and dry. Most precipitation falls during short thunderstorms. Melting snowpacks at higher elevations become an important source of moisture in late summer. Temperatures average 43 to 80 degrees Fahrenheit in the summer months.

Table 4 Representative climatic features

Frost-free period (characteristic range)	40-60 days

Freeze-free period (characteristic range)	120-130 days
Precipitation total (characteristic range)	1,040-1,070 mm
Frost-free period (actual range)	30-140 days
Freeze-free period (actual range)	120-130 days
Precipitation total (actual range)	580-1,630 mm
Frost-free period (average)	50 days
Freeze-free period (average)	120 days
Precipitation total (average)	1,040 mm

- (1) HEADQUARTERS [USC00104150], Orofino, ID
- (2) PIERCE [USC00107046], Pierce, ID

Influencing water features

Flooding and ponding do not occur on Ashy Hills and Mountains sites in normal years. The average depth to a water table is typically greater than 80 inches and does not influence site dynamics. Overland flow may occur during rain-on-snow events, which typically happen in the transitional months between seasons (McCabe et al. 2007). During such circumstances, the snow melt and rainfall exceed the capacity of the soil to absorb moisture. Frequent overland flow may degrade soil quality and influence site dynamics.

Soil features

The key attributes of the soils associated with this ecological site are:
• The top 7 inches or more of the soil profile have andic soil properties.
• A moderately well to well-drained drainage class.
• No restrictive layer within 40 inches of the surface.
• A udic soil moisture regime and frigid soil temperature regime.

Associated soil taxonomic subgroups are: Alfic Udivitrands, Typic Udivitrands, Andic Glossudalfs, and Andic Hapludalfs.

Associated soil series include Dullaxe, Jaype, Jury, Revling, Tomodo, Vassar, and more.

Map unit components associated with this site occur most frequently in soil surveys ID612, ID670, and ID057. Associated map unit acreage totals 852,888

On average, sites that occur on Alfic Udivitrand or Andic Hapludalf soils are the most productive, with grand fir, Douglas-fir, and western white pine site index medians of 99 feet in 50 years.

Soil depth is greater than 20 inches to the underlying parent material.

Figure 7. Profile of Vassar soil.

Table 5. Representative soil features

Parent material	(1) Volcanic ash (2) Alluvium (3) Colluvium – granite (4) Colluvium – metamorphic rock (5) Residuum – granite (6) Residuum – metamorphic rock
Surface texture	(1) Ashy silt loam (2) Ashy loam (3) Medial silt loam
Family particle size	(1) Ashy over loamy (2) Medial over loamy (3) Fine-silty
Drainage class	Well drained
Permeability class	Moderate
Depth to restrictive layer	200 cm
Surface fragment cover <=3"	0 – 10 %
Surface fragment cover >3"	Not specified
Available water capacity (0-101.6cm)	18.29 cm
Calcium carbonate equivalent (0-152.4cm)	Not specified
Electrical conductivity (0-152.4cm)	Not specified

Soil reaction (1:1 water) (0-152.4cm)	5.2 – 5.8
Subsurface fragment volume <=3" (25.4-152.4cm)	0 – 10 %
Subsurface fragment volume >3" (25.4-152.4cm)	Not specified

Table 6. Representative soil features (actual values)

Drainage class	Moderately well drained to somewhat excessively drained
Permeability class	Very slow to moderate
Depth to restrictive layer	100 – 200 cm
Surface fragment cover <=3"	0 – 10 %
Surface fragment cover >3"	0 – 10 %
Available water capacity (0-101.6cm)	8.64 – 26.92 cm
Calcium carbonate equivalent (0-152.4cm)	0 %
Electrical conductivity (0-152.4cm)	0 mmhos/cm
Soil reaction (1:1 water) (0-152.4cm)	4.6 – 6.2
Subsurface fragment volume <=3" (25.4-152.4cm)	0 – 30 %

Subsurface fragment volume >3" (25.4-152.4cm)	0 – 10 %

Ecological dynamics

The ecological dynamics of the Ashy Hills and Mountains 30-45” PZ Frigid Ecological Site are controlled by natural and human-caused disturbances which alter ecosystem structure and plant composition over time. The site is composed of diverse plant communities that vary depending on initial stand characteristics, such as differences in fire severity, management, and specific soil characteristics.

Stand-replacing events, such as severe fire or clearcutting, will shift the site into a shrub dominated phase composed of Ceanothus spp. on drier sites and oceanspray (Holodiscus discolor), Rocky Mountain maple (Acer glabrum), and common snowberry (Symphoricarpos albus) as the dominant shrubs on other sites. Further disturbances at this stage may prevent tree establishment for several decades and require intervention to restore the site to the reference state (Coop et al. 2020).

In the absence of further disturbances, early seral tree species will establish and become dominant, such as Rocky Mountain Douglas-fir (Pseudotsuga menziesii var. glauca), lodgepole pine (Pinus contorta), and western larch (Larix occidentalis) on drier sites. Grand fir (Abies grandis), western redcedar (Thuja plicata), and Englemann spruce (Picea engelmannii) establish as well but remain in the understory. As early seral trees establish and form a closed canopy, they shade the understory and prevent the establishment of new understory vegetation and tree regeneration (Oliver 1980).

Mixed severity fire and other disturbance mechanisms create canopy openings and allow for understory regeneration (Spies and Franklin 1989). Overtime, this results in a mosaic of mixed-age stands, with Douglas-fir being a dominant component of younger stands and western redcedar and grand fir dominating older stands. In mixed age stands, understory vegetation communities stabilize and include brides’ bonnet (Clintonia uniflora), starry false lily of the valley (Maianthemum stellatum), and Idaho goldthread (Coptic occidentalis).

With infrequent, low-severity fires or lack thereof for 150 year or more, western redcedar will persist to form even-aged stands (Daniels 2003). These stands have variable understory compositions and dynamics that are primarily controlled by individual tree mortality (Wells et al. 1998). Plants such as bride’s bonnet and twinflower (Linnaea borealis) often occur alongside grand fir and western redcedar regeneration.

State and transition model

Additional community tables

Table 7. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 8. Community 1.1 forest overstory composition

Common Name	Symbol	Scientific Name	Nativity	Height M	Canopy Cover (%)	Diameter Cm	Basal Area (square M/hectare)
Tree							
grand fir	ABGR	*Abies grandis*	Native	36.6-39.6	25-75	45.7-53.3	–
western redcedar	THPL	*Thuja plicata*	Native	–	25-75	–	–

Table 9. Community 1.1 forest understory composition

Common Name	Symbol	Scientific Name	Nativity	Height (m)	Canopy Cover (%)
Forb/Herb					
Idaho goldthread	COOC	*Coptis occidentalis*	Native	–	25-50
bride's bonnet	CLUN2	*Clintonia uniflora*	Native	–	5-25
twinflower	LIBO3	*Linnaea borealis*	Native	–	5-25
British Columbia wildginger	ASCA2	*Asarum caudatum*	Native	–	5-25
Shrub/Subshrub					
bunchberry dogwood	COCA13	*Cornus canadensis*	Native	–	1-5

Table 10. Community 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 11. Community 1.2 forest overstory composition

Common Name	Symbol	Scientific Name	Nativity	Height M	Canopy Cover (%)	Diameter Cm	Basal Area (square M/hectare)
Tree							
grand fir	ABGR	*Abies grandis*	Native	24.4-41.1	20-90	30.5-55.9	–
Rocky Mountain Douglas-fir	PSMEG	*Pseudotsuga menziesii var. glauca*	Native	22.9-38.1	5-65	33-55.9	–
western redcedar	THPL	*Thuja plicata*	Native	–	2-30	–	–
Engelmann spruce	PIEN	*Picea engelmannii*	Native	27.4-33.5	1-23	30.5-40.6	–
western larch	LAOC	*Larix occidentalis*	Native	27.4-38.1	1-20	30.5-45.7	–
western white pine	PIMO3	*Pinus monticola*	Native	30.5-38.1	1-5	35.6-43.2	–

Table 12. Community 1.2 forest understory composition

Common Name	Symbol	Scientific Name	Nativity	Height (m)	Canopy Cover (%)
Grass/grass-like (Graminoids)					
Columbia brome	BRVU	*Bromus vulgaris*	Native	–	0-1
Forb/Herb					
bride's bonnet	CLUN2	*Clintonia uniflora*	Native	–	5-25
starry false lily of the valley	MAST4	*Maianthemum stellatum*	Native	–	5-25
Idaho goldthread	COOC	*Coptis occidentalis*	Native	–	5-25
twinflower	LIBO3	*Linnaea borealis*	Native	–	1-5
British Columbia wildginger	ASCA2	*Asarum caudatum*	Native	–	1-5
American trailplant	ADBI	*Adenocaulon bicolor*	Native	–	1-5
darkwoods violet	VIOR	*Viola orbiculata*	Native	–	1-5
fragrant bedstraw	GATR3	*Galium triflorum*	Native	–	1-5
Pacific trillium	TROV2	*Trillium ovatum*	Native	–	0-1
Fern/fern ally					
western brackenfern	PTAQ	*Pteridium aquilinum*	Native	–	0-1
Shrub/Subshrub					
common snowberry	SYAL	*Symphoricarpos albus*	Native	–	1-5
bunchberry dogwood	COCA13	*Cornus canadensis*	Native	–	1-5
dwarf rose	ROGY	*Rosa gymnocarpa*	Native	–	1-5
thinleaf huckleberry	VAME	*Vaccinium membranaceum*	Native	–	1-5
Rocky Mountain maple	ACGL	*Acer glabrum*	Native	–	1-5

Table 13. Community 1.3 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 14. Community 1.3 forest overstory composition

Common Name	Symbol	Scientific Name	Nativity	Height M	Canopy Cover (%)	Diameter Cm	Basal Area (square M/hectare)
Tree							
grand fir	ABGR	*Abies grandis*	Native	24.4-41.1	35-95	33-58.4	–
western redcedar	THPL	*Thuja plicata*	Native	–	1-40	–	–
Rocky Mountain Douglas-fir	PSMEG	*Pseudotsuga menziesii var. glauca*	Native	21.3-33.5	5-40	27.9-48.3	–

western larch	LAOC	*Larix occidentalis*	Native	21.3-39.6	1-25	22.9-38.1	–

Table 15. Community 1.3 forest understory composition

Common Name	Symbol	Scientific Name	Nativity	Height (m)	Canopy Cover (%)
Grass/grass-like (Graminoids)					
Columbia brome	BRVU	*Bromus vulgaris*	Native	–	0-1
Forb/Herb					
bride's bonnet	CLUN2	*Clintonia uniflora*	Native	–	1-5
starry false lily of the valley	MAST4	*Maianthemum stellatum*	Native	–	1-5
Idaho goldthread	COOC	*Coptis occidentalis*	Native	–	1-5
American trailplant	ADBI	*Adenocaulon bicolor*	Native	–	1-5
twinflower	LIBO3	*Linnaea borealis*	Native	–	0-1
Shrub/Subshrub					
common snowberry	SYAL	*Symphoricarpos albus*	Native	–	1-5
thinleaf huckleberry	VAME	*Vaccinium membranaceum*	Native	–	1-5
bunchberry dogwood	COCA13	*Cornus canadensis*	Native	–	1-5
Rocky Mountain maple	ACGL	*Acer glabrum*	Native	–	0-1
pipsissewa	CHUM	*Chimaphila umbellata*	Native	–	0-1

Table 16. Community 1.4 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 17. Community 1.4 forest overstory composition

Common Name	Symbol	Scientific Name	Nativity	Height M	Canopy Cover (%)	Diameter Cm	Basal Area (square M/hectare)
Tree							
grand fir	ABGR	*Abies grandis*	Native	19.8-35.1	48-90	22.9-48.3	–
Rocky Mountain Douglas-fir	PSMEG	*Pseudotsuga menziesii var. glauca*	Native	18.3-21.3	4-50	22.9-35.6	–

Table 18. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 19. 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*	75	110	144	201	100	–	–	
grand fir	*ABGR*	87	106	106	201	95	–	–	
Rocky Mountain Douglas-fir	*PSMEG*	81	97	65	152	104	–	–	
western larch	*LAOC*	84	98	74	146	70	–	–	
Engelmann spruce	*PIEN*	110	112	–	–	–	–	–	

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Approval

Kirt Walstad, 5/05/2025

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:

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):**

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14. **Average percent litter cover (%) and depth (in):**

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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:**
