USDA Natural Resources Conservation Service

Ecological site F043AY569ID
Vitrandic Fragipan Hills 30-45" PZ Frigid Western Bitterroot Foothills

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Accessed: 05/10/2025

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 43A09 (Western Bitterroot Foothills). Also found in 43A11 (Bitterroot Metasedimentary Zone). 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 Redcedar Series: THPL/CLUN, THPL/ASCA. (Williams et. al. 1995)

Ecological site concept

This ES group is distinguished by an overstory of western redcedar, grand fir and Douglas-fir and a diverse understory of shrubs such as woods rose and Utah honeysuckle; and herbs such as bride’s bonnet, Idaho

goldthread and starry false solomon's seal. It occurs on foothills, mountainsides, and ridges. These soils have developed in highly mixed Mazama tephra deposits over older sediments. The soils are moderately deep to a fragipan and have adequate available water capacity to a depth of 40 inches. The soils are somewhat poorly or moderately well drained. Water tables are perched and occur at 18 to 30 inches depth during Mar-May. Soils are dry otherwise. This ES group fits into the National Vegetation Standard's Tsuga heterophylla - Thuja plicata Cool-Mesic Central Rocky Mountain Forest & Woodland Alliance and Washington State's Natural Heritage Program's Northern Rocky Mountain Mesic Montane Mixed Conifer Forest.

Table 1. Dominant plant species

Tree	(1) *Thuja plicata* (2) *Abies grandis*
Shrub	(1) *Vaccinium membranaceum* (2) *Linnaea borealis ssp. longiflora*
Herbaceous	(1) *Clintonia uniflora* (2) *Asarum caudatum*

Physiographic features

Physiographic Features
Landscapes: Foothills, Plateaus
Landform: hillslopes

Elevation (m): Total range = 630 to 1135 m
(2,065 to 3,725 feet)
Central tendency = 785 to 930 m
(2,575 to 3,050 feet)

Slope (percent): Total range = 0 to 45 percent
Central tendency = 6 to 20 percent

Aspect: none dominant

Table 2. Representative physiographic features

Landforms	(1) Foothills > Hillslope (2) Plateau > Hillslope
Flooding frequency	None
Ponding frequency	None
Elevation	2,575–3,050 ft
Slope	6–20%
Water table depth	80 in
Aspect	Aspect is not a significant factor

Table 3. Representative physiographic features (actual ranges)

Flooding frequency	None
Ponding frequency	None
Elevation	2,065–3,725 ft
Slope	0–45%
Water table depth	6–80 in

Climatic features

Influencing water features

Water Table Depth: perched water tables at 6 to 40 inches (median = 28 inches) during Feb to May
Soil is dry within 40 inches otherwise

Flooding:
Frequency: None to Occasional
Duration: None to Brief

Ponding:
Frequency: None to Frequent
Duration: None to Long

Soil features

Representative Soil Features

This ecological site is associated with a single series (i.e. Reggear). These soils are Vitrandic Fraglossudalfs. These soils have developed in highly mixed Mazama tephra deposits over older sediments. The soils are moderately deep to a fragipan and have adequate available water capacity to a depth of 40 inches. The soils are moderately well drained. Water tables are perched and occur at 18 to 30 inches depth during Mar-May. Soils are dry otherwise.

Table 4. Representative soil features

Parent material	(1) Volcanic ash (2) Loess (3) Alluvium
Surface texture	(1) Ashy silt loam
Drainage class	Moderately well drained
Permeability class	Moderate
Depth to restrictive layer	38 in
Soil depth	80 in
Surface fragment cover >3"	0%
Available water capacity (0-40in)	5.7 in
Calcium carbonate equivalent (0-60in)	0%
Electrical conductivity (0-60in)	0 mmhos/cm
Soil reaction (1:1 water) (0-60in)	5.7
Subsurface fragment volume <=3" (10-60in)	0%
Subsurface fragment volume >3" (10-60in)	0%

Table 5. Representative soil features (actual values)

Drainage class	Somewhat poorly drained to moderately well drained
Permeability class	Very slow to moderate

Depth to restrictive layer	20–80 in
Soil depth	80 in
Surface fragment cover >3"	0%
Available water capacity (0-40in)	3.9–6.2 in
Calcium carbonate equivalent (0-60in)	0%
Electrical conductivity (0-60in)	0 mmhos/cm
Soil reaction (1:1 water) (0-60in)	4.5–7.3
Subsurface fragment volume <=3" (10-60in)	0–1%
Subsurface fragment volume >3" (10-60in)	0%

Ecological dynamics

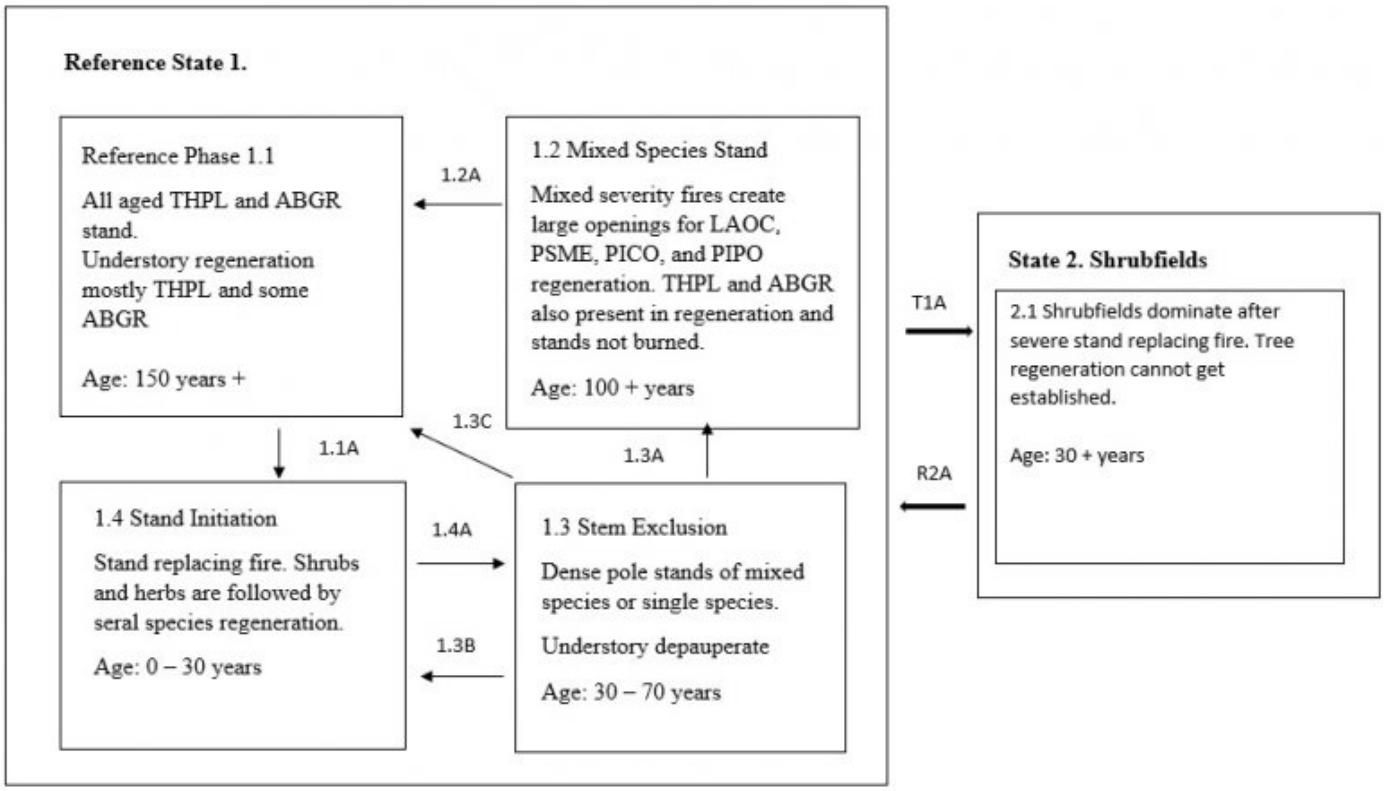
Ecological Dynamics of the Site

This ecological site is highly diverse in tree species, shrub and forb composition. Forest composition is dependent of fire severity, occurrence, and tree species seed source after fire. Western white pine used to dominate stands after stand replacing fires before the white pine blister rust. Now, western larch, Douglas-fir, lodgepole, and ponderosa pine (dry exposures) have replaced it. Grand fir and western red cedar also get established but sit in understory underneath the other species until release from canopy openings. In early stands after fire Quaking aspen, paper birch, and black cottonwood will be present only to be overtopped in later years. Shrub competition can be severe after fire with many shrub species dominating the site. Red stem ceanothus or snowbrush ceanothus (drier areas) could dominate sites with severe burns. Mixed severity fires create a patchy mosaic of all tree species being present. Reference condition will have fire exclusion or fire intervals of over 150 years which produce an all-aged western red cedar – grand fir forest. Relic western larch, Douglas-fir, and ponderosa pine may be present.

State and transition model

State and Transition Diagram

Ecological Site
Frigid Udic Loamy Foothills/Mountainsides (Western redcedar, moist herb)
Thuja plicata / Clintonia uniflora (western redcedar / bride's bonnet)



State 1
Reference

This state with extended fire intervals turns into an all aged western redcedar stand with some grand fir present. Most understory regeneration is western redcedar again with some grand fir. Stand replacing fires start off in the herb/shrub stage with many species of shrubs potentially occupying the site. Shrubs include Douglas maple, serviceberry, snowbrush ceanothus, redstem ceanothus, snowberry, and ninebark. Tree regeneration is variable depending on available seed source. A host of seral species can establish including western larch, Douglas-fir, ponderosa pine, lodgepole pine, and western white pine (limited due to blister rust). Cedar and grand fir can also establish, but will sit underneath the seral species until released. Severe fires can cause soil degradation causing sites to remain in shrubs for long periods preventing tree establishment. With successful tree regeneration a mix of seral tree species can occupy the stand or in some cases, a single species like western larch will dominate the stand. These stands go into the stem exclusion phase with tree to tree competition. Understory vegetation will be

sparse. As these stands mature mixed severity fires create a mosaic of stand structure and species composition with a combination of seral species and shade tolerant cedar and grand fir. Sites on midslopes are more likely to burn more intensely than lower slopes due to a “thermal belt” condition with lower slopes being cooler and midslopes warmer and drier in summer conditions.

Community 1.1
Reference

Mature stands of 150+ old western redcedar with some grand fir. An all aged stand structure is present with most regeneration being cedar with some grand fir. Relic western larch, Douglas-fir, ponderosa pine, and western white pine (if not killed by blister rust) may be present. Paper birch can be present in the understory. Major herb species include queencup beadily (brides bonnet), starry Solomonplume, w. rattlesnake plantain, and round-leaved violet. Major shrubs include pachistima, twinflower, w. prince’s pine, baldhip rose, Oregon grape, Douglas maple, and Utah honeysuckle.

Dominant plant species

- western redcedar (*Thuja plicata*), tree
- grand fir (*Abies grandis*), tree
- Rocky Mountain Douglas-fir (*Pseudotsuga menziesii var. glauca*), tree
- western larch (*Larix occidentalis*), tree
- Oregon boxleaf (*Paxistima myrsinites*), shrub
- longtube twinflower (*Linnaea borealis ssp. longiflora*), shrub
- pipsissewa (*Chimaphila umbellata*), shrub
- Rocky Mountain maple (*Acer glabrum*), shrub
- Utah honeysuckle (*Lonicera utahensis*), shrub
- dwarf rose (*Rosa gymnocarpa*), shrub
- hollyleaved barberry (*Mahonia aquifolium*), shrub
- darkwoods violet (*Viola orbiculata*), other herbaceous
- bride's bonnet (*Clintonia uniflora*), other herbaceous
- western rattlesnake plantain (*Goodyera oblongifolia*), other herbaceous
- starry false lily of the valley (*Maianthemum stellatum*), other herbaceous
- Piper's anemone (*Anemone piperi*), other herbaceous
- Pacific trillium (*Trillium ovatum ssp. ovatum*), other herbaceous
- fairy slipper (*Calypso bulbosa*), other herbaceous

Community 1.2
Mixed Species Stand

Mixed severity fires create a mosaic of mixed tree species. Western larch, Douglas-fir, western white pine, ponderosa pine (drier sites), and lodgepole pine can compose the stand. Cedar and grand fir will be mixed into the stand structure. Quaking aspen, black cottonwood and paper birch can be part on these mosaic stands.

Dominant plant species

- grand fir (*Abies grandis*), tree
- Rocky Mountain Douglas-fir (*Pseudotsuga menziesii var. glauca*), tree
- western redcedar (*Thuja plicata*), tree
- western larch (*Larix occidentalis*), tree
- western white pine (*Pinus monticola*), tree

Community 1.3
Stem Exclusion

Dense pole size stand competition. Stands composed of mixed seral species or in some cases only cedar

Dominant plant species

- grand fir (*Abies grandis*), tree
- western redcedar (*Thuja plicata*), tree
- Rocky Mountain Douglas-fir (*Pseudotsuga menziesii var. glauca*), tree

Community 1.4
Stand Initiation

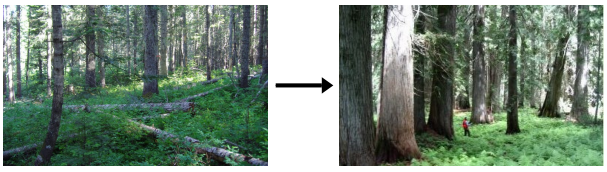
Shrub and herb phase with tree regeneration depending on seed source. Single species regeneration such as western larch or mixed with larch, Douglas-fir, white pine, grand fir and cedar. Ponderosa pine establishment mostly on drier warmer sites. Lodgepole pine establishment possible on hotter burn sites. Shrubs can dominate for long periods preventing tree establishment

Pathway 1.1A
Community 1.1 to 1.4

Reference **Stand Initiation**

Stand replacing fire

Pathway 1.2A
Community 1.2 to 1.1



Mixed Species Stand **Reference**

Fire interval extended to allow shade tolerant cedar and grand fir to grow up from understory to dominate stand.

Pathway 1.3C
Community 1.3 to 1.1

Stem Exclusion **Reference**

Time, fire interval extended to allow cedar and grand fir to dominate stand. No disturbance to allow seral species to dominate.

Pathway 1.3A
Community 1.3 to 1.2

Stem Exclusion | Mixed Species Stand

Time, allowing stands to reach maturity before a stand replacing fire. Mixed severity fires then occur.

Pathway 1.3B
Community 1.3 to 1.4

Stem Exclusion | Stand Initiation

Stand replacing fire in dense pole stands.

Pathway 1.4A
Community 1.4 to 1.3

Stand Initiation | Stem Exclusion

Time, allowing tree regeneration to grow into pole stands

State 2
Shrubfields

Severe fires change reference state to a shrubfield site. No tree regeneration due to shrub competition and soil conditions. Major shrubs include snowbrush and redstem ceanothus, serviceberry, ninebark, Scouler willow, elderberry species, snowberry, spirea, and Douglas maple

Dominant plant species

- ceanothus (*Ceanothus*), shrub
- Saskatoon serviceberry (*Amelanchier alnifolia*), shrub
- mallow ninebark (*Physocarpus malvaceus*), shrub
- Scouler's willow (*Salix scouleriana*), shrub
- red elderberry (*Sambucus racemosa*), shrub

- common snowberry (*Symphoricarpos albus*), shrub
- white spirea (*Spiraea betulifolia*), shrub
- Rocky Mountain maple (*Acer glabrum*), shrub

Community 2.1
Reference

Severe fires change reference state to a shrubfield site. No tree regeneration due to shrub competition and soil conditions. Major shrubs include snowbrush and redstem ceanothus, serviceberry, ninebark, Scouler willow, elderberry species, snowberry, spirea, and Douglas maple

Transition T1A
State 1 to 2

Reference **Shrubfields**

Severe fires creating shrubfields preventing tree establishment for long time periods.

Restoration pathway R2A
State 2 to 1

Shrubfields **Reference**

Site by site analysis to determine tree planting survival. Tree planting species mostly seral species like, larch, Douglas-fir, ponderosa pine, and white pine (blister rust resistant).

Additional community tables

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*	75	110	144	201	100	–	–	
grand fir	*ABGR*	76	124	106	201	95	–	–	
Rocky Mountain Douglas-fir	*PSMEG*	64	98	65	152	104	–	–	
western larch	*LAOC*	56	93	74	146	70	–	–	
Rocky Mountain Douglas-fir	*PSMEG*	66	100	56	130	88	–	–	

References

. 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.

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.

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.

Smith and Fischer. 1997. Fire Ecology of the Forest 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	05/10/2025
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:**

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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:**

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17. **Perennial plant reproductive capability:**
