

Ecological site F043CY510WA

Frigid, Dry-Udic, Loamy, Hills and Mountains, Basalt, Ashy surface (grand fir/moist herb)

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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): 043C–Blue and Seven Devils 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 43C04 (Dissected Basalt Highlands). Also found in adjacent areas of 43C02 (Eastern High Basalt Plateau).

Classification relationships

This ecological site is aligned to the following classification systems:

- U.S. National Vegetation/NatureServe and Washington NHP Classification Matrix:

Plant Association Group* Alliance** Association***

ABGR/CLUN (modal) G-211 A-3362 CEGL 000272

ABGR/TABR/CLUN G-211 A-3362 CEGL 000283

PSME/VAME G-211 A-3362 GEGL 000466

* G-211 is the U.S. National Vegetation Classification (NVC) Standard Middle Rocky Mountain Montane Douglas-fir Forest & Woodland

** Alliance-3462 is the Northern Rocky Mountain Mesic Montane Mixed Conifer Forest

*** CEGL 000272 is the Grand fir/Bride's Bonnet Forest (note that the local name for this plant association is /Queen's Cup Beadlily (CLUN) Forest

CEGL 000283 is the Grand Fir/Pacific Yew Forest

CEGL 000466 is the Douglas-fir/Thinleaf Huckleberry Forest (note that the local name for this plant association is /Big Huckleberry (VAME) Forest

- USDA Forest Service Ecological Sub-region M332 "Blue Mountains".
- LANDFIRE BpS model 10470: Northern Rocky Mountain Mesic Montane Mixed-Conifer Forest (primary model).
- Ecoclass Code(s): ABGR/CLUN-CWF421; ABGR/TABR/CLUN-CWC811 and PSME/VAME-CDS821 (All plant

associations are in the Blue-Ochoco PA, 1991).

Ecological site concept

The grand fir/cool moist forb (GF -CMF) ecological site (ES) encompasses the modal grand fir (*Abies grandis*)/queen's cup beadlily (*Clintonia uniflora*) plant association (ABGR/CLUN) , and the closely related grand fir/Pacific yew (*Taxus brevifolia*)/queen's cup beadlily plant association ABGR/TABR/CLUN). Pacific yew forests are a moist microsite association, with longer fire return intervals compared to queen's cup beadlily associations. This ecological site occupies the wetter and cooler end of the moisture/temperature spectrum for the grand fir series. It's found on moist, well-drained sites which are protected from harsh sun and wind. These soils have developed in Mazama tephra deposits over residuum and colluvium from basalt or andesite. The tephra layers are important for forest productivity in that they retain large amounts of water compared to other parent materials, have high cation exchange capacity and high availability of organically bound plant nutrients. The soils range from deep to very deep and have adequate available water capacity to a depth of 40 inches.

Associated sites

F043CY503WA	Frigid, Moist-Xeric Loamy, Canyons and Mountains (Grand fir/Moist Shrub) frigid, moist-xeric, ashy surface, basalt/andesite geology.
F043CY513WA	Frigid, Dry-Udic, Loamy, Mountains, and Canyons, Ashy Surface (grand fir/moist herb) frigid, dry-udic, ashy surface, granitic geology.

Similar sites

F043CY513WA	Frigid, Dry-Udic, Loamy, Mountains, and Canyons, Ashy Surface (grand fir/moist herb) Granitic geology
F043CY501WA	Mesic, Xeric, Loamy Foothills and Canyons (Ponderosa Pine Warm Dry Shrub) Pinus ponderosa/Symphoricarpos albus Mesic soil temperature regime
F043CY511WA	Frigid, Dry-Udic, Loamy, Hills, and Canyons, Basalt, Mixed Ash (grand fir/moist herb) mixed ash surface

Table 1. Dominant plant species

Tree	(1) <i>Abies grandis</i> (2) <i>Pseudotsuga menziesii</i> var. <i>glauca</i>
Shrub	(1) <i>Acer glabrum</i> (2) <i>Linnaea borealis</i> ssp. <i>longiflora</i>
Herbaceous	(1) <i>Clintonia uniflora</i> (2) <i>Adenocaulon bicolor</i>

Physiographic features

Landscapes: Mountains, Plateaus, Canyonlands

Landform: mountain slopes, hill slopes, canyon walls

Elevation (m): Total range = 735 to 1630 m

(2,410 to 5,345 feet)

Central tendency = 1120 to 1375 m

(3,675 to 4,510 feet)

Slope (percent): Total range = 0 to 95 percent

Central tendency = 20 to 50 percent

Water Table Depth: >80 inches

Flooding:

Frequency: None
Duration: None

Ponding:
Frequency: None
Duration: None

Aspect: Total range 285-10-145
Central tendency: 255-10-60

Table 2. Representative physiographic features

Landforms	(1) Mountains > Mountain slope (2) Plateau > Hillslope (3) Canyonlands > Canyon wall
Flooding frequency	None
Ponding frequency	None
Elevation	3,675–4,510 ft
Slope	20–50%
Water table depth	0 in
Aspect	W, NW, N, NE

Table 3. Representative physiographic features (actual ranges)

Flooding frequency	Not specified
Ponding frequency	Not specified
Elevation	2,410–5,345 ft
Slope	0–95%
Water table depth	0 in

Climatic features

Frost-free period (days): Total range = 70 to 145 days
Central tendency = 85 to 105 days

Mean annual precipitation (cm): Total range = 580 to 1320 mm
(23 to 52 inches)
Central tendency = 805 to 1175 mm
(32 to 46 inches)

MAAT (C): Total range = 5.9 to 9.1
(43 to 48 F)
Central tendency = 6.9 to 7.8
(45 to 46 F)

Climate Stations: none

Table 4. Representative climatic features

Frost-free period (characteristic range)	85-105 days
Freeze-free period (characteristic range)	
Precipitation total (characteristic range)	32-46 in
Frost-free period (actual range)	70-145 days

Freeze-free period (actual range)	
Precipitation total (actual range)	23-52 in
Frost-free period (average)	95 days
Freeze-free period (average)	
Precipitation total (average)	39 in

Influencing water features

Water Table Depth: >80 inches

Flooding:

Frequency: None

Duration: None

Ponding:

Frequency: None

Duration: None

Soil features

This ecological subsite is associated with several soil components (e.g. Helmer, Limberjim, and Webbridge). The soil components can be grouped into Alfic Udivitrands, and Alfic Vitricryands. These soils have developed in Mazama tephra deposits over residuum and colluvium from basalt or andesite. The tephra layers are important for forest productivity in that they retain large amounts of water compared to other parent materials, have high cation exchange capacity and high availability of organically bound plant nutrients. The soils range from deep to very deep and have adequate available water capacity to a depth of 40 inches. The soils are well-drained.

Parent Materials:

Kind: Tephra (volcanic ash)

Origin: mixed

Kind: alluvium

Origin: mixed

Kind: residuum and colluvium

Origin: Basalt, Andesite

Surface Texture: (<2mm fraction)

(1) Ashy Silt Loam

Table 5. Representative soil features

Parent material	(1) Volcanic ash (2) Alluvium (3) Residuum–basalt (4) Colluvium–basalt (5) Residuum–andesite (6) Colluvium–andesite
Surface texture	(1) Ashy silt loam
Drainage class	Well drained
Permeability class	Moderate
Depth to restrictive layer	0 in
Soil depth	40–80 in
Surface fragment cover <=3"	0%

Surface fragment cover >3"	0%
Available water capacity (0-40in)	11 in
Soil reaction (1:1 water) (0-60in)	6.1–7.3
Subsurface fragment volume <=3" (10-60in)	10%
Subsurface fragment volume >3" (10-60in)	12%

Table 6. Representative soil features (actual values)

Drainage class	Well drained
Permeability class	Moderately slow to moderate
Depth to restrictive layer	0–40 in
Soil depth	40–80 in
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-40in)	5.9–11 in
Soil reaction (1:1 water) (0-60in)	6.1–7.3
Subsurface fragment volume <=3" (10-60in)	10–30%
Subsurface fragment volume >3" (10-60in)	7–45%

Ecological dynamics

The grand fir/cool moist forb (GF -CMF) ecological site (ES) encompasses the modal grand fir (*Abies grandis*)/queen's cup beadlily (*Clintonia uniflora*) plant association (ABGR/CLUN) , and the closely related grand fir/Pacific yew (*Taxus brevifolia*)/queen's cup beadlily plant association ABGR/TABR/CLUN). Pacific yew forests are a moist microsite association, with longer fire return intervals compared to queen's cup beadlily associations. This ecological site occupies the wetter and cooler end of the moisture/temperature spectrum for the grand fir series. It's found on moist, well-drained sites which are protected from harsh sun and wind. The GF-CMF site is transitional to colder subalpine fir (*Abies lasiocarpa*) forests in an increasing moisture/temperature gradient. The Douglas-fir (*Pseudotsuga menziesii*)/big huckleberry (*Vaccinium membranaceum*) (PSME/VAME) plant association, relatively modest in extent, is also included in the GF-CMF ecological site group. The main reason for assigning this particular association to the ES is because the historic fire regime is very similar to that of the two grand fir plant associations, and therefore the primary driver of the ecological processes forms the logical link. The big huckleberry Douglas-fir association is the wettest expression of the Douglas-fir series. It also shares many attributes of the Douglas-fir warm dry shrub (DF-WDS) ecologic site (which is represented by the modal Douglas-fir/ninebark (*Physocarpus malevaceus*) plant association, abbreviated as PSME/PHMA). The expression of conifers within the PSME/VAME member is skewed to the warmer Ponderosa pine and Doug-fir, and away from the cooler and more moist larch and grand fir.

This ecological site is floristically diverse and has a wide range of seral plant expressions which can develop following disturbance. The specific plant occupancy will vary according to the initial composition of the stand, the individual surviving trees, along with specific sources of seeds (especially conifer species) the surviving root or rhizomes of adapted understory plants. The type and extent of the disturbance event determines post-fire recovery opportunities, along with the passage of time.

Ponderosa pine (*Pinus ponderosa*), western larch (*Larix occidentalis*) and lodgepole pine are the primary early seral species following widespread, stand replacing disturbance events in the modal expression of the ecological site. Douglas-fir and Western white pine (*Pinus monticola*) are dominant mid seral conifers, and Englemann spruce (*Picea*

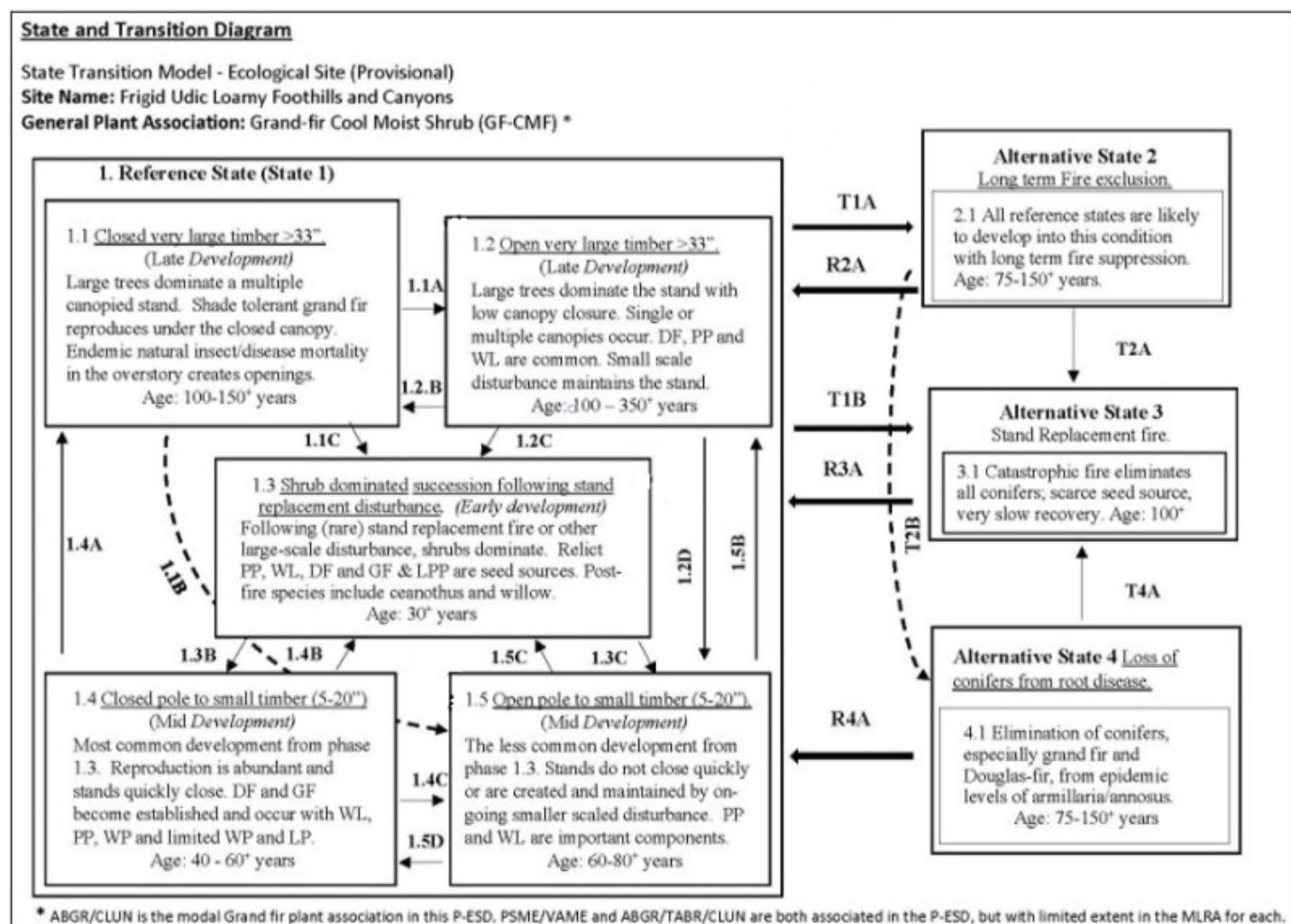
engelmannii) is a late seral species. Douglas-fir is well represented in all three plant associations that comprise the ecological site. Grand fir is the climax conifer of the ecological site, but Doug-fir and grand fir will commonly co-exist as the late stage dominant overstory species while grand fir typically shows the greater expression of the two species. Western white pine and western larch are not well represented in the Pacific yew type of the grand fir PVT, and western white pine is not a common component in the moist Douglas-fir association. The historical occurrence of western white pine historical was limited to the modal plant association essentially. Western white pine has been very restricted in expression and ecological function since the introduction of white pine blister rust (*Cronartium ribicola*) to the United States in the early part of the 21st century. Regardless of the exact progression from one plant community stage to another, mature stands in this site develop as predominately uneven-aged forests. Pacific Yew has a growth form of a small tree or a shrub, depending on site conditions in which is found. Pacific yew establishes in in moister microenvironments and therefore has a longer fire return interval than the other plant association members of the ecologic site. The species has been reduced in extent following high levels of bark harvest because of the cancer inhibiting properties of the plant.

Shrubs such as common pipsissewa (*Chimaphila umbellata*), twinflower (*Linnea borealis*), Oregon boxwood (*Pachistima myrsintea*), baldhip rose (*Rosa gymnocarpa*), common snowberry (*Symphoricarpos albus*) and big huckleberry (*Vaccinium membranaceum*) are common.

Insect and disease agents that are important in this site include fir engraver, Douglas-fir beetle, dwarf mistletoe, root diseases and defoliating insects including spruce budworm, Douglas-fir tussock moth, and larch casebearer. These are usually small to mid-scale in scope unless the disturbance reaches an epidemic stage.

Overall, fire was the major historic disturbance factor in the ecological site. Ponderosa pine, western larch and lodgepole pine were common early seral conifers that established following mixed or stand replacement fire events. Fire exclusion within the past 100 years (the "post-European" time frame) has drastically altered the structural expression of the present forest, resulting in an increase in ladder fuels and in overall fuel levels. This, in turn, increases the risk of more widespread, catastrophic wildfires in this forest type.

State and transition model



Plant Community, Transition(s) and Restoration Pathways

Reference State Community Pathways:

(see Appendix 1 for tree-size classes)

1.1 A Mixed severity fire or insect/disease disturbance.

1.1 B Epidemic insect (bark beetles) disturbance.

1.1 C Stand replacement fire.

Mixed or surface fire occurs, or endemic insect/disease maintaining 1.2.

1.2 B Stand Closes.

1.2 C Replacement fire

1.2 D Disturbance event transitions the stand back to the mid development phase.

Persistent shrub fields develop at various scales maintaining 1.3.

1.3 B Develops to closed pole and small timber stand.

1.3 C Develops to open pole and small timber stand.

1.4 A Develops to a closed, very large structural phase.

1.4 B Replacement fire.

1.4 C Fire or insect/disease or other disturbance.

Community Phase 1.5 is a Fire-maintained stand.

1.5 B Develops to closed pole, very large timber.

1.5 C Replacement fire.

1.5 B Develops to late development open community phase.

1.5 D Develops to a closed, pole to small timber structural phase.

Transitions to Alternative States:

T1A Long term fire exclusion.

T1B Naturally occurring catastrophic wildfire; limited conifer recruitment.

T2A Elevated catastrophic wildfire threat results in a severe, widespread fire episode. Conifer recruitment is severely limited or non-existent.

T2B Excessive root disease results in the potential losses of all conifer species as these diseases increase.

T4A High intensity wildfire in brush fields. Lack of conifer seed source, similar resource impact as in T2A.

Restoration Pathways:

R2A Stands restored: properly stocked with preferred species.

R3A Reforestation or afforestation is applied using preferred species.

R4A Infected root mass deteriorates in time, followed by reforestation/afforestation with preferred species.

References

Powell, D.C., C.G. Johnson, E.A. Crowe, A. Wells, and D.K. Swanson. 2007. Potential vegetation hierarchy for the Blue Mountains section of northeastern Oregon, southeastern Washington, and west-central Idaho. Gen. Tech. Rep. PNW-GTR-709.. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station., Portland, OR.

Other references

USNVC [United States National Vegetation Classification]. 2020. United States National Vegetation Classification Database, V2.03. Federal Geographic Data Committee, Vegetation Subcommittee, Washington DC. USNVC: <http://usnvc.org/>

Contributors

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Approval

Kirt Walstad, 9/08/2023

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	05/06/2024
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:**

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17. **Perennial plant reproductive capability:**
-