

Ecological site F043CY505WA

Warm-Frigid, Xeric, Loamy Eolian Hills and Plateaus (Douglas-fir/ warm dry shrub)

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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

Major land resource area (MLRA): 043C-Blue and Seven Devils 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 ESD fits into the National Vegetation Standard's Douglas-fir Middle Rocky Mountain Mesic-Wet Forest Alliance and Washington State's Natural Heritage Program's Northern Rocky Mt. Dry Mesic Montane Mixed Conifer Forest.

Ecological site concept

This ESD is distinguished by an overstory of ponderosa pine, and Douglas-fir with an understory of shrubs such as common snowberry, mallow ninebark and oceanspray. Common forbs are pinegrass, heartleaf arnica, lupines, western hawkweed and strawberry. It occurs on foothills, mountainsides, and canyon walls. Soils have developed in mixed Mazama tephra deposits and thick loess, over basalt or metavolcanics. The soils are moderately deep to very deep and have adequate available water capacity to a depth of 1 m. The soils are moderately well or well-drained.

Associated sites

F043CY506WA	Warm-Frigid, Xeric Loamy, Granitic, Mountains (Douglas-fir/ warm dry shrub) warm-frigid, xeric, mixed ash and loess, granitic geology.
F043CY507WA	Warm-Frigid, Xeric Loamy, Hills and Plateaus, High WT (Douglas-fir/ warm dry shrub) warm-frigid, xeric, mixed ash and loess, perched water table at 18 to 36 inches during Feb-May.

Similar sites

F043CY507WA	Warm-Frigid, Xeric Loamy, Hills and Plateaus, High WT (Douglas-fir/ warm dry shrub) Site has a perched water table at 18 to 36 inches during Feb-May
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F043CY504WA	Warm-Frigid, Xeric, Loamy, Basalt Mountains and Plateaus (Douglas-fir/warm dry shrub) Basalt geology
F043CY506WA	Warm-Frigid, Xeric Loamy, Granitic, Mountains (Douglas-fir/ warm dry shrub) Granitic geology

Table 1. Dominant plant species

Tree	(1) <i>Pseudotsuga menziesii</i> var. <i>glauca</i> (2) <i>Pinus ponderosa</i>
Shrub	(1) <i>Physocarpus malvaceus</i> (2) <i>Symphoricarpos albus</i>
Herbaceous	(1) <i>Calamagrostis rubescens</i> (2) <i>Arnica cordifolia</i>

Physiographic features

Landscapes: Foothills

Landform: Hillslopes, Plateaus, Ridges

Elevation (m): Total range = 680 to 1400 m

(2,230 to 4,590 feet)

Central tendency = 965 to 1155 m

(3,165 to 3,790 feet)

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

Central tendency = 10 to 45 percent

Water Table Depth:

33% of components have a perched water table at 18 to 48 inches during Jan-Mar

67% of components have no water table within 80 inches

Flooding:

Frequency: None

Duration: None

Ponding:

Frequency: None

Duration: None

Aspect:

Total range: 250-5-160

Central tendency: 300-5-60

Table 2. Representative physiographic features

Landforms	(1) Foothills > Hillslope (2) Foothills > Ridge (3) Foothills > Plateau
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Flooding frequency	None
Ponding frequency	None
Elevation	970 – 1,160 m
Slope	10 – 50 %
Water table depth	0 cm
Aspect	NW, N, NE, E

Table 3. Representative physiographic features (actual ranges)

Flooding frequency	Not specified
Ponding frequency	Not specified
Elevation	680 – 1,400 m
Slope	0 – 100 %
Water table depth	0 – 50 cm

Climatic features

Frost-free period (days): Total range = 80 to 140 days
Central tendency = 100 to 115 days

Mean annual precipitation (cm): Total range = 600 to 1205 mm
(24 to 47 inches)
Central tendency = 810 to 1050 mm
(32 to 41 inches)

MAAT (C): Total range = 7.3 to 9.4
(45 to 49 F)
Central tendency = 8.1 to 8.6
(46 to 47 F)
Climate Stations: none

Table 4 Representative climatic features

Frost-free period (characteristic range)	100-120 days
Freeze-free period (characteristic range)	

Precipitation total (characteristic range)	810-1,040 mm
Frost-free period (actual range)	80-140 days
Freeze-free period (actual range)	
Precipitation total (actual range)	610-1,190 mm
Frost-free period (average)	110 days
Freeze-free period (average)	
Precipitation total (average)	910 mm

Influencing water features

Water Table Depth:

33% of components have a perched water table at 18 to 48 inches during Jan-Mar

67% of components have no water table within 80 inches

Flooding:

Frequency: None

Duration: None

Ponding:

Frequency: None

Duration: None

Soil features

This ecological site is associated with two soil components (i.e. Couse and Larkin). These soils developed in mixed volcanic ash and thick loess, over basalt. The soils are moderately deep to very deep and have adequate available water capacity to a depth of 1 m. The soils are moderately well drained or well-drained.

Parent Materials:

Kind: volcanic ash, loess

Origin: mixed

Surface Texture:

(1) Silt loam

(2) Silty clay loam

Table 5. Representative soil features

Parent material	(1) Volcanic ash (2) Loess (3) Residuum – basalt
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Surface texture	(1) Silt loam (2) Silty clay loam
Drainage class	Well drained
Permeability class	Moderately slow to moderate
Depth to restrictive layer	120 – 150 cm
Soil depth	120 – 150 cm
Surface fragment cover ≤3"	Not specified
Surface fragment cover >3"	Not specified
Available water capacity (0-101.6cm)	20.07 cm
Soil reaction (1:1 water) (0-152.4cm)	10
Subsurface fragment volume ≤3" (25.4-152.4cm)	Not specified
Subsurface fragment volume >3" (25.4-152.4cm)	Not specified

Table 6. Representative soil features (actual values)

Drainage class	Moderately well drained to well drained
Permeability class	Very slow to moderate
Depth to restrictive layer	50 – 200 cm
Soil depth	50 – 200 cm

Surface fragment cover <=3"	0 %
Surface fragment cover >3"	0 %
Available water capacity (0-101.6cm)	14.73 – 20.07 cm
Soil reaction (1:1 water) (0-152.4cm)	6.1 – 7.3
Subsurface fragment volume <=3" (25.4-152.4cm)	0 – 20 %
Subsurface fragment volume >3" (25.4-152.4cm)	0 – 30 %

Ecological dynamics

This site is comprised of the modal Douglas-fir (*Pseudotsuga menziesii*)/ninebark (*Physocarpus malvaceus*) plant association (PSME/PHMA). The less abundant Douglas-fir/Common Snowberry (*Symphoricarpos albus*) (PSME/SYAL) and Douglas-fir/birchleaf spirea (*Spirea betulifolia*) (PSME/SPBE) plant associations are included in this provisional ESD. These plant associations are all part of the broader warm dry upland forest plant association group (PAG), and the dry upland forest potential vegetation group (PVG). This warm dry Douglas-fir forest type occurs above Ponderosa pine (*Pinus ponderosa*) forest types on a moisture gradient. It is in turn transitional to the mesic mixed (using LANDFIRE terminology; generally, “moderately dry”) conifer types.

This ESD was characterized by a ponderosa pine dominated overstory in the historic, naturally occurring ecological condition. Older stands typically contained large, widely spaced ponderosa pine and Douglas-fir, with understory shrub species such as ninebark, ocean spray (*Holodiscus discolor*), and snowberry.

Other conifers found in this ecologic site include grand fir (to a limited extent) and western larch (*Larix occidentalis*). Larch begins to occur in greater proportions compared to the dryer and warmer grass dominated Douglas-fir plant associations (such as in the pinegrass and elk sedge plant association environments).

Pre-European frequent, low intensity surface fires (also called “under-burns”) maintained long lived stands of fire-resistant late seral conifers in the older, more open stands. Less frequent occurring mixed-severity and stand replacement fires resulted in mosaics of older and larger trees, intermingled with younger patches of regenerating forests. The early development (i.e. regeneration) phase of this ecological site was dominated by Ponderosa pine recruitment and lesser numbers of larch seedlings, occurring with fire adapted understory species such as ceanothus spp., Scouler's willow (*Salix scouleriana*), ninebark, and grass species including pinegrass and elk sedge.

Young, newly regenerated stands would normally progress to mid-development phases in time, in the absence of major disturbance impacts that would halt progression. Those developing stands were dominated by large pole to small and intermediate sawtimber sized individual conifers. The stands expressed varying degrees of canopy closure depending on the initial seedling and stocking rates, coupled with the impacts of minor, small scale disturbance events that occurred over the course of development. Mid-development stands could in turn progress to mature stands with the passing of additional time and under favorable conditions. In the absence of significant surface fire, shade tolerant grand fir will begin to dominate the understory conifer layer (understory infill of mid and late seral conifers is now a common, widespread condition which is a direct result of a policy of total fire suppression. The policy of total forest fire suppression was implemented in the Post-European era of settlement in the western United States and became progressively effective in extinguishing the majority of wildfires across dry western landscapes.

The expressions of the various historical stand(s) in this site contained various ages, sizes and species mixes which were found in a mosaic pattern across the larger landscape. Clumps, gaps and individual trees were the norm. These forests occurred in ecologically defined “spatially heterogeneous patterns”.

Although fire was the major disturbance factor in the historic context in this ecological site, insects (such as bark beetles and defoliators) and root diseases also impacted the forest at any given time. Less frequent wind events and lightning also occurred, locally altering stand structural and functional attributes of the stand.

State and transition model

Additional community tables

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	08/29/2026
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:

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:
