Ecological site group EX044AESG02
Warm-Frigid, Moist-Xeric, Hill and Mountain Slopes (Grand Fir Warm Dry Shrub) Abies grandis - Pseudotsuga menziesii / Physocarpus malvaceus - Symphoricarpos albus

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Key Characteristics

None specified

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.

Physiography

Major land resource area (MLRA): 044A-Northern Rocky Mountain Valleys
Modal LRU – 44A01 Spokane-Rathdrum Outwash Plains

This LRU is composed predominantly of low to mid elevation foothills and valley floors. The soils tend to be loamy andisols, mollisols and inceptisols with distinct or mixed ash surfaces. Till, outwash and residuum from granitic or metamorphic rock are the dominant parent materials. Soil climate is a mesic temperature regime and xeric moisture regime with average annual precipitation around 525 mm (21 inches).

Others where occurring – 44A02 - Pend Oreille-Kootenai Valleys
43A04 – Selkirk Mountains

Ecological Site Concept:

This ES group is distinguished by an overstory of grand fir and Douglas-fir and an understory shrub component of ninebark, oceanspray, snowberry and /or twinflower. It occurs on foothills, and terraces. This ES group fits into the National Vegetation Standard’s Grand Fir - Douglas-fir Central Rocky Mountain Forest & Woodland Alliance and Washington State’s Natural Heritage Program’s Northern Rocky Mt. Mesic Montane Mixed Conifer Forest.

Physiographic Features
Landscapes: Foothills, Valleys
Landform: outwash terraces, lake terraces and outwash plains

Elevation (m): Total range = 495 to 1185 m
(1,625 to 3,885 feet)
Central tendency = 645 to 860 m
(2,115 to 2,820 feet)

Slope (percent): Total range = 0 to 40 percent
Central tendency = 1 to 15 percent

Water Table Depth (cm):
40 cm to 75 cm (median = 53 cm)
(16 to 30 inches; median = 21 inches)

Flooding:

Frequency: None to occasional
Duration: None to brief

Ponding:
Frequency: None
Duration: None

Aspect: (central tendency)
119-202-287

Water Table Depth:
40 cm to >200 cm
(16 to >80 inches)

Climate

Climatic Features

During the spring and summer, a circulation of air around a high-pressure center brings a prevailing westerly and northwesterly flow of comparatively dry, cool and stable air into the region. As the air moves inland, it becomes warmer and drier which results in a dry season beginning in the late spring and reaching a peak in mid-summer. In the fall and winter, a circulation of air around two pressure centers over the ocean brings a prevailing southwesterly and westerly flow of air into the Pacific Northwest. This air from over the ocean is moist and near the temperature of the water. Condensation occurs as the air moves inland over the cooler land and rises along the windward slopes of the mountains or highlands. This results in a wet season beginning in October, reaching a peak in winter, then gradually decreasing in the spring.

The elevation within the LRU varies from approximately 1,500 feet in the lower river valleys to over 7,000 feet in the higher terrain. The annual precipitation increases from 20 inches in the valleys to over 52 inches over the higher mountains. Winter season snowfall varies from 30 to 50 inches. Both rainfall and snowfall increase in the higher elevations. Snow can be expected after the first of November and to remain on the ground from the first of December until March or April.

In January, the average maximum temperature is near 31° F and the minimum temperature is 18° F. Minimum temperatures from -10° to -20°F are recorded almost every winter and temperatures ranging to -30° F have been recorded. In July, the average maximum temperature is 85° to 90° and the minimum temperature 45° to 50° F. Maximum temperatures reach 100° F on a few afternoons each summer and temperatures between 105° to 110° F have been recorded. Temperatures in the mountains decrease three to five degrees Fahrenheit with each 1,000 feet increase in elevation. The average date of the last freezing temperatures can be expected by mid-May and before mid-October in the warmer areas.
(Compiled from WRCC: Climate of Washington and available station data)

Frost-free period (days): Total range = 95 to 130 days
Central tendency = 110 to 120 days

Mean annual precipitation (cm): Total range = 355 to 1065 mm
(14 to 42 inches)
Central tendency = 555 to 760 mm
(22 to 30 inches)

MAAT (C): Total range = 4.8 to 9.3
(41 to 49 F)
Central tendency = 6.7 to 8.0
(44 to 46 F)

Climate Stations: CHEWELAH, CHEWELAH MTN LOOKOUT, Teepee Seed Orchard

Soil features

Representative Soil Features

This ecological site is associated with several soil soil series (e.g. Kegel, Mokins, Fan Lake, Dalkena, Wolfeson, Martella). The soil components can be grouped into: Fluvaquentic Haploxerolls, Andic Haploxeralfs, Vitrandic Haploxerepts, anmd Oxyaquic Vitrandic Haploxerepts. These soils have developed in thin or mixed Mazama tephra deposits over glaciolacustrine, outwash and alluvium from mixed sources. The soils are very deep and have adequate available water capacity to a depth of 1 m. The soils are mostly moderately well-drained.

Parent Materials:
Kind: Tephra (volcanic ash)
Origin: mixed
Kind: Till, Outwash
Origin: mixed
Kind: residuum and colluvium
Origin: Granite, Metasedimentary, other metamorphic rock

Surface Texture: (<2mm fraction)
(1) Ashy Silt Loam
(2) Ashy Loam
(3) Ashy Sandy Loam

Surface Fragments

Vegetation dynamics

Ecological Dynamics of the Site

This site is the warmest extent where grand fir can be an overstory component. As the temperature gradient gets warmer Douglas-fir and ponderosa pine habitat types occur. Above this temperature gradient (cooler) subalpine fir habitats exist. Relative to moisture this is the driest grand fir habitat type. As moister increases grand fir/herb, cedar, and cedar-hemlock habitat types occur. Fire disturbance is a major factor in mature stand development. Frequent fires create an open stand of western larch, ponderosa pine, and Douglas-fir with a mixed understory of shrubs, grass, and herbs. Mixed severity fires create a patchy forest overstory with shrubs and grass understory. Fire exclusion allows grand fir to establish and become an overstory component with Douglas-fir. Stands in this condition are subject to stand replacing fires. Root rot can become a problem in these older stands dominated by Douglas-fir and grand fir.
The moister end of this ES lies in Northern Idaho where grand fir is more prominent in stand composition and western larch can be a major stand component. As this ES extends westward grand fir is near its ecological limit and is a minor stand component. Douglas-fir and ponderosa pine are the major tree species. In this warmer environment this ESG looks very similar to the Douglas-fir/ninebark ESG.

Major Land Resource Area

MLRA 044A
Northern Rocky Mountain Valleys

Subclasses

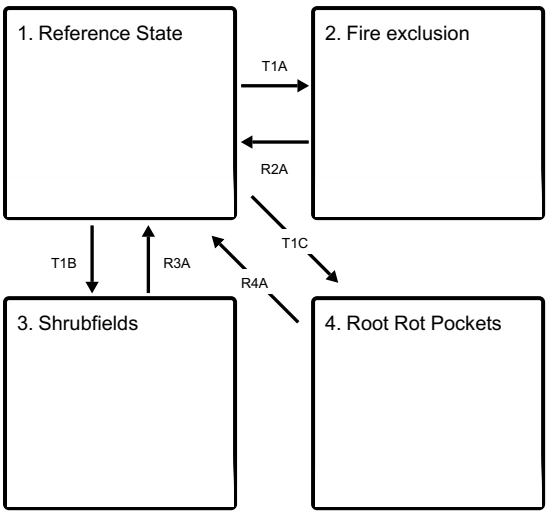
- F044AY503WA–Warm-Frigid, Moist- Xeric Loamy Foothills/Mountainsides, high water table (Grand Fir Warm Dry Shrub) Abies grandis - Pseudotsuga menziesii / Physocarpus malvaceus - Symphoricarpos albus

Stage

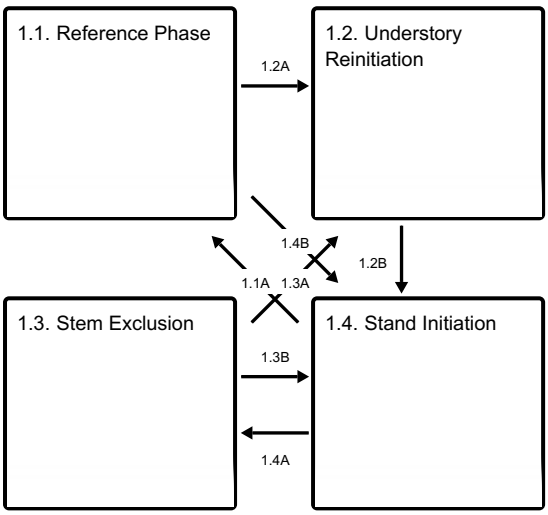
Provisional

State and transition model

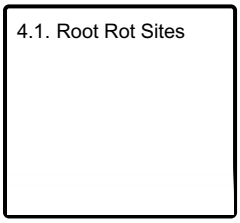
Ecosystem states



State 1 submodel, plant communities



State 4 submodel, plant communities



State 1
Reference State

Reference State – Open Stand Frequent ground fires every 10 – 20 years create an open stand of mature ponderosa pine, western larch, and some Douglas-fir. Understory is a mix of grass and shrubs. Most of the scattered regeneration is pine and larch with some Douglas-fir and grand fir. Most of the herb component is pine grass with scattered ninebark, oceanspray, and snowberry. With infrequent fire the mature stand becomes denser and Douglas-fir and grand fir regeneration increases. Fire exclusion for several years creates a multi-story Douglas-fir –grand fir stand with remnant pine and larch. Stands in this condition are more susceptible to stand replacing fires. Amillaria root rot mortality can increase in Douglas-fir and grand fir creating deciduous tree/shrub pockets. Severe fires can lead to shrub dominated areas for long time periods.

Dominant plant species

- Rocky Mountain Douglas-fir (*Pseudotsuga menziesii var. glauca*), tree
- ponderosa pine (*Pinus ponderosa*), tree

- western larch (*Larix occidentalis*), tree
- oceanspray (*Holodiscus discolor*), shrub
- mallow ninebark (*Physocarpus malvaceus*), shrub
- common snowberry (*Symphoricarpos albus*), shrub
- pinegrass (*Calamagrostis rubescens*), grass

Management interpretations

Critical values	Interpretations

Community 1.1
Reference Phase

This phase would be considered the historical plant community. Frequent low severity fires create an open stand of mostly large diameter 100+ year old ponderosa pine and western larch with some Douglas-fir. Tree regeneration is patchy consisting mainly of ponderosa pine, western larch with some Douglas-fir. Understory vegetation is a mix of shrubs, forbs and grasses

Dominant plant species

- ponderosa pine (*Pinus ponderosa*), tree
- western larch (*Larix occidentalis*), tree
- Rocky Mountain Douglas-fir (*Pseudotsuga menziesii var. glauca*), tree
- mallow ninebark (*Physocarpus malvaceus*), shrub
- oceanspray (*Holodiscus discolor*), shrub
- common snowberry (*Symphoricarpos albus*), shrub
- pinegrass (*Calamagrostis rubescens*), grass

Community 1.2
Understory Reinitiation

Mixed stand of mature ponderosa pine, western larch and Douglas-fir. Canopy gaps from tree mortality increase shrub understory. Douglas-fir and grand fir regeneration present. Bark beetle and root rot hazard increases. Snags and downed wood present. Ninebark, oceanspray, snowberry, and Douglas-maple key understory shrubs. Mixed severity fires and ground fires open up stand and create a patchy mosaic of openings for pine, larch, and Douglas-fir regeneration mixed with grass and shrubs.

Dominant plant species

- ponderosa pine (*Pinus ponderosa*), tree
- western larch (*Larix occidentalis*), tree
- Rocky Mountain Douglas-fir (*Pseudotsuga menziesii var. glauca*), tree
- mallow ninebark (*Physocarpus malvaceus*), shrub
- oceanspray (*Holodiscus discolor*), shrub
- common snowberry (*Symphoricarpos albus*), shrub
- Rocky Mountain maple (*Acer glabrum*), shrub

Community 1.3
Stem Exclusion

Dense pole stands of pine, larch, and Douglas-fir. Understory sparse. Stand competition make stands susceptible to bark beetle attack.

Community 1.4
Stand Initiation

Stand replacing fires create dense shrub fields mixed with grass. Tree regeneration dependent on good seed

source. Ponderosa pine and western larch usually most prominent regeneration. Douglas-fir regeneration sporadic. *Ceanothus velutinus*, snowbrush ceanothus, can dominate the site after fires and limit tree regeneration for 50+ years. Scouler willow and Douglas maple can also be prevalent along with pinegrass and elk sedge.

Dominant plant species

- ponderosa pine (*Pinus ponderosa*), tree
- western larch (*Larix occidentalis*), tree
- ceanothus (*Ceanothus*), shrub
- Scouler's willow (*Salix scouleriana*), shrub
- Rocky Mountain maple (*Acer glabrum*), shrub
- pinegrass (*Calamagrostis rubescens*), grass
- Geyer's sedge (*Carex geyeri*), grass

Pathway 1.2A
Community 1.1 to 1.2

Mixed severity and low ground fires open up stand.

Pathway 1.4B
Community 1.1 to 1.4

Fire at 10 – 15 year intervals keep stand in open condition.

Pathway 1.2B
Community 1.2 to 1.4

Stand replacing fire.

Pathway 1.3A
Community 1.3 to 1.2

Time. Stand grows to mature stage, canopy gaps occur from overstory mortality

Pathway 1.3B
Community 1.3 to 1.4

Stand replacing fire

Pathway 1.1A
Community 1.4 to 1.1

Stand replacing fire.

Pathway 1.4A
Community 1.4 to 1.3

Time. Seedlings/saplings grow to dense pole stage

State 2
Fire exclusion

This state develops with extended lack of fire and consists of all aged Douglas-fir and grand fir with scattered old ponderosa pine and western larch remnants. Tree canopy is multi-stored. Tree age ranges from 60-125+ years. Windthrow and root rot pockets create openings for shrub or tree regeneration. Many snags and down logs can be present. High fuel loads and ladder fuels create conditions for stand replacing fire.

Dominant plant species

- Rocky Mountain Douglas-fir (*Pseudotsuga menziesii var. glauca*), tree
- grand fir (*Abies grandis*), tree
- ponderosa pine (*Pinus ponderosa*), tree
- western larch (*Larix occidentalis*), tree
- mallow ninebark (*Physocarpus malvaceus*), shrub
- oceanspray (*Holodiscus discolor*), shrub

State 3
Shrubfields

Reoccurring severe fire damages soil surface and shrubs dominate site for extended time period. Tree regeneration is sporadic or nonexistent. Ceanothus species would be a key component in this state. Other shrub species would include snowberry, ninebark, oceanspray, Douglas-maple, and Scouler willow.

Dominant plant species

- ceanothus (*Ceanothus*), shrub
- common snowberry (*Symphoricarpos albus*), shrub
- mallow ninebark (*Physocarpus malvaceus*), shrub
- oceanspray (*Holodiscus discolor*), shrub
- Douglas maple (*Acer glabrum var. douglasii*), shrub
- Scouler's willow (*Salix scouleriana*), shrub

State 4
Root Rot Pockets

Community 4.1
Root Rot Sites

Armillaria root disease causes by the fungus Armillaria ostoyae along with other root diseases such as Laminated root rot (Phellinus weirii) and Annosum root disease (Heterobasidion annosum) kill the overstory Douglas-fir and grand fir creating brush fields of aspen, maple, willow, ninebark, and oceanspray. Sporadic conifer tree regeneration may occur with the susceptibility of the mortality due to root disease. Ponderosa pine and western larch are less susceptible with potential establishment and survival. It may take several years for a mature conifer overstory to dominate these areas depending on the root disease longevity.

Dominant plant species

- ponderosa pine (*Pinus ponderosa*), tree
- western larch (*Larix occidentalis*), tree
- quaking aspen (*Populus tremuloides*), tree
- Rocky Mountain maple (*Acer glabrum*), shrub
- Scouler's willow (*Salix scouleriana*), shrub
- mallow ninebark (*Physocarpus malvaceus*), shrub
- oceanspray (*Holodiscus discolor*), shrub

Transition T1A
State 1 to 2

Fire Exclusion

Transition T1B
State 1 to 3

Reoccurring severe fire with soil degradation keeping a shrubfield state

Transition T1C

State 1 to 4

Root rot pockets killing Douglas-fir and Grand fir creating a deciduous vegetation state

Restoration pathway R2A
State 2 to 1

Selective overstory removal with prescribed burning

Restoration pathway R3A
State 3 to 1

Tree planting with proper site selection

Restoration pathway R4A
State 4 to 1

Site preparation and tree planting with larch and/or ponderosa pine

Citations