Ecological site group EX043AESG03
Warm, Dry, Hill Slopes and Terraces (Ponderosa Pine Warm Dry Grass) Pinus ponderosa / Pseudoroegneria spicata , Pinus ponderosa / Festuca idahoensis Pinus ponderosa - Pseudotsuga menziesii / Pseudoroegneria spicata

Last updated: 03/19/2020
Accessed: 05/10/2025

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

Modal LRU: 43A03 - Columbia-Colville Valleys

This LRU is composed predominantly of low to mid-elevation slopes of hills, outwash terraces and escarpments. The soils tend to be loamy mollisols, entisols and inceptisols with mixed ash surfaces. Till, outwash and some residuum or colluvium from metamorphic rock are the dominant parent materials. Soil climate is mesic temperature regime and xeric moisture regime with average annual precipitation around 490 mm (19 inches).

Other LRU where occurring: 44A01 - Spokane-Rathdrum Outwash Plains
43A02 - Western Selkirk Highlands
43A01 - Okanogan Plateau

Ecological Site Group Concept:

The data below describes the physiographic, climatic and other parameters for the Ponderosa Pine/ Dry Grass ES group as a whole. This vegetation alliance is widespread so a Core Concept for each parameter is also described.

See Appendix A for a finer division of the alliance based on selected soil features.

This ecological site is distinguished by a ponderosa pine / grass community on dry slopes or benches. Bluebunch wheatgrass dominates the understory on the drier slopes and Idaho fescue will be more prevalent on the moister landscapes like level benches. Ponderosa pine is the only tree species, except at higher elevations Douglas-fir can creep in without fire and be a minor stand component. With reoccurring ground fires, the landscape is a pine – grass savanna with scattered pine and dominant bunchgrass cover. With fire exclusion, pine seedling cohorts can survive, and a patchy pine woodland develops.

Physiographic Features
This ecological site occurs mainly on forested glaciated mountain back slopes, shoulders and foot slopes. It is found between 1,025 feet and 3,940 feet in elevation on east to northwest aspects. Slopes generally range from 10 to 35 percent, but can be found on slopes up to 100 percent.

Landscapes: Mountains, Foothills, Valleys

Landform: Mountain slopes, Hill slopes, Outwash terraces, Escarpments
Elevation Total range: 315 – 1,200m
(1,025 to 3,940 feet)
Core Concept: 605-840m
(1,980 to 2,755 feet)
Slope (percent): Total range: 0-100
Core Concept: 10-35 Water Table Depth 60- >200 cm
(24 to >80 inches)
Most water tables where present are perched

Flooding: Frequency: None
Duration: None
Ponding:
Depth (inches): 0
Frequency: none Duration: None

Aspect: Range: 70-203-335
Core Concept: 175-203-273

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 1,000 feet in the lower river valleys to 3,500 feet over the Okanogan highlands. North-south ranges of mountains extending into southern British Columbia reach elevations of 4,000 to 5,000 feet within a few miles of the Okanogan River. The annual precipitation increases from 11 inches in the valley to 23 inches over some of the Plateau. Winter season snowfall varies from 30 to 70 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. The few snow survey reports available for elevation above 5,000 feet indicate six to eight feet of snow on the ground the first of April and four to five feet the first of May.

In January, the average maximum temperature is near 30° F and the minimum temperature is 15° F. Minimum temperatures from -10° to -20°F are recorded almost every winter and temperatures ranging from -25° to -42° F have been recorded in the colder valleys. 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 in the colder valleys by the first of September and before mid-October in the warmer areas.(from WRCC: Climate of Washington)
Mean Annual precipitation
Total Range: 245-755 mm
(10 to 30 inches)
Core Concept: 425-560 mm
(17 to 22 inches)

MAAT
Total Range 5.6-10.5 C
(42 to 51 F)
Core Concept: 7.4-8.6 C

(45 to 47 F)

Frost free period (days)
Total range: 95-145
Core Concept: 115-125

Climate Stations: CONCONULLY, , HUNTERS, INCHELIUM, JAY, MALOTT, MARBLE, MOUNT BONAPART, SULLIVAN LAKE NEAR, TONASKET, TONASKET (1), Midnite Mine, Wellpinit

Soil features

Representative Soil Features

This ecological site group is associated with several soil components. The soil components can be grouped into five soil great groups: Haploxerolls, Haploxerepts, Xeropsamments, Xerorthents, and Argixerolls. Soils in this ecologic site are very deep to moderately deep with available water holding capacities mostly equal to or greater than 6.7 cm (in 100cm). Most of these soils have developed in over till, outwash and residuum and colluvium from metamorphic rock that has some influence from Mazama tephra. The soils are mostly well-drained. Surface textures include ashy fine sandy loam, ashy silt loam, stony and/or ashy loam.

Soil series occuring in this ES group:

Bisbee, Boesel, Bong, Brincken, Dart, Dehart, Donavan, Dragoon, Garrison, Hesseltine, Hodgson, Hunters, Kartar, Koerling, Lacy, Maki, Malo, Marble, Marblespring, Muckamuck, Nez Perce, Northstar, Opportunity, Peka, Phoebe, Raisio, Reardan, Rufus, Scala, Seaboldt, Skanid, Spens, Springdale, Tekoa, Uhlig, Winthrop

Parent Materials:

Kind: Volcanic ash, Till, Outwash, Residuum, Colluvium, and small amounts of Glaciolacustrine material
Origin: Granite, Metasedimentary, other Metamorphic, Rhyolite and Quartzite

Surface Texture:
(1)Ashy Loam (2)Ashy Silt loam (3)Loamy Sand
(4)Stony Ashy Loam
(5)Ashy Fine Sandy Loam
(6)Gravelly Ashy Loam Subsurface Texture Groups: Loamy, Sandy Surface Fragments

Subsurface Texture Groups: Loamy, Sandy Surface Fragments

Vegetation dynamics

Ecological Dynamics of the Site

This reference site is located on very warm dry slopes with ponderosa pine the only tree species with an understory of mainly bluebunch wheatgrass, Idaho Fescue, and some needle and thread grass. Tree stocking is low with large open grown ponderosa pine and small amounts of sapling/pole size pine in understory. Frequent ground fires every 10-15 years kept pine regeneration low and perpetuated this condition with a dominant grass understory. With fire exclusion a mosaic of pine cohorts underneath the large pine survive and a patchy woodland develops. In addition, some woodland shrubs may establish, and an occasional Douglas-fir may be present. Stands in this altered state are subject to beetle kill and mistletoe infestation. Soils are mainly sandy loams or loamy sands. The main habitat types included in this ecological site are Ponderosa pine/bluebunch wheatgrass and Ponderosa pine/Idaho fescue. The bluebunch wheatgrass sites occur on the warmer drier slopes and the Idaho fescue sites occur on the lower slopes and more level terrain. Both habitat types have similar ecological processes as described above. The fescue sites will have more pine stand density due to a little more moisture and topographic position. Another habitat type this ecological site includes is Douglas-fir – Ponderosa pine/Bluebunch wheatgrass which will occur at higher elevations. The Douglas-fir will be subdominant to pine and woodland shrubs will be present.

Relationship to Other Established Classifications:

United States National Vegetation Classification (2008) – A3447 Ponderosa Pine / Herbaceous Understory Central Rocky Mt. Forest & Woodland Alliance

Washington Natural Heritage Program. Ecosystems of Washington State, A Guide to Identification, Rocchio and Crawford, 2015 – Northern Rocky Mountain Ponderosa Pine Woodland and Savanna

Description of Ecoregions of the United States, USFS PN # 1391, 1995 - M332 Middle Rocky Mt. Forest-Steppe-Coniferous Forest-Alpine Meadow Province

Level III and IV Ecoregions of WA, US EPA, June 2010 - 15r Okanogan – Colville Xeric Valleys & Foothills and 15s Spokane Valley Outwash Plains

This ecological site includes the following USDA Forest Service Plant Associations: PIPO/PSSP, PIPO/FEID, and PIPO-PSME/PSSP. (Williams et. al. 1995)

Major Land Resource Area

MLRA 043A
Northern Rocky Mountains

Subclasses

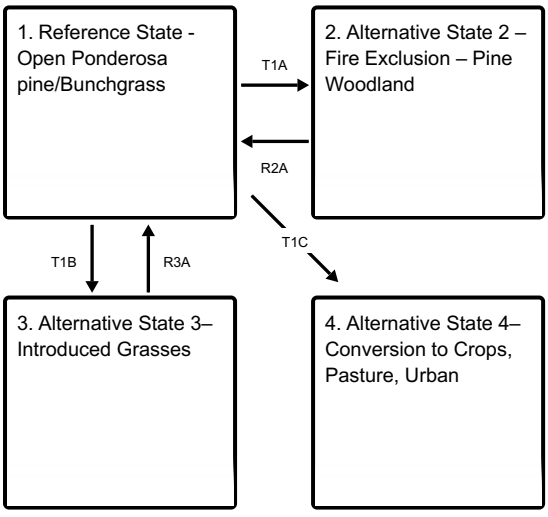
- F043AY509WA–Warm, Xeric, Sandy, Outwash Terraces and Plains (Ponderosa Pine/Dry Grass) Pinus ponderosa / Pseudoroegneria spicata , Pinus ponderosa / Festuca idahoensis
- F043AY510WA–Warm, Xeric, Loamy Hillsides, Low Available Water Capacity (Ponderosa Pine/Dry Grass) Pinus ponderosa / Pseudoroegneria spicata , Pinus ponderosa / Festuca idahoensis
- F043AY511WA–Warm, Xeric, Loamy Hillsides, Mixed ash surface (Ponderosa Pine/Dry Grass) Pinus ponderosa / Pseudoroegneria spicata, Pinus ponderosa / Festuca idahoensis
- F043AY512WA–Warm, Xeric, Loamy Mountainsides, ashy surface (Ponderosa Pine/Dry Grass) Pinus ponderosa / Pseudoroegneria spicata , Pinus ponderosa / Festuca idahoensis

Stage

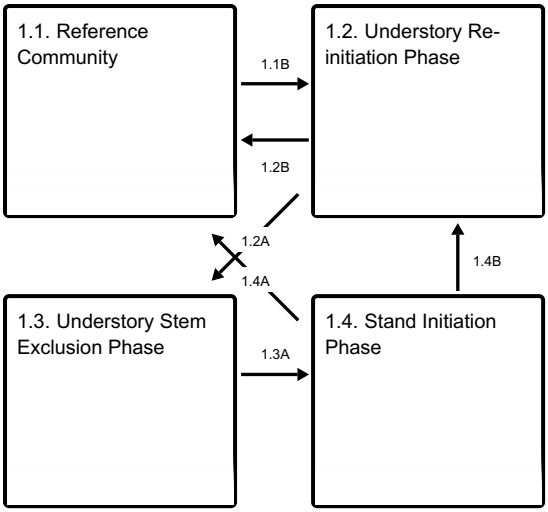
Provisional

State and transition model

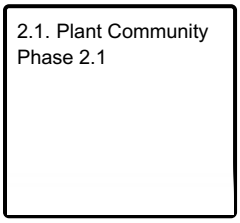
Ecosystem states



State 1 submodel, plant communities



State 2 submodel, plant communities



State 1
Reference State - Open Ponderosa pine/Bunchgrass

This state is dependent on the occurrence of frequent low intensity ground fires keeping an open grown pine stand with a dominant ground cover of bunchgrass. When fire intervals are infrequent pine regeneration can survive and a patchy pine woodland develops underneath the large old pine. With drought stress the large old pine can be subject to beetle kill and the understory pine stands subject to dwarf mistletoe infestation. It is also possible to have a stand replacement fire when stand density is increased and ladder fuels can reach the larger pine crowns. Forest productivity is measured using site index (SI) and culmination of annual increment (CMAI). Ponderosa pine is the key tree species and site indexes ranges greatly depending on local site characteristics. NRCS forest site index plots taken throughout MLRA 430 shows this variability. Site index ranges from 60 - 108. Average site index for this ecological site will be 80 - 85 feet using Meyers 100-year total age table. Using the average SI CMAI would be 75 cubic feet/acre/year at 40 years of age in a fully stocked stand. Forage production estimates from NRCS Range 5 Plots in Okanogan County in Ponderosa pine /bluebunch wheatgrass and PP/Idaho fescue sites are as follows based on overstory tree canopy. Forage production figures are in pounds/acre for all vegetation below 4.5 feet (grass, sedges, forbs, shrubs, tree regeneration): In addition, these Ppine/grass sites are adjacent to 12 – 15 inch loamy-sandy loam range sites composed of bluebunch wheatgrass and fescue in association with sagebrush and/or bitterbrush. Comparisons are made below in forage production. Overstory tree canopy – Forage production 0 – 20% - 600 to 1100 lbs/ac 60+% < 400 lbs/ac No tree canopy – 12 -15 inch range site 800 to 1200 lbs/ac The bulk of the grass production was bluebunch wheatgrass and Idaho fescue. Other grass species included needle and thread grass, prairie junegrass, rough fescue, pine grass and sandberg bluegrass. The most prominent forbs were lupine, basalmroot, pussytoes, hawkweed, and yarrow. The most prominent shrub was bitterbrush. Other shrubs included currant, snowbrush ceanothus, big sagebrush, rabbitbrush, and buckwheat. Tree regeneration included mostly ponderosa pine with an occasional Douglas-fir.

Community 1.1
Reference Community

Large open grown pine with bunchgrass understory. Pine canopy coverage may range from 10 – 30%. Understory dominated by bluebunch wheat grass on the drier sites and Idaho fescue on the moister sites. Other key understory species include arrowleaf basalmroot, western yarrow, buckwheat, and needle and thread grass.

Community 1.2
Understory Re-initiation Phase

Understory pine starts to establish. Bunchgrass cover reduced. Woodland shrubs and fir may establish at higher elevations.

Community 1.3
Understory Stem Exclusion Phase

Understory pine stands start to decline through competition. Snags and woody debris develop. Beetle kill possible. Stand susceptible to stand replacing fire with possible large old pine killed. Mixed severity fire will thin out understory pine stand, woodland shrubs and kill fir regeneration. Bunchgrass cover will increase.

Community 1.4
Stand Initiation Phase

Understory pine stand killed by fire, some larger overstory pine killed. Bunchgrass cover increased. Sporadic pine regeneration dependent on moisture, topographic position, and good seed crop years.

Pathway 1.1B
Community 1.1 to 1.2

Reference Community | Understory Re-initiation Phase

Time. Lack of fire allowing pine regeneration to survive in a patchy mosaic underneath overystory pine. Some woodland shrubs like snowberry, serviceberry, chokecherry and rose species may establish. Occasionally a Douglas-fir may establish in this condition. A mixed severity fire will thin out the understory pine stand and kill the shrubs and Douglas-fir.

Pathway 1.2B
Community 1.2 to 1.1

Understory Re-initiation Phase | Reference Community

Ground fires reoccur returning site to open pine/grass site

Pathway 1.2A
Community 1.2 to 1.3

Time, continued lack of fire allowing pine cohorts to form dense stands.

Pathway 1.3A
Community 1.3 to 1.4

Stand replacing fire, dense understory pine stands killed, some large overstory pine survive

Pathway 1.4A
Community 1.4 to 1.1

Stand Initiation Phase

Reference Community

Natural fire interval resumes, maintaining open pine stand with abundant bunchgrass.

Pathway 1.4B
Community 1.4 to 1.2

Stand Initiation Phase

Understory Re-initiation Phase

Lack of reoccurring fire causing increase in pine establishment.

State 2
Alternative State 2 – Fire Exclusion – Pine Woodland

Fire Exclusion for 50+ years leads to a light to medium dense pine woodland with all ages present. Canopy cover ranges from 30- 60%. Canopy cover will be higher in the pine/fescue habitat. Mixed severity fires will create a mosaic of pine stands between burned areas which will seed in with pine maintaining a multi-level pine woodland.

Community 2.1
Plant Community Phase 2.1

Reference phase depicted by multi-level pine stand with scattered old pine over all aged pine. Stand density light to medium in patchwork of pine cohorts of large old pine.

State 3
Alternative State 3– Introduced Grasses

Invasion of introduced perennial and annual cool season grasses from adjacent pastures, homesteads, and abandoned areas. One particular annual grass of concern from past overgrazing is the invasion of cheat grass. Once it gets established in the understory it will prevent native bunchgrasses from reestablishing and restoring site.

State 4
Alternative State 4– Conversion to Crops, Pasture, Urban

Lower level terrain converted to crops, pasture or urban development. Much of the ponderosa pine ESDs are

adjacent to local towns and cities. They have been converted to housing developments, shopping malls, or urban recreation areas. In the more rural areas, these sites have been converted to pastures and dry or irrigated cropland.

Transition T1A
State 1 to 2

The natural fire regime intervals changed to 50+ years allowing understory pine regeneration to survive and grow creating more of a woodland site. Older larger pine now more susceptible to mortality from stand replacing fire.

Transition T1B
State 1 to 3

Invasion of introduced perennial and annual grasses which outcompete native bunchgrasses

Transition T1C
State 1 to 4

Land converted to crop, pasture, or urban development

Restoration pathway R2A
State 2 to 1

Overstory thinning and understory burning for specified time intervals to return site to Reference State 1.

Restoration pathway R3A
State 3 to 1

Site preparation, native grass reseeding, weed control, grazing protection followed by prescribed burning after establishment to maintain site in reference plant community.

Citations

. 1998. NRCS National Forestry Manual.

. 2017. NRCS Soil and Site Index data for NE WA and N. Idaho.

. 1992, 1993 (Date accessed). NRCS Range 5 forage production summary plots.

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