

Ecological site F004AC015OR Aquic Forest

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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): 004A–Sitka Spruce Belt

This resource area is along the coast of the Pacific Ocean. It is characterized by a marine climate and coastal fog belt. The parent material is primarily glacial, marine, or alluvial sediment and some scattered areas of Tertiary sedimentary rock and organic deposits. Glacial deposits are dominant in the northern part of the MLRA in Washington; marine and alluvial deposits and eolian sand are dominant along the southern part of the Washington coast and extending into Oregon. The mean annual precipitation ranges from 52 to 60 inches near the beaches to more than 190 inches in the inland areas of the MLRA.

Andisols and Inceptisols are the dominant soil orders in the MLRA, but Spodosols, Entisols, and Histosols are also present. The soils are shallow to very deep and very poorly drained to somewhat excessively drained. They are on hilly marine terraces and drift plains; coastal uplands, hills, and foothills; flood plains; and coastal dunes, marshes, and estuaries.

The soil temperature regimes of MLRA 4A are moderated by the proximity to the Pacific Ocean, which eases the differences between the mean summer and winter temperatures. The seasonal differences in temperature are more pronounced in adjacent MLRAs further inland. Included in MLRA 4A are soils in cooler areas at higher elevations or on northerly aspects that have an isofrigid temperature regime.

The soil moisture regimes of MLRA 4A are typified by soils that do not have an extended dry period during normal years. Many of the soils further inland in MLRA 2 have a dry period in summer. Soils in low-lying areas and depressions of MLRA 4A are saturated in the rooting zone for extended periods due to a high water table or long or very long periods of flooding or ponding.

MLRA 4A Soil Temperature Regimes

Isomesic The mean annual soil temperature (measured at a depth of 20 inches) is 46 to 59 degrees F, and the difference between the mean winter and summer temperatures is less than 11 degrees. The seasonal soil temperatures and difference between the mean winter and summer temperatures are moderated by the proximity to the ocean and the effects of fog in summer.

Isofrigid The mean annual soil temperature (measured at a depth of 20 inches) is 32 degrees F to less than 46 degrees, and the difference between the mean winter and mean summer temperatures is less than 11 degrees. The seasonal soil temperatures and difference between the mean winter and summer temperatures are moderated by the proximity to the ocean and the effects of fog in summer. The temperatures are cooler than in surrounding lowlands because of the higher elevation and differences in slope and aspect.

MLRA 4A Soil Moisture Regimes

Udic The soil rooting zone is not dry in any part for more than 90 cumulative days in normal years. Soil moisture does not limit plant growth because of the fog in summer.

Aquic The soil is virtually free of dissolved oxygen due to saturation of the rooting zone. The soils are saturated for extended periods during the growing season and may be subject to long or very long periods of ponding and flooding.

Refer to Keys to Soil Taxonomy for complete definitions of the soil temperature and moisture regimes.

LRU notes

The Southern Sitka Spruce Belt land resource unit (LRU C) of MLRA 4A is along the west coast of Oregon. This LRU extends from the northern edge of South Slough to the Chetco River, and it is bounded on the west by the Pacific Ocean. The area consists of sand dunes, flood plains, and marine terraces that extend a few miles east and are parallel to the Pacific Ocean, and it transitions to steeper, higher elevation ridges and foothills of the western slopes of the Coast Range. The soils in the coastal lowland areas dominantly formed in eolian (wind-deposited) sand, alluvium, and marine sediment. The soils in the coastal foothills formed in residuum, colluvium, and landslide deposits derived from sedimentary and basaltic rock. Minor additions of recent alluvium are along the river valleys. Several major rivers that have headwaters in the coastal mountains carved steep, narrow valleys through the foothills before entering the broader coastal valleys. Subduction zones along the Pacific Coast may cause significant earthquakes and tsunamis, which would disrupt the ecological processes beyond what is described in this ecological site description.

Classification relationships

National vegetation classification: G256 North Pacific Maritime Swamp Forest; A356 Western hemlock-Sitka spruce/American skunkcabbage Swamp Forest Alliance

Ecological site concept

This ecological site is on the western coastline of the Pacific Northwest, from central to southern Oregon. It is at low elevations (less than 1,500 feet) that receive abundant precipitation and persistent fog in summer. It consists of forested wetlands in depressions, on marine terraces and relatively flat earthflows, and in seeps of mountain slopes that have a seasonal high water table. The site is strongly influenced by physiography and hydrology, which provide rare and unique habitats along the coast of the Pacific Ocean.

The maritime climate is characterized by cool, moist summers and cool, wet winters. The mean annual precipitation is 55 to 130 inches. Coastal fog provides supplemental moisture in summer. Snowfall is rare, and it does not persist when it occurs. The mean annual air temperature is 50 to 55 degrees F.

The soils that support this ecological site are in the isomesic soil temperature regime and aquic soil moisture regime. This site typically is subject to residual ponding or a seasonal high water table. The water table commonly is at or near the surface much of the growing season, and the rate of organic decomposition is slow due to anaerobic conditions. The seasonal high water table and ponding dynamics may be altered by artificial drainage of the site or adjacent areas. A thin organic horizon consisting of decomposing twigs, needles, and litter is on the surface, which helps to protect the soils from wind and water erosion.

The most common overstory species are western hemlock (*Tsuga heterophylla*), Sitka spruce (*Picea sitchensis*), Port Orford cedar (*Chamaecyparis lawsoniana*), western redcedar (*Thuja plicata*), and shore pine (*Pinus contorta* var. *contorta*). As a result of soil saturation during much of the year, conifers may be restricted to nurse logs or higher microsites and they commonly are short and stunted (Roccio, 2015). Shrubs may be sparse or entirely absent in some areas. Shrubs may include evergreen huckleberry (*Vaccinium ovatum*) and salal (*Gaultheria shallon*). The herb layer commonly is dominantly American skunkcabbage (*Lysichiton americanus*).

The most common natural disturbance is ponding. The volume and longevity of the ponding determine the effect on the dynamics of the forest. The site is vulnerable to windthrow following large coastal storms. Trees in this site are particularly susceptible to windthrow due to the shallow rooting depth in response to the seasonal high water table and long periods of ponding that extend into the growing season. Fallen trees that have exposed root systems and large woody debris are common. The fallen trees result in more canopy openings. The openings allow more sunlight to reach the forest floor, which leads to a shrubby understory. Logging and agricultural disturbances in adjacent areas may alter the hydrology and increase the susceptibility to infestation by invasive species.

Table 1. Dominant plant species

| | |
|------------|--|
| Tree | (1) <i>Tsuga heterophylla</i> (2) <i>Picea sitchensis</i> |
| Shrub | Not specified |
| Herbaceous | (1) <i>Lysichiton americanus</i> |

Physiographic features

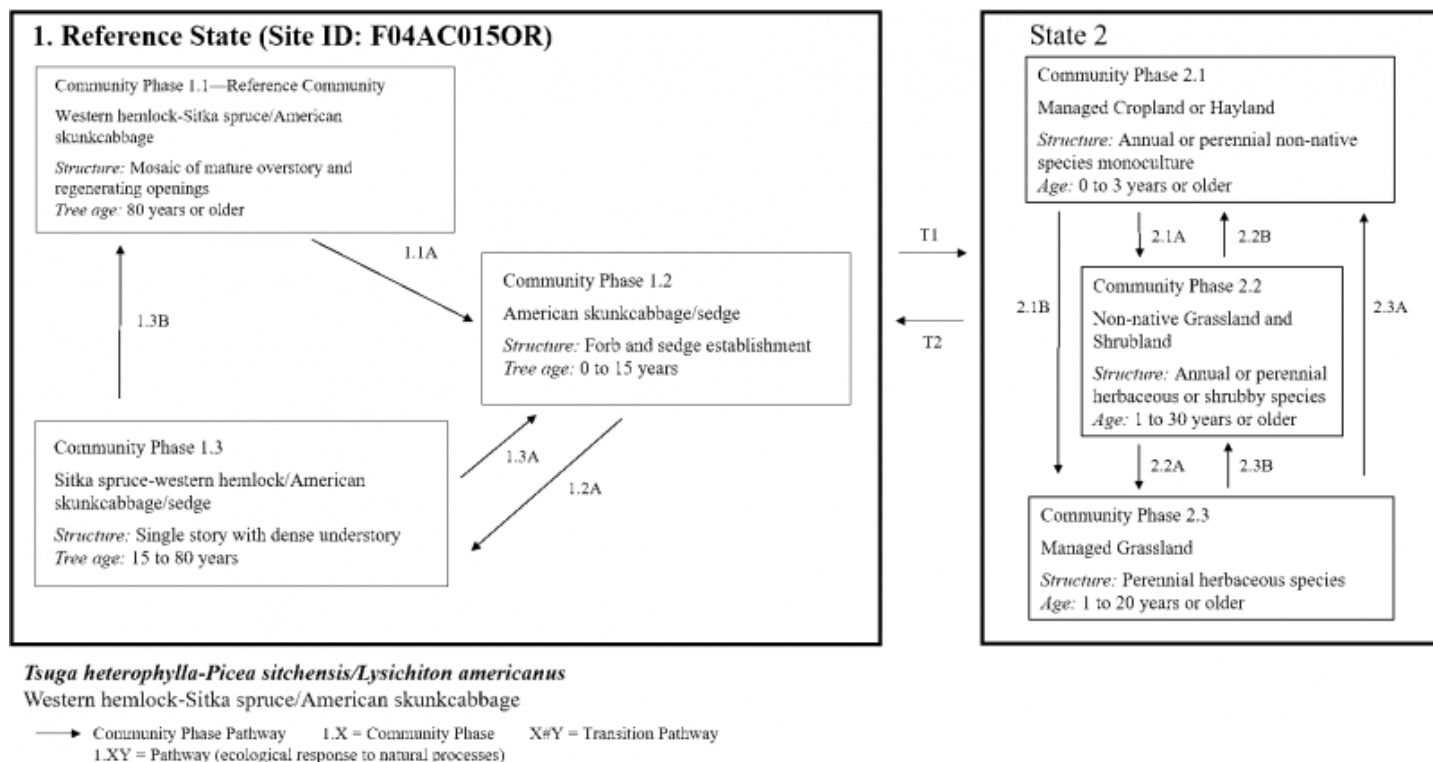
Climatic features

Influencing water features

Soil features

Ecological dynamics

State and transition model



State 1

Reference

Community 1.1

Western Hemlock, Sitka Spruce, and American Skunkcabbage

Structure: Mosaic of mature overstory and regenerating openings The reference community represents a lack of major disturbance from windthrow or ponding for at least 80 years, which allows the pioneering species to form a mature canopy. Western hemlock and Sitka spruce are the dominant overstory species. Western redcedar, Port Orford cedar, and shore pine may be present, but they are limited to drier microsites such as nurse logs and mounds. Red alder (*Alnus rubra*) may be in some areas, but the site commonly consists dominantly of conifers. The overstory canopy closure is 50 to 70 percent, and the understory is patchy (Christy, 2005). Shrubs commonly are restricted to nurse logs, stumps, and higher microsites. Understory species include salal, American skunkcabbage, evergreen huckleberry (*Vaccinium ovatum*), California wax myrtle (*Morella californica*), Cascade azalea (*Rhododendron albiflorum*), swordfern (*Polystichum munitum*), deer fern (*Blechnum spicant*), threeleaf foamflower (*Tiarella trifoliata*), and sedges. Common disturbances include small gap dynamics (1/2-acre openings or smaller) following windstorms and excessive ponding.

Community 1.2

American Skunkcabbage and Sedge

Structure: Forb and sedge establishment Community phase 1.2 represents a forest that is undergoing regeneration or stand initiation immediately following excessive ponding or windthrow. Scattered remnant mature trees and shrubs may be in some areas, and woody debris is abundant. Loss of the overstory and the fallen trees may impact the hydrology by resulting in more frequent, longer periods of ponding. Successful regeneration is dependent on the local seed source, an adequate seedbed, and sufficient light and water (Nierenberg, 2000). Rapid recolonization is limited to plants that are well adapted to saturated soil conditions much of the year. American skunkcabbage and sedges will begin to re-establish during this phase.

Community 1.3

Sitka Spruce, Western Hemlock, American Skunkcabbage, and Sedge



Structure: Single story with dense understory Community phase 1.3 is an early seral forest in regeneration. Scattered remnant mature trees may be present. Sitka spruce and western hemlock will begin to establish a canopy. Shrubs are sparse, but species such as salal and evergreen huckleberry become established on fallen trees and in higher microsites. Understory species may include deer fern, American skunkcabbage, and sedges.

Pathway 1.1A

Community 1.1 to 1.2

This pathway represents excessive ponding that results in a shallow rooting zone. The trees are susceptible to windthrow, which may create pockets of fallen trees larger than 1 acre in size. Catastrophic windstorms may be stand replacing.

Pathway 1.2A

Community 1.2 to 1.3

This pathway represents growth over time with no further major disturbance.

Pathway 1.3B

Community 1.3 to 1.1

This pathway represents no further major disturbance. Continued growth over time and ongoing mortality lead to increased vertical diversification. The community begins to resemble the structure of the reference community, including small pockets of regeneration (both deciduous and coniferous) and a more diversified understory.

Pathway 1.3A Community 1.3 to 1.2

This pathway represents excessive ponding that results in a shallow rooting zone. The trees are susceptible to windthrow, which may create pockets of fallen trees larger than 1 acre in size. Catastrophic windstorms may be stand replacing.

State 2 Converted

Community 2.1 Managed Cropland or Hayland

Structure: Annual or perennial non-native species monoculture Community phase 2.1 may consist of a range of crops, including annually planted species, short-lived perennial species, and more permanent shrubby plants. Hay and grasses and legumes for silage are included in this community phase.

Community 2.2 Non-Native Grassland and Shrubland

Structure: Annual or perennial herbaceous or shrubby species Community phase 2.2 is characterized by low-level agronomic or management activity such as adding soil nutrients, intensive grazing management, regular mowing, or weed control. This plant community commonly consists dominantly of introduced weedy species. Areas that have extremely low fertility or are subject to heavy grazing pressure have a higher proportion of annual, stoloniferous, or rhizomatous species. Wetland areas commonly support dominantly non-native rhizomatous grasses. The plant community may include remnants of introduced pasture species that commonly are seeded.

Community 2.3 Managed Grassland

Structure: Perennial herbaceous species Community phase 2.3 receives regular agronomic inputs, including adding soil nutrients and other soil amendments such as lime, implementing grazing management plans, regular mowing, controlling weeds, and reseeding as needed. This plant community typically includes introduced perennial pasture and hay species that commonly are seeded. In areas of historic native grassland, mixtures of perennial and annual native species may be seeded and managed by appropriate agronomic and livestock management activities. Minor amounts of introduced species that commonly are in non-native grassland and shrubland communities (community phase 2.2) are in this phase.

Pathway 2.1A Community 2.1 to 2.2

In the absence of agronomic and livestock management activities, seeds from surrounding weedy plant communities will be transported to the site by wind, floodwater, animals, or vehicle traffic. Adapted species will become established. Management activities include tilling, adding soil nutrients and other soil amendments such as lime, mowing, burning, harvesting or chemically controlling vegetation, planting to desirable herbaceous species, and implementing grazing management plans.

Pathway 2.1B Community 2.1 to 2.3

This pathway represents agronomic and livestock management activities, including tilling, adding soil nutrients and

other soil amendments such as lime, mowing, burning, harvesting or chemically controlling vegetation, planting to desirable herbaceous species, and implementing grazing management plans.

Pathway 2.2B **Community 2.2 to 2.1**

This pathway represents agronomic activities such as tilling, adding soil nutrients and other soil amendments such as lime, mowing, burning, harvesting or chemically controlling vegetation, and planting to desirable crop species.

Pathway 2.2A **Community 2.2 to 2.3**

This pathway represents agronomic and livestock management activities, including tilling, adding soil nutrients and other soil amendments such as lime, mowing, burning, harvesting or chemically controlling vegetation, planting to desirable herbaceous species, and implementing grazing management plans.

Pathway 2.3A **Community 2.3 to 2.1**

This pathway represents agronomic activities, including tilling, adding soil nutrients and other soil amendments such as lime, mowing, burning, harvesting or chemically controlling vegetation, and planting to desirable crop species.

Pathway 2.3B **Community 2.3 to 2.2**

In the absence of agronomic and livestock management activities, seeds from surrounding weedy plant communities will be transported to the area by wind, floodwater, animals, or vehicle traffic. Adapted species will become established. Management activities include tilling, adding soil nutrients and other soil amendments such as lime, mowing, burning, harvesting or chemically controlling vegetation, planting to desirable herbaceous species, and implementing grazing management plans.

Transition T1A **State 1 to 2**

This pathway represents a change in land use. Land management includes modifications to the hydrologic function to develop pasture and agriculture. Non-native seed disbursement is introduced (intentionally or unintentionally), which alters the reference community.

Transition T2A **State 2 to 1**

This pathway represents restoration of the natural hydrologic function and native plant habitat. Native seed sources and extensive management and mitigation of brush and invasive species are needed to restore the community.

Additional community tables

Other references

- Boss, T. 1982. Vegetation ecology and net primary productivity of selected freshwater wetlands in Oregon. Oregon State University Press, Corvallis, Oregon.
- Christy, J., J. Kagan, and A. Wiedemann. 1998. Plant associations of the Oregon Dunes National Recreation Area. U.S. Department of Agriculture, Forest Service, Pacific Northwest Region Technical Paper R6-NR-ECOL-TP-09-98.
- Christy, J. 2004. Native freshwater wetland plant associations of northwestern Oregon. Oregon Natural Heritage Information Center, Portland, Oregon.
- Christy, J. 2005. Sphagnum fens on the Oregon Coast: Diminishing habitat and need for management. Oregon Natural Heritage Information Center, Portland, Oregon.
- Dwire, K., and J. and Kauffman. 2003. Fire and riparian ecosystems in landscapes in the western United States.

Forest Ecology and Management. Volume 178, pages 61-74.

Franklin, J.F., and C.T. Dyrness. 1973. Natural vegetation of Oregon and Washington. Oregon State University Press, Corvallis, OR.

Goheen, E.M. and E.A. Willhite. 2006. Field guide to common diseases and insect pests of Oregon and Washington conifers. U.S. Department of Agriculture, Forest Service, Pacific Northwest Region, Series R6-NR-FID-PR-01-06.

Griffith, R.S. 1992. *Picea sitchensis*. In Fire Effects Information System. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory.

Kunze, L.M. 1994. Preliminary classification of native, low elevation, wetland vegetation in western Washington. Washington State Department of Natural Resources, Natural Heritage Program. Olympia, WA.

Minore, D. 1990. *Thuja plicata*. In Silvics of North America. U.S. Department of Agriculture, Forest Service, Northeastern Area.

Packee, E.C. 1990. *Tsuga heterophylla*. In Silvics of North America. U.S. Department of Agriculture, Forest Service, Northeastern Area.

Peterson, E.B., N.M. Peterson, G.F. Weetman, and P.J. Martin. 1997. Ecology and management of Sitka spruce: Emphasizing its natural range in British Columbia. University of British Columbia Press, Vancouver, British Columbia.

Pojar, J., and A. MacKinnon. 1994. Plants of the Pacific Northwest coast. Lone Pine Publishing, Vancouver, British Columbia.

PRISM Climate Group. Oregon State University. <http://prism.oregonstate.edu>. Accessed February 2015.

Roccio, J., and R. Crawford. 2015. Ecological systems of Washington State. A guide to identification. Washington Department of Natural Resources, Natural Heritage Report 2015-04.

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service. U.S. Department of Agriculture Handbook 436.

Soil Survey Staff. 2014. Keys to soil taxonomy. 12th edition. U.S. Department of Agriculture, Natural Resources Conservation Service.

Taylor, A. 1990. Disturbance and persistence of Sitka spruce (*Picea sitchensis*) in coastal forests of the Pacific Northwest, North America. *Journal of Biogeography*. Volume 17, number 1, pages 47-58.

United States National Vegetation Classification. 2016. United States national vegetation classification database, V2.0. Federal Geographic Data Committee, Vegetation Subcommittee, Washington, D.C. Accessed November 28, 2016.

Washington Department of Natural Resources, Natural Heritage Program. 2015. Ecological systems of Washington State. A Guide to Identification.

Approval

Kirt Walstad, 1/23/2025

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 | 05/07/2024 |
| 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:**

17. **Perennial plant reproductive capability:**
