Ecological site F004AC013OR
Aquic Flood Plain 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 Vancouverian North Pacific Maritime Swamp Group; A3756 Swamp Forest Alliance
Plant associations of the Oregon Dunes National Recreation Area: Sitka Spruce Saturated Forest Alliance; Red Alder Saturated 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. The site is in depressions, oxbows, and backswamps of flood plains that are subject to ponding and flooding. Ponding typically occurs in October through May. Flooding occurs dominantly in November through April, but it may occur throughout the year in some areas near active rivers or stream channels.
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. The mean annual air temperature is 50 to 55 degrees F. The mild temperatures and long growing season result in highly productive forestland.
The soils that support this ecological site are in the isomesic soil temperature regime and aquic soil moisture regime. These mineral soils have a seasonal high water table and are poorly drained. They typically are very deep and formed in fine or fine-silty alluvium. These soils are dominantly Entisols or weakly developed Inceptisols due to their young age and periodic deposition of new alluvium from flooding. The seasonal high water table and ponding dynamics may be altered by artificial drainage of the site or adjacent areas.
The most common overstory species are Sitka spruce (Picea sitchensis) and red alder (Alnus rubra). Other tree species such as western hemlock (Tsuga heterophylla) and Port Orford cedar (Chamaecyparis lawsoniana) may be present, but they may be restricted to nurse logs or higher microsites. The canopy cover commonly is less than 50 percent, which provides for robust understory due to the abundant sunlight. Common understory species include twinberry (Lonicera involucrata), American skunkcabbage (Lysichiton americanus), salmonberry (Rubus spectabilis), common ladyfern (Athyrium filix-femina), and slough sedge (Carex obnupta). This ecological site closely resembles the Aquic Flood Plain Forest (F04AB007OR) site in LRU B; but the productivity of this site is higher because of the warmer, longer growing season.
The most common natural disturbances are ponding and flooding. The volume and longevity of the disturbance determine the effect on the dynamics of the forest. Minor flooding and ponding events may affect the understory through minor scouring and sediment deposition but leave the overstory essentially intact. The trees are particularly susceptible to windthrow following large coastal storms 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. As the interval between disturbances extends, the overstory becomes more diverse due to conifer establishment. Logging activities in adjacent uplands may alter the hydrology of those areas, which may increase susceptibility to infestation by invasive species. In the absence of disturbance, it is expected that maturation and succession will result in an old-growth conifer forest.

Table 1. Dominant plant species

Tree	(1) *Picea sitchensis* (2) *Alnus rubra*

Shrub	(1) *Rubus spectabilis*
Herbaceous	(1) *Lysichiton americanus*

Physiographic features

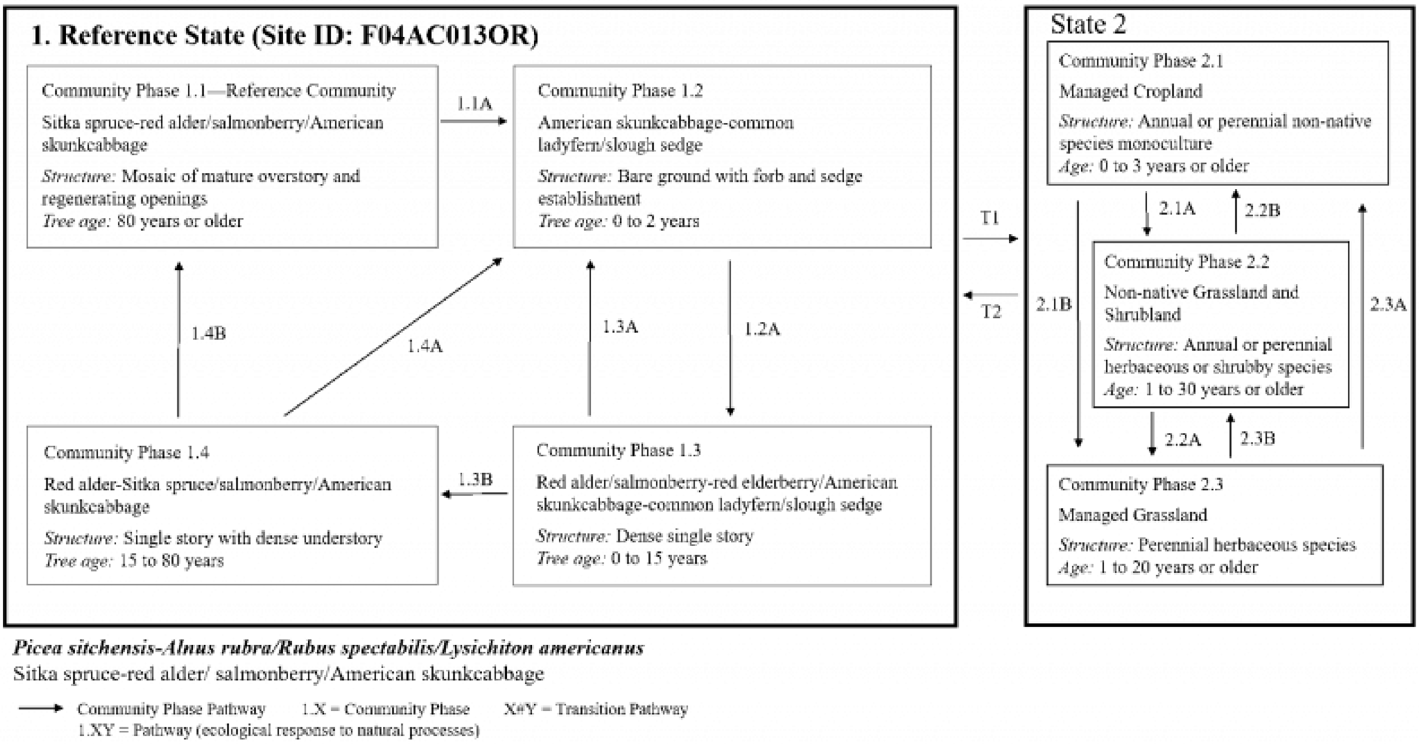
Climatic features

Influencing water features

Soil features

Ecological dynamics

State and transition model



State 1
Reference

Community 1.1
Sitka Spruce, Red Alder, Salmonberry, and American Skunkcabbage

Structure: Mosaic of mature overstory and regenerating openings Sitka spruce is the dominant overstory species in the reference community. Western hemlock and Port Orford cedar are in old-growth stands, but they are limited to drier microsites such as nurse logs and mounds. Red alder remains a major component in most mature stands, but it will start to actively decline after 40 to 70 years. Frequent small-scale disturbances will support alder regeneration in pockets where sunlight is abundant (Balian, 2005). The reference community represents a lack of major disturbance for at least 75 years, which allows the pioneering species to form a mature canopy. The overstory canopy closure typically is less than 50 percent, which results in a very dense, productive understory. The lack of disturbance and sparse canopy cover promote the growth of shrubs and forbs. Species common in wet depressions include American skunkcabbage, common ladyfern, water parsley (*Oenanthe sarmentosa*), and slough sedge. Species prevalent on hummocks and in other drier microsites include Douglas spirea (*Spiraea douglasii*), cascara (*Frangula purshiana*), Oregon crabapple (*Malus fusca*), salal (*Gaultheria shallon*), evergreen huckleberry (*Vaccinium ovatum*), California wax myrtle (*Morella californica*), red elderberry (*Sambucus racemosa*), and salmonberry. Common disturbances include small gap dynamics (1/2-acre openings or smaller) following windstorms or minor scouring from flooding. The death of one or two trees creates gaps for sunlight to reach the understory, which promotes the growth of forbs and shrubs and regeneration of overstory species, primarily red alder. Soil deposition following periods of ponding or minor scouring from flooding temporarily affects the understory community, but it does not alter the composition of the overstory.

Community 1.2
American Skunkcabbage, Common Ladyfern, and Slough Sedge

Structure: Bare ground with forb and sedge establishment Community phase 1.2 represents a forest that is undergoing regeneration or stand initiation immediately following flooding 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 for much of the year. American skunkcabbage, common ladyfern, slough sedge, and water parsley will begin to re-establish during this phase.

Community 1.3
Red Alder, Salmonberry, Red Elderberry, American Skunkcabbage, Common Ladyfern, and Slough Sedge

Structure: Dense single story Community phase 1.3 is an early seral forest in regeneration. Scattered remnant mature trees may be present. Red alder is dominant in the overstory because it has several competition advantages. It fixes nitrogen in soils, which provides an early competitive advantage (Villarin, 2009). Red alder can establish quickly as compared to conifers. Seeds of deciduous species are light and can be transported long distances by wind and water, allowing for rapid recolonization. An understory of salmonberry and red elderberry establishes in this phase.

Community 1.4
Red Alder, Sitka Spruce, Salmonberry, and American Skunkcabbage

Structure: Single story with dense understory Community phase 1.4 is a forest in the competitive exclusion stage. Scattered remnant mature trees may be present. Sitka spruce and red alder are dominant in the overstory. Red alder will begin to die 40 to 70 years following disturbance and more light will penetrate the newly nitrogen-rich soil (Naiman, 2009). As a result of several dynamics, conifer regeneration becomes more prevalent in this community phase. Other overstory species may include Port Orford cedar and western hemlock, which typically establish on mounds or downed woody debris. Seedlings of Sitka spruce will begin to establish sporadically, especially in areas that have more shade. They may establish within 4 years of hardwood establishment (Stolnack, 2010). Understory species such as salmonberry, evergreen huckleberry, salal, American skunkcabbage, and common ladyfern flourish under the open canopy. If red alder regeneration is present, it is inferred that frequent minor flooding or windthrow has influenced the site dynamics (Nierenberg, 2000).

Pathway 1.1A
Community 1.1 to 1.2

Sitka Spruce, Red Alder, Salmonberry, and American Skunkcabbage

American Skunkcabbage, Common Ladyfern, and Slough Sedge

This pathway represents a major 100- or 500-year flood, catastrophic windstorm, or high-intensity, stand-replacing wildfire. Major floods scour and alter the adjacent stream channel, remove understory and overstory vegetation, and may alter the streamflow and subsurface flow. This type of disturbance may completely reconfigure sediment loads and dramatically reduce or eliminate the forest overstory. Catastrophic windstorms may be stand replacing.

Pathway 1.2A
Community 1.2 to 1.3

American Skunkcabbage, Common Ladyfern, and Slough Sedge

Red Alder, Salmonberry, Red Elderberry, American Skunkcabbage, Common Ladyfern, and Slough Sedge

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

Pathway 1.3A
Community 1.3 to 1.2

Red Alder, Salmonberry, Red Elderberry, American Skunkcabbage, Common Ladyfern, and Slough Sedge

American Skunkcabbage, Common Ladyfern, and Slough Sedge

This pathway represents a major 100- or 500-year flood or catastrophic windstorm. Major floods scour and alter the adjacent stream channel, remove understory and overstory vegetation, and may alter the streamflow and subsurface flow. This type of disturbance may completely reconfigure sediment loads and dramatically reduce or eliminate the forest overstory. Catastrophic windstorms may be stand replacing.

Pathway 1.3B
Community 1.3 to 1.4

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

Pathway 1.4B
Community 1.4 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 1.4A
Community 1.4 to 1.2

This pathway represents a major 100- or 500-year flood or catastrophic windstorm. Major floods scour and alter the adjacent stream channel, remove understory and overstory vegetation, and may alter the streamflow and subsurface flow. This type of disturbance may completely reconfigure sediment loads and dramatically reduce or eliminate the forest overstory. 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 species. 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 or 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 shrub 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

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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:**