USDA Natural Resources Conservation Service

Ecological site F004AB407OR
Coastal Headland

Last updated: 1/23/2025
Accessed: 05/11/2025

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 Central Sitka Spruce Belt land resource unit (LRU B) of MLRA 4A is along the west coast of Washington and Oregon. The LRU extends from the Chehalis River in Washington to South Slough in Oregon, and it is bounded on the west by the Pacific Ocean. This 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 and higher elevation ridges and mountainsides of the western slopes of the Coast Range in Oregon. Near the shore in coastal lowland areas, the parent material is dominantly eolian (wind-deposited) sand, alluvium, and marine sediment. Residuum, colluvium, and landslide deposits derived from sedimentary and basaltic sources are on the coastal foothills and mountains, and minor additions of recent alluvium are along the river valleys. Several major rivers carved steep, narrow valleys through the coastal mountains and foothills before entering 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: G488 Southern Vancouverian Shrub & Herbaceous Bald, Bluff & Prairie Group; CEGL000972 Gaultheria shallon-*Vaccinium ovatum*/*Pteridium aquilinum* Shrubland Association
Ecological Systems of Washington State community type: North Pacific Hypermaritime Shrub and Herbaceous Headland

Ecological site concept

This ecological site is on the western coastline of the Pacific Northwest, from southern Washington through central Oregon. The site includes coastal headlands on plains, hills, and marine terraces along the coast of the Pacific Ocean. It commonly is on south or southwesterly aspects of very steep slopes. The site is exposed to extremely high winds and salt spray.
The maritime climate is characterized by cool, moist summers and cool, wet winters. The mean annual precipitation is 70 to 105 inches. Coastal fog provides supplemental moisture in summer. Snowfall is rare, and it is not persistent when it occurs. The mean annual air temperature is 48 to 52 degrees F.
The soils that support this ecological site generally formed in colluvium and residuum derived dominantly from volcanic, basaltic, or metasedimentary rock. Areas of soils that are shallow to bedrock or are skeletal and have a high content of rock fragments and areas of rock outcroppings are on the steeper slopes. These areas can be significant locally.
The soil parent material along the coast is exposed to a heightened weathering regime due to moderated temperatures and high precipitation. Enhanced weathering and organic matter from the dense vegetative cover has resulted in an accumulation of a particular suite of organic and metal oxide compounds, a process called andisolization. The level of andisolization varies within this ecological site, but Andisols and andic intergrades have been identified. A unique set of soil properties has developed as a result of andisolization, including an improved water-holding capacity, a high content of organic matter, and high phosphorous retention. This process is most typical in soils that formed in weathered volcanic ash, but a unique combination of climatic conditions and vegetation has resulted in these soil properties in coastal areas of the Pacific Northwest.
The vegetation is dominantly trees, shrubs, and forbs that are well adapted to wind pruning, salt spray, low nutrient availability, and wind desiccation. The most common tree species include stunted and dwarfed krummholz Sitka spruce (Picea sitchensis) and shore pine (Pinus contorta var. contorta). The dominant shrubs commonly are salal (Gaultheria shallon) and salmonberry (Rubus spectabilis). Forbs and grasses are less prevalent in mature stands, but they may include Canada goldenrod (*Solidago canadensis*), western brackenfern (*Pteridium aquilinum*), and Pacific reedgrass (*Calamagrostis nutkaensis*).
The most common disturbance on this site is windthrow following large coastal storms, which creates pockets of forest openings. Landslides may occur along the steep coastal hillslopes. Wildfire is uncommon on this site, but it will limit the establishment and encroachment of conifer trees and maintain a coastal prairie community. Unnatural disturbances include grazing, urban sprawl, and establishment of non-native species.

Table 1. Dominant plant species

Tree	(1) *Picea sitchensis* (2) *Pinus contorta var. contorta*

Shrub	(1) *Gaultheria shallon* (2) *Rubus spectabilis*
Herbaceous	(1) *Pteridium aquilinum* (2) *Calamagrostis nutkaensis*

Physiographic features

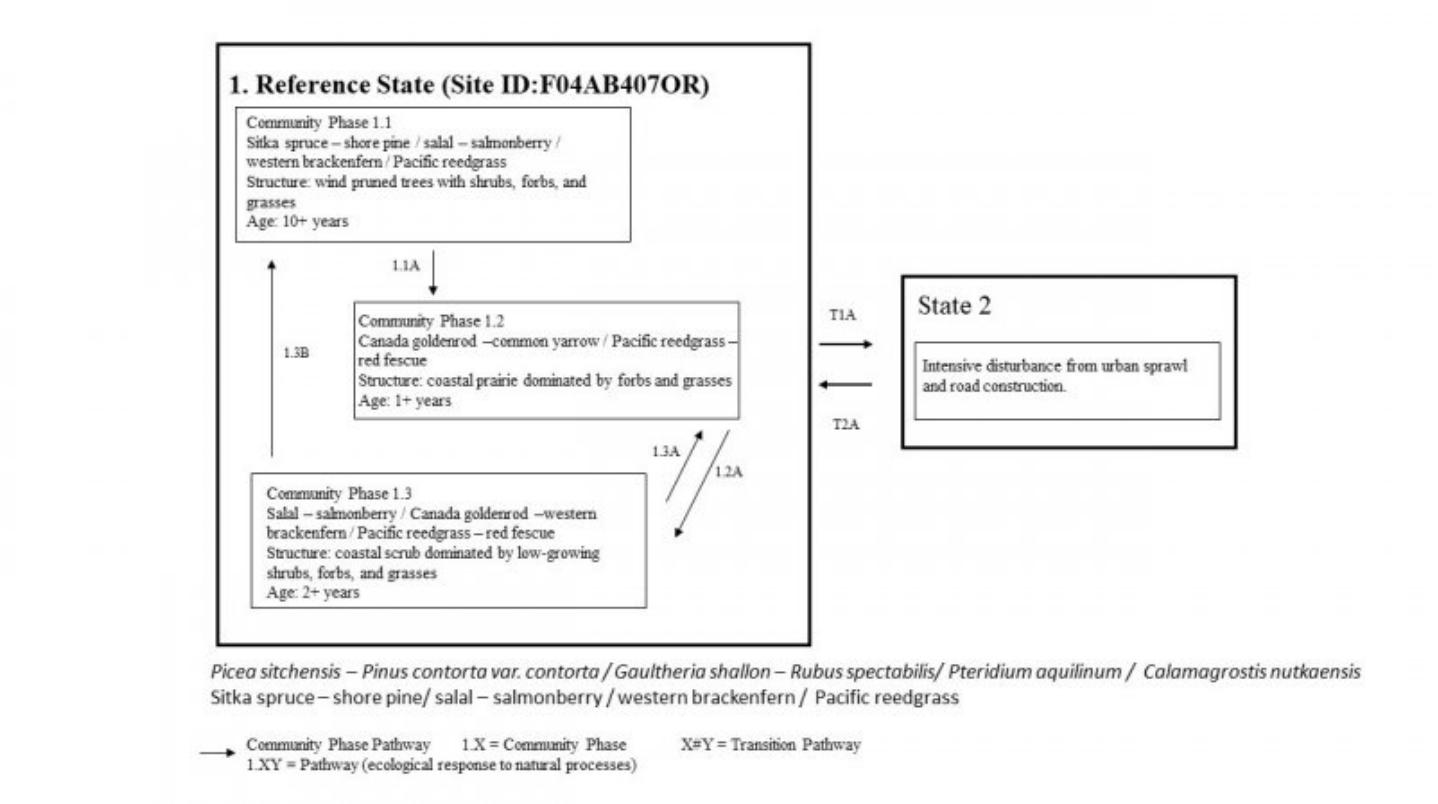
Climatic features

Influencing water features

Soil features

Ecological dynamics

State and transition model



State 1
Reference

Community 1.1
Sitka Spruce, Shore Pine, Salal, Salmonberry, Western Brackenfern, and Pacific Reedgrass

Structure: Wind-pruned trees with shrubs, forbs, and grasses The reference community is a mature coastal forest and scrub landscape. Krummholz conifers that have been sculpted and pruned by wind commonly are dominant. A mosaic of shrubs, forbs, and grasses may be present, but it depends on the density of the trees and the depth to bedrock. Areas vary in size and maturity depending on the position on the landscape, prevailing wind, and slope. The vegetation is tolerant of routine inputs of salt spray and drought in summer. This community represents a lack of major disturbance and unnatural modifications. The vegetative cover may fluctuate from sparse to full. The dominant conifers are Sitka spruce and shore pine, but western hemlock (*Tsuga heterophylla*) may be in areas less susceptible to salt spray. The most common shrub species include salal and salmonberry. Other shrubs may include evergreen huckleberry (*Vaccinium ovatum*), twinberry (*Lonicera involucrata*), trailing blackberry (*Rubus ursinus*), thimbleberry (*Rubus parviflorus*), and coyotebrush (*Baccharis pilularis*). Forbs and grasses are less prevalent in mature stands, but they may include Canada goldenrod (*Solidago canadensis*), western brackenfern (*Pteridium aquilinum*), false lily of the valley (*Maianthemum dilatatum*), western swordfern (*Polystichum munitum*), horsetail (Equisetum sp.), Pacific reedgrass (*Calamagrostis nutkaensis*) and red fescue (*Festuca rubra*).

Community 1.2
Canada Goldenrod, Common Yarrow, Pacific Reedgrass, and Red Fescue

Structure: Coastal prairie dominated by forbs and grasses Community phase 1.2 represents an area affected by disturbance and is at the initiation phase of regeneration. Grasses and herbaceous species recover very rapidly following disturbance. Cover may return to 100 percent within the first growing season if a seed source is available and moisture conditions are suitable. Common yarrow and Canada goldenrod are successful early colonizers on recently disturbed sites, but they will decrease in prominence as the vegetation fully recovers. Minimizing disturbance (natural and unnatural) is important for the vegetative recovery of the site. Monitoring for establishment of non-native species is imperative for a successful native plant community.

Community 1.3
Salal, Salmonberry, Canada Goldenrod, Western Brackenfern, Pacific Reedgrass, and Red Fescue

Structure: Coastal scrub dominated by low-growing shrubs, forbs, and grasses Community phase 1.3 is a maturing coastal scrubland that has a high diversity of plant life. Shrubs such as salal, salmonberry, trailing blackberry, and thimbleberry will begin to establish. Forbs and grasses are dense, but they will begin to diminish as a result of competition from the establishment of shrubs.

Pathway 1.1A
Community 1.1 to 1.2

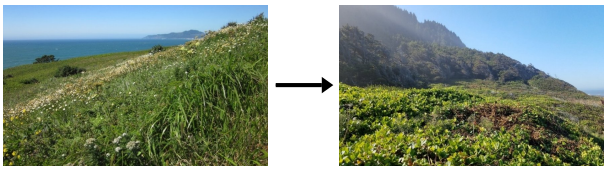
Sitka Spruce, Shore Pine, Salal, Salmonberry, Western Brackenfern, and Pacific Reedgrass

Canada Goldenrod, Common Yarrow, Pacific Reedgrass, and Red Fescue

This pathway represents a major stand-replacing disturbance such as a high-intensity fire, a large-scale wind event,

or large mass movement that leads to the stand initiation phase of forest development.

Pathway 1.2A
Community 1.2 to 1.3



Canada Goldenrod, Common Yarrow, Pacific Reedgrass, and Red Fescue

Salal, Salmonberry, Canada Goldenrod, Western Brackenfern, Pacific Reedgrass, and Red Fescue

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

Pathway 1.3B
Community 1.3 to 1.1

Salal, Salmonberry, Canada Goldenrod, Western Brackenfern, Pacific Reedgrass, and Red Fescue

Sitka Spruce, Shore Pine, Salal, Salmonberry, Western Brackenfern, and Pacific Reedgrass

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

Pathway 1.3A
Community 1.3 to 1.2

Salal, Salmonberry, Canada Goldenrod, Western Brackenfern, Pacific Reedgrass, and Red Fescue

Canada Goldenrod, Common Yarrow, Pacific Reedgrass, and Red Fescue

This pathway represents a major stand-replacing disturbance such as a high-intensity fire, a large-scale wind event, or large mass movement that leads to the stand initiation phase of forest development.

State 2
Developed

This state represents a full departure from the native reference state as a result of human-caused impacts. Urban sprawl and construction of roadways will increase susceptibility to non-native species, restrict natural disturbances, and reduce habitat.

Transition T1A
State 1 to 2

This pathway represents human-influenced disturbance from urban sprawl or other development or from road construction. The plant community and habitat are diminished or completely lost.

Transition T2A
State 2 to 1

This pathway represents restoration of the native plant community and removal of man-made structures. Native seed sources and extensive management and mitigation of brush and non-native species are needed to restore the community.

Additional community tables

Other references

Franklin, J.F., and C.T. Dyrness. 1973. Natural vegetation of Oregon and Washington. Oregon State University Press, Corvallis, OR.
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 July 2018.
Ripley, J. 1984. Description of the plant communities and succession of the Oregon Coast grasslands. Oregon State University Press, Corvallis, USA.
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.
United States Department of Agriculture, Natural Resources Conservation Service. 2003. Soil Survey of Douglas County Area, Oregon.
United States Department of Agriculture, Natural Resources Conservation Service. 2013. Soil Survey of Tillamook County, Oregon.
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:**
