USDA Natural Resources Conservation Service

Ecological site R004AB203OR
Aquic Interdune

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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 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: G322 Vancouverian Wet Shrubland Group; G517 Vancouverian Freshwater Wet Meadow and Marsh Group
Ecological Systems of Washington State community type: North Pacific Coastal Interdunal Wetland
Plant associations of the Oregon Dunes National Recreation Area: Hooker Willow/Slough Sedge-Pacific Silverweed Shrubland Alliance

Ecological site concept

This ecological site is on the western coastline of the Pacific Northwest, from southern Washington through central Oregon. Deflation hollows, which are depressions that commonly are between dunes, typically form from wind erosion of dunes when vegetation is removed. Wind erosion continues until the deeper moist sediment that is more resistant to erosion is exposed. The depth to the moist sediment is a function of the grain size, depth to the water table, and height of the capillary fringe above the water table. Revegetation limits wind erosion, increases the stability of the dunes, and limits expansion of the deflation hollows. The hollows are characterized by acidic soils that have a high water table.
This ecological site is strongly influenced by hydrology, and ponding is the primary dynamic. The soils may be saturated at the surface throughout the year. The dominant vegetation is adapted to very wet, acidic soils; salt spray; low nutrient availability; and anaerobic conditions.
The maritime climate is characterized by cool, moist summers and cool, wet winters. The mean annual precipitation is 60 to 110 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 duration and frequency of ponding directly influence the plant community. The vegetation in this ecological site is well adapted to soils that contain abundant moisture and are ponded and acidic. The most common species include Hooker willow (Salix hookeriana), Sitka willow (Salix sitchensis), California wax myrtle (Morella californica), salt rush (Juncus lesueurii), Sierra rush (Juncus nevadensis), slough sedge (Carex obnupta), and Pacific silverweed (Argentina egedii). Trees such as Sitka spruce (Picea sitchensis) and shore pine (Pinus contorta var. contorta) are on mounds or at the edges of the site.
The most common disturbance is alteration of the watershed and hydrologic system. The water table and channel flow may be altered by dams, dikes, and levees. Beaver (Castor canadensis) activity may be a significant driver in small-scale disturbances and hydrologic morphology. Other disturbances may include strong windstorms, wildfires, and intense storm surges that alter the stability of the dunes.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Salix hookeriana* (2) *Morella californica*
Herbaceous	(1) *Argentina egedii* (2) *Carex obnupta*

Physiographic features

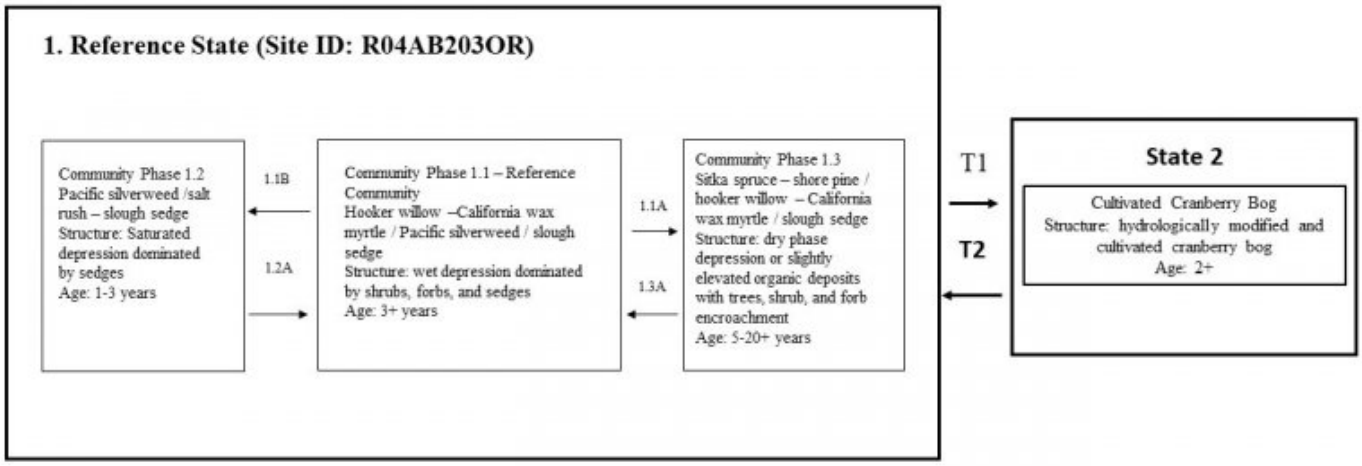
Climatic features

Influencing water features

Soil features

Ecological dynamics

State and transition model



State 1

Community 1.1
Reference Community Phase 1.1: Hooker willow-California wax myrtle/Pacific silverweed/slough sedge

Structure: Wet depression dominated by shrubs, forbs, and sedges The reference community is a wet depression. The vegetation is dominantly shrubs, forbs, sedges, and rushes. The soils are acidic and have a water table near or above the soil surface much of the year. Plant growth is restricted to uniquely adapted hydrophytic species. Shrubs are dominant at the edges of the site or in higher areas that are drier. The most common shrubs are Hooker willow, Sitka willow, and California wax myrtle. The species in the marshes and meadows are primarily tinker's penny (*Hypericum anagalloides*), salt rush, Sierra rush, slough sedge, variegated scouring rush (*Equisetum variegatum*), and Pacific silverweed. Trees such as Sitka spruce and shore pine are on mounds or at the edges of older marshes and meadows.

Community 1.2
Pacific silverweed/salt rush-slough sedge

Structure: Saturated depression dominated by sedges Community phase 1.2 represents a plant community of sedges and rushes that is influenced by a water table above the soil surface most of the year. Extended ponding restricts the plant diversity to species adapted to standing water or saturated conditions typified by organic soils. This early seral community is dominantly rushes such as salt rush, Sierra rush, and falcate rush (*Juncus falcatus*); Pacific silverweed; and slough sedge (Wiedemann, 1998).

Community 1.3
Community Phase 1.3: Sitka spruce-shore pine/hooker willow-California wax myrtle/slough sedge

Structure: Dry phase depression or slightly elevated organic deposits with tree, shrub, and forb encroachment
Community phase 1.3 represents a plant community of trees, shrubs, forbs, grasses, and sedges. This community is influenced by a water table at or below the soil surface during the growing season or is at the edge of wet

meadows. It is maintained by below-average ponding and precipitation for several consecutive years. The drier conditions restrict the regeneration of hydrophytic species, and shrubs and conifers establish rapidly (Wiedemann, 1966). Plant species in this phase and ecotone include Sitka spruce, shore pine, Pacific crab apple (*Malus fusca*), salal (*Gaultheria shallon*), evergreen huckleberry (*Vaccinium ovatum*), Hooker willow, and California wax myrtle. Slough sedge is common in saturated pockets, but it may be absent in some areas.

Pathway 1.1B
Community 1.1 to 1.2

Reference Community Phase 1.1: Hooker willow-California wax myrtle/Pacific silverweed/slough sedge

Pacific silverweed/salt rush-slough sedge

This pathway represents a climatic change toward wetter conditions. If the site becomes wetter from increased precipitation, the depth to a water table will decrease and the duration of flooding or ponding will increase. This hydrologic change will alter the plant community.

Pathway 1.1A
Community 1.1 to 1.3

Reference Community Phase 1.1: Hooker willow-California wax myrtle/Pacific silverweed/slough sedge

Community Phase 1.3: Sitka spruce-shore pine/hooker willow-California wax myrtle/slough sedge

This pathway represents a climatic change toward drier conditions. If the site becomes drier from reduced precipitation, the depth to a water table will increase and the duration of ponding will decrease. This hydrologic change will alter the plant community.

Pathway 1.2A
Community 1.2 to 1.1

Pacific silverweed/salt rush-slough sedge

Reference Community Phase 1.1: Hooker willow-California wax myrtle/Pacific silverweed/slough sedge

This pathway represents a climatic change toward drier conditions. If the site becomes drier from reduced precipitation, the depth to a water table will increase and the duration and frequency of ponding will decrease. This hydrologic change will alter the plant community.

Pathway 1.3A
Community 1.3 to 1.1

Community Phase 1.3: Sitka spruce-shore pine/hooker willow-California wax myrtle/slough sedge

Reference Community Phase 1.1: Hooker willow-California wax myrtle/Pacific silverweed/slough sedge

This pathway represents a climatic change toward wetter conditions. If the site becomes wetter from excessive ponding or flooding, the depth to a water table will decrease. This will impact the growing season and alter the plant community.

State 2
Cultivated Cranberry Bog

Structure: Hydrologically modified and cultivated cranberry bog Transition state 2 represents a departure from the native plant community by the establishment and cultivation of cranberry (*Vaccinium macrocarpon*). The initial establishment of cranberry beds requires intensive management that includes clearing, leveling, and installing drainage systems, dikes, and irrigation systems. A monoculture crop is susceptible to a variety of insects, pathogens, and weedy plant species. Hydrologic changes from irrigation, drainage, erosion, and sedimentation impact the ecology of the site (Oregon State University Extension, 2002).

Transition T1
State 1 to 2

This pathway represents human-influenced hydrologic changes and cultivation of commercial cranberry bogs.

Transition T2
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

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Approval

Kendra Moseley, 9/09/2020

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	05/03/2024
Approved by	Kendra Moseley
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:**

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):**

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5. **Number of gullies and erosion associated with gullies:**

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6. **Extent of wind scoured, blowouts and/or depositional areas:**

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7. **Amount of litter movement (describe size and distance expected to travel):**

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8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):**

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):**

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:**

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11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):**

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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:

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):**

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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:**