USDA Natural Resources Conservation Service

Ecological site R004AB011OR
Bog or Fen

Last updated: 9/09/2020
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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: G284 North Pacific Bog and Acidic Fen Group; A2514 Bog and Acidic Fen Alliance; CEGL003434 Western Labrador-tea/Slough Sedge/Peatmoss Species Fen Association
Oregon Natural Heritage Information Center native freshwater wetland plant association: Labrador tea/slough sedge/sphagnum

Ecological site concept

This ecological site is on the western coastline of the Pacific Northwest, from southern Washington through central Oregon. It is at low elevations (less than 1,500 feet) that receive abundant precipitation and persistent fog in summer. The site is strongly influenced by physiography and hydrology. It includes both bogs and fens, which are unique ecosystems that impact carbon and hydrologic cycles and host rare and unique plant and animal species. Bogs commonly are in depressions and within closed hydrologic basins that primarily are influenced by snowpack and rainfall. They do not have an outlet for water flow; therefore, they are a more acidic environment. Fens are influenced by groundwater and aquifer recharge and discharge (Patterson, 2007).
The maritime climate is characterized by cool, moist summers and cool, wet winters. The mean annual precipitation is 70 to 190 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 46 to 52 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 in areas that are 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 the anaerobic conditions. The most common natural disturbance is a change toward wetter or drier conditions. The seasonal high water table and ponding dynamics may be altered by artificial drainage of the site or adjacent areas.
The duration and frequency of ponding directly influence the plant community. The vegetation is well adapted to abundant soil moisture, ponding, and acidic soils. Plant species vary depending on soil acidity and anaerobic conditions. The areas south of the Columbia River consist dominantly of western Labrador tea (*Ledum glandulosum*), and the areas north of the Columbia River consist dominantly of bog Labrador tea (*Ledum groenlandicum*). Other species include western bog laurel (*Kalmia microphylla*), bog blueberry (*Vaccinium uliginosum*), bog cranberry (*Vaccinium oxycoccos*), Chamisso's cottongrass (*Eriophorum chamissonis*), American skunkcabbage (*Lysichiton americanus*), deer fern (*Blechnum spicant*), roundleaf sundew (*Drosera rotundifolia*), slough sedge (*Carex obnupta*), and sphagnum moss (Sphagnum spp.).

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Ledum glandulosum* (2) *Kalmia microphylla*
Herbaceous	(1) *Carex obnupta* (2) *Sphagnum*

Physiographic features

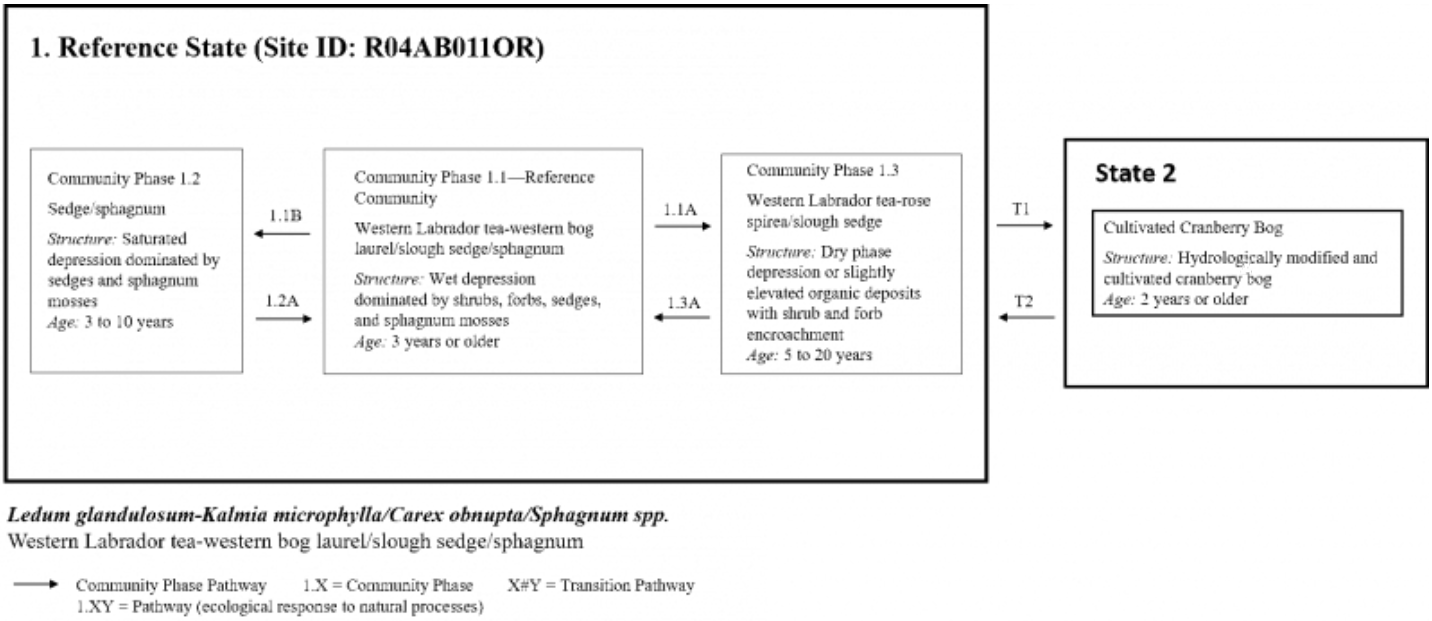
Climatic features

Influencing water features

Soil features

Ecological dynamics

State and transition model



State 1

Community 1.1
Reference Community Phase 1.1: Western Labrador tea-western bog laurel/slough sedge/sphagnum

Structure: Wet depression dominated by shrubs, forbs, sedges, and sphagnum mosses The reference community is a wet meadow that consists dominantly of shrubs, forbs, sedges, and sphagnum mosses that are influenced by a water table near or above the soil surface much of the growing season. The soils associated with the site are aerobic and very poorly drained. This restricts plant growth to uniquely adapted species. The saturation of the soils and the vegetation cover vary throughout the site. Woody vegetation is restricted to mounds and hummocks, and sphagnum mosses and sedges are dominant in saturated areas. Western Labrador tea (*Ledum glandulosum*) is the most common shrub south of the Columbia River, and bog Labrador tea (*Ledum groenlandicum*) is north of the Columbia River. Western bog laurel (*Kalmia microphylla*) and bog blueberry (*Vaccinium uliginosum*) are co-dominant shrubs. Other species include bog cranberry (*Vaccinium oxycoccos*), Chamisso's cottongrass (*Eriophorum chamissonis*), American skunkcabbage (*Lysichiton americanus*), deer fern (*Blechnum spicant*), roundleaf sundew (*Drosera rotundifolia*), slough sedge (*Carex obnupta*), and sphagnum moss (Sphagnum spp.).

Community 1.2
Community Phase 1.2: Sedge/sphagnum

Structure: Saturated depression dominated by sedges and sphagnum mosses Community phase 1.2 represents a plant community of sedges and sphagnum mosses that is influenced by a water table above the soil surface during the growing season. Extended ponding restricts the plant diversity to water- and peat-adapted species. Slough sedge (*Carex obnupta*), star sedge (*Carex echinata*), and bristlystalked sedge (*Carex leptalea*) are in this community phase.

Community 1.3
Community Phase 1.3: Western Labrador tea-rose spirea/slough sedge

Structure: Dry phase depression or slightly elevated organic deposits with shrub and forb encroachment
Community phase 1.3 represents a plant community of shrubs, forbs, grasses, and sedges that is influenced by a water table at or below the soil surface during the growing season or by a buildup of organic matter above the soil surface. The plant community is influenced by below-average ponding and precipitation for several consecutive years. The drier conditions restrict the regeneration of some wetland species. Species that inhabit the edges of the reference site and ecotone, such as rose spirea (Spirea douglasii), will begin to encroach on the open meadow and become more dominant. Over a long period of dry conditions or absence of wildfire, shore pine (*Pinus contorta* var. contorta) and Sitka spruce (*Picea sitchensis*) may establish and encroach on the site.

Pathway 1.1B
Community 1.1 to 1.2

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 will alter the plant community.

Pathway 1.1A
Community 1.1 to 1.3

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.

Pathway 1.2A
Community 1.2 to 1.1

The pathway represents a climatic change toward drier conditions. If the site becomes drier from reduced precipitation, the duration of ponding will decrease and the growing season will increase. This will alter the plant community.

Pathway 1.3A
Community 1.3 to 1.1

This pathway represents a climatic change toward wetter conditions or a return of wildfire. If the site becomes wetter from excessive ponding or flooding, the duration of soil saturation will increase and impact the growing season. This will 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

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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	04/28/2024
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:**

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:**