USDA Natural Resources Conservation Service

Ecological site AX001X03X205
Bog or Fen

Last updated: 5/07/2024
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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): 001X–Northern Pacific Coast Range, Foothills, and Valleys

This long and narrow resource area stretches along the Pacific Border Province of the Pacific Mountain System in Oregon and Washington. The area is bounded by the Olympic Mountains on the north and the Klamath Mountains on the south. Most of the area consists of hills and low mountains with gentle to steep slopes. The parent materials are composed primarily of young Tertiary sedimentary rocks with some minor volcanic rocks. Glacial till and outwash deposits are found in the northern half of the area within Washington. In the far southern portion of the area, near the Klamath Mountains, the sedimentary rocks are older and some have been metamorphosed. The average annual precipitation ranges from 60 to 200 inches, increasing with elevation.
The dominant soil orders in this MLRA are Andisols, Inceptisols, and Ultisols. Soil depth ranges from shallow to very deep. While most soils in the area are well drained and occur on foothills, mountain slopes and ridges, floodplain and depressional soils can range from well drained to very poorly drained. Soil textures are typically medial, loamy, or clayey. The dominant soils in the area have a mesic or frigid soil temperature regime and a udic soil moisture regime; however, soils with an aquic soil moisture regime or cryic soil temperature regime do occur.

LRU notes

The Central Pacific Coast Range land resource unit (LRU 3) of MLRA 1 ranges from the Olympic Peninsula south into northern Oregon. LRU 3 is located south of the Olympic National Forest and extends to the Siletz River in Oregon. LRU 3 is bounded on the west by MLRA 4a Sitka Spruce Belt and MLRA 2 Willamette and Puget Sound Valleys to the east. Several major rivers have headwaters in this LRU or carved valleys through the landscape depositing more recent alluvium. These include the Chehalis, Columbia, Grays, Humptulips, Klaskanine, Nehalem, Satsop, Siletz, Willapa, Wilson, Wynoochee, and Yamhill Rivers.

Ecological site concept

This ecological site is found on the western Coast Range in the Pacific Northwest from southern Washington to northern Oregon. It is located at low elevations (less than 1500 ft.) with abundant precipitation. 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. Bogs 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 duration and frequency of ponding directly influences the plant community. The vegetation is well adapted to abundant soil moisture, ponding, and soil acidity. Plant species vary depending on soil acidity and anaerobic conditions. The ecological sites located south of the Columbia River are dominated by western labrador tea (Ledum glandulosum) and bog Labrador tea (Ledum groenlandicum) is found on ecosites north of the Columbia River. Additional plant species include roundleaf sundew (Drosera rotundifolia), sedges (Carex spp.), and sphagnum moss (Sphagnum spp.). Shrubby species such as sweetgale (Myrica gale), salal (Gaultheria shallon), and small cranberry (Vaccinium oxycoccos) are on mounds and hummocks.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Ledum* (2) *Myrica gale*
Herbaceous	(1) *Carex* (2) *Sphagnum*

Legacy ID

R001XC205OR

Physiographic features

This ecological site is located at low elevations (less than 1500 ft.) and is strongly influenced by physiography.

Table 2. Representative physiographic features

Landforms	(1) Flood plain > Swale (2) Depression
Flooding frequency	None to frequent
Ponding frequency	None to frequent
Elevation	0–457 m
Slope	0–3%
Water table depth	0–91 cm
Aspect	N, NE, E, SE, S

Climatic features

The climate has warm, moist summers and cool, wet winters. Mean annual precipitation ranges from 70 to 130 inches and occurs mostly as rain. Snowfall is rare, and it is not persistent when it occurs. The mean annual air temperature is 45 to 52 degrees F.

Table 3. Representative climatic features

Frost-free period (characteristic range)	121-139 days
Freeze-free period (characteristic range)	157-212 days
Precipitation total (characteristic range)	1,778-3,302 mm
Frost-free period (actual range)	116-148 days
Freeze-free period (actual range)	157-215 days
Precipitation total (actual range)	
Frost-free period (average)	130 days
Freeze-free period (average)	185 days
Precipitation total (average)	

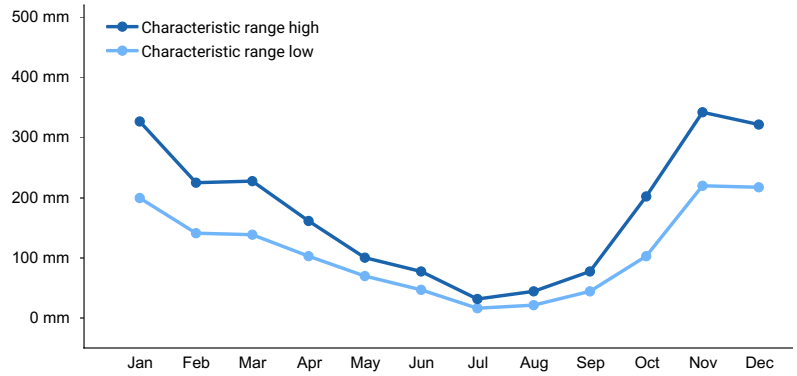


Figure 1. Monthly precipitation range

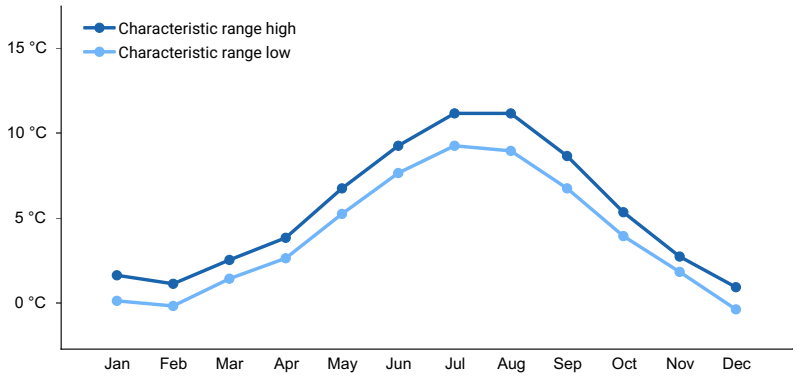


Figure 2. Monthly minimum temperature range

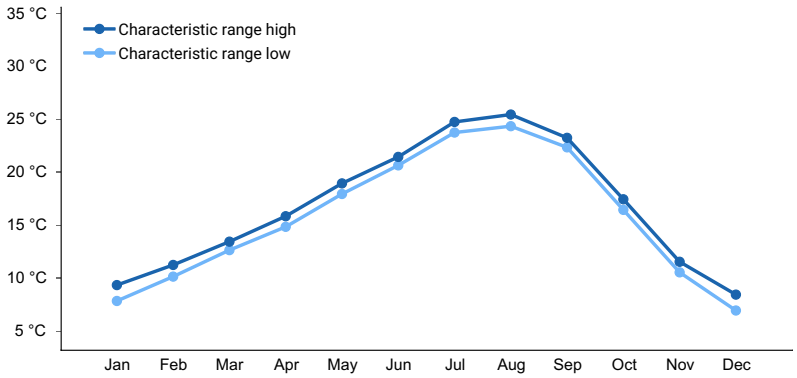


Figure 3. Monthly maximum temperature range

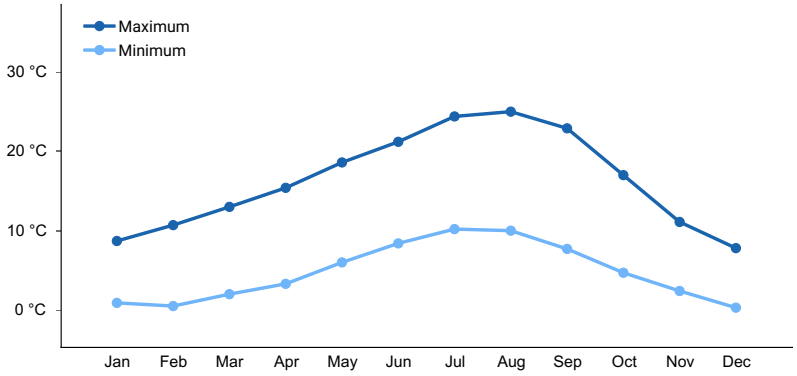


Figure 4. Monthly average minimum and maximum temperature

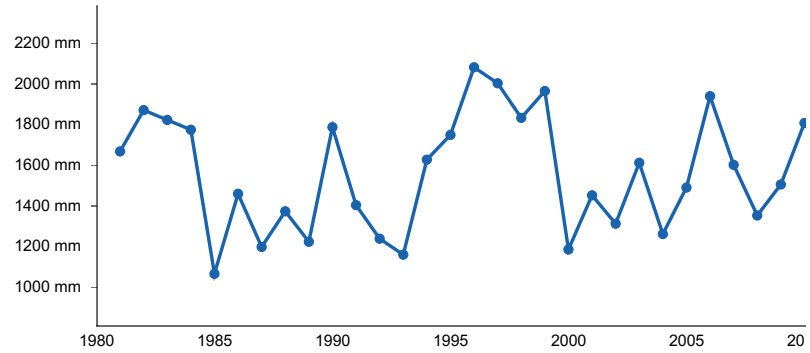


Figure 5. Annual precipitation pattern

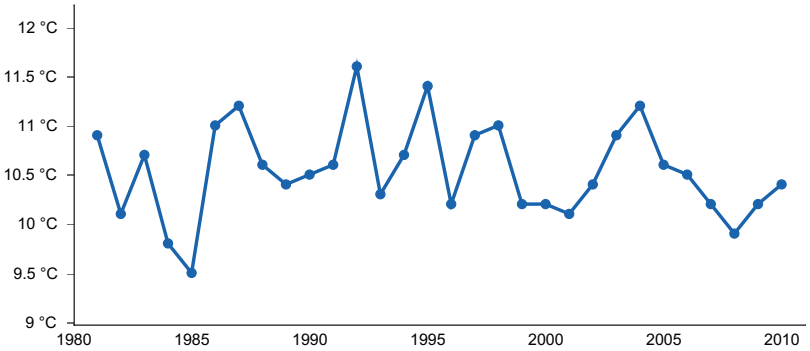


Figure 6. Annual average temperature pattern

Climate stations used

- (1) ELMA [USC00452531], Elma, WA
- (2) GRAYS RIVER HATCHERY [USC00453333], Grays River, WA
- (3) VERNONIA NO 2 [USC00358884], Vernonia, OR
- (4) CLATSKANIE [USC00351643], Clatskanie, OR

Influencing water features

This ecological site 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. Bogs 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).

Soil features

Soils that support this ecological site occur in the mesic soil temperature regime and the 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 for 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 towards wetter or drier conditions.

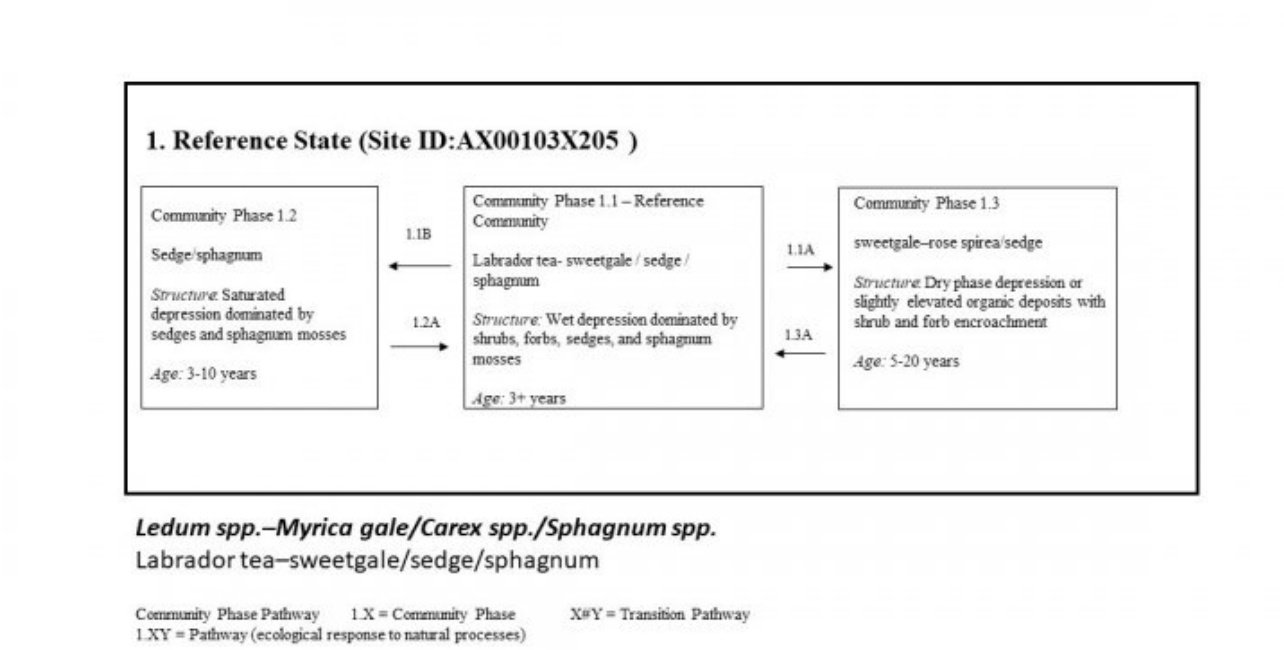
Table 4. Representative soil features

Parent material	(1) Alluvium (2) Mossy organic material (3) Herbaceous organic material
Surface texture	(1) Silty clay (2) Silt loam
Drainage class	Very poorly drained to poorly drained

Soil depth	152 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Clay content (0-15.2cm)	18–42%
Subsurface fragment volume <=3" (2.5-152.4cm)	0%
Subsurface fragment volume >3" (2.5-152.4cm)	0%

Ecological dynamics

State and transition model



State 1
Reference State

Community 1.1
Labrador tea-sweetgale /sedge/sphagnum

Labrador tea-sweetgale /sedge/sphagnum Structure: Wet depression dominated by shrubs, forbs, and sedges, and sphagnum mosses The reference community is a wet meadow that consists dominantly of shrubs, forbs, sedges, and sphagnum mosses and is 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 more dominant in saturated areas. The most common shrubs include bog Labrador tea or western Labrador tea, sweetgale, salal, and small cranberry. These shrubs may vary in cover from sparse to very tall thickets, depending on ponding and small disturbances commonly caused by animal trails. Species in wet and ponded areas are bog Labrador tea, roundleaf sundew, sedges, sphagnum moss, and deer fern (*Blechnum spicant*).

Dominant plant species

- Labrador tea (*Ledum*), shrub
- sweetgale (*Myrica gale*), shrub
- salal (*Gaultheria shallon*), shrub
- small cranberry (*Vaccinium oxycoccos*), shrub
- roundleaf sundew (*Drosera rotundifolia*), other herbaceous
- sedge (*Carex*), other herbaceous
- sphagnum (*Sphagnum*), other herbaceous
- deer fern (*Blechnum spicant*), other herbaceous

Community 1.2
Sedge/sphagnum

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.

Dominant plant species

- sedge (*Carex*), grass
- sphagnum (*Sphagnum*), grass

Community 1.3
Sweetgale-rose spirea/slough sedge

Sweetgale-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. This plant community has been 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 sweetgale, salmonberry (*Rubus spectabilis*), rose spirea (*Spiraea douglasii*) will begin to encroach on the open meadow area and become more dominant. Over a long period of dry conditions or an absence of fire, red alder (*Alnus rubra*), western redcedar (*Thuja plicata*) and western hemlock (Tsuga heteropylla) may establish and encroach on the site.

Dominant plant species

- sweetgale (*Myrica gale*), shrub
- rose spirea (*Spiraea douglasii*), shrub
- salmonberry (*Rubus spectabilis*), shrub
- slough sedge (*Carex obnupta*), other herbaceous

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 restoration of the site from periodic 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.

Additional community tables

Inventory data references

Relationship to Other Established Classifications

National Vegetation Classification Group G284 North Pacific Bog and Acidic Fen Group and A2514 Bog and Acidic Fen Alliance

Washington Department of Natural Resources Ecological Systems of Washington State- North Pacific Bog and Fen

Other references

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Contributors

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Approval

Kirt Walstad, 5/07/2024

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	12/14/2021
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:**