Ecological site R002XC004OR
Marsh Group

Last updated: 11/27/2024
Accessed: 05/21/2025

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): 002X–Willamette and Puget Sound Valleys

The Willamette and Puget Sound Valleys Major Land Resource Area (MLRA 2) is located in western Washington and Oregon. It occupies a forearc basin between coast ranges and the Cascade Mountain volcanic arc. The northern part contains Pleistocene drift, outwash, lacustrine and glaciomarine deposits associated with continental glaciers. The southern part contains Late Pleistocene deposits from glacial outburst floods (Missoula Floods). Climate is mild and moist, with a long growing season. Mean annual precipitation ranges from 20 to 60 inches, falling mostly in fall, winter, and spring. Summers are dry. Soil temperature regime is mesic and soil moisture regimes are xeric and aquic.
Most sites in this MLRA can support forested vegetation, but some were maintained as prairie, savanna, or woodland through cultural burning prior to Euro-American settlement. Puget Sound has a moderating effect on temperatures and humidity can be higher in the northern part of the MLRA. Douglas-fir (Pseudotsuga menziesii) is widespread throughout. Oregon white oak (Quercus garryana) is common on uplands in the south and on warm, exposed or droughty sites in the north. Pacific madrone (Arbutus menziesii) occurs in areas close to salt water. Western hemlock (Tsuga heterophylla) is codominant with Douglas-fir in the north. Floodplains usually contain black cottonwood (*Populus balsamifera* ssp. trichocarpa) and red alder (*Alnus rubra*). Oregon ash (*Fraxinus latifolia*) is typical of forested wetlands in the south. Forestry, urban development, and cultivated agriculture are currently the most extensive land uses (Soil Survey Staff, 2006).

LRU notes

The Willamette Valley land resource unit (LRU C) is located in northwestern Oregon. It is bounded by the Portland Basin to the north and the Umpqua Valley to the south.

Topography is generally flat to hilly. Major landforms include floodplains and alluvial terraces, glaciolacustrine terraces, hills, and foothills. The valley floor is underlain by Pleistocene fluvial deposits (Rowland Formation). Valley borders and foothills are underlain by Eocene to Pliocene sedimentary rocks (Yamhill, Spencer, and Nestucca Formations) or, in some western areas, Eocene pillow basalts (Siletz River Volcanics). Other hills consist of Miocene Columbia River Basalt (Yeats et al., 1996; Orr et al., 1992). Locations below 400 feet elevation are covered with late Pleistocene silts deposited by the Missoula Floods (Willamette Silts).
Mean annual precipitation ranges from 35 to 60 inches. Most falls as rain between October and May. The frost-free period ranges from 160 to 210 days. Snowfall occasionally occurs in winter, but snow cover rarely lasts longer than a few days. Ice storms usually occur at least once each winter. Winter storm winds come from the south. Fair-weather winds during summer come from the north.
Prior to Euro-American settlement, fire was used in this LRU to maintain early-seral plant communities for food and fiber. General Land Office (GLO) land surveys conducted between 1851 and 1910 documented widespread prairies and savannas (Hulse et al., 2002). Fire exclusion since Euro-American settlement allowed many of these to succeed to forested communities (Johannessen et al., 1971; Day, 2005). Historic prairies and savannas were less common at the north end of the Willamette Valley, but an island of these types occurred in the Tualitan Valley. In general, fire frequency decreased with distance from human settlements (Christy and Alverson, 2011).
Presence of Oregon white oak and absence of western hemlock distinguish this area from the coast range (MLRA 1) and Cascade mountains (MLRA 3). This LRU is distinguished from Portland Basin and Hills (LRU B) by low-frequency occurrence of species common in the Umpqua and Rogue valleys, including California black oak (Quercus kelloggii), Pacific madrone (Arbutus menziesii), incense cedar (Calocedrus decurrens), and white alder (*Alnus rhombifolia*) (Franklin and Dyrness, 1973).

Classification relationships

This ecological site is similar to following plant associations (Christy, 2004) which emphasize observed plant communities with unspecified successional status:
• Crabapple/slough sedge association
• Douglas spiraea association
• Douglas spiraea/sphagnum association

Ecological site concept

This site occurs in oxbows on relict floodplains. Ponding or low-energy flooding occurs. Soils are very deep, poorly or very poorly drained, and contain layers of organic material. The rooting zone is saturated during at least part of the growing season, and it is not dry for any significant period during the year.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) *Sagittaria latifolia* (2) *Grass-like, perennial*

Physiographic features

Landform: oxbows on relict floodplains
Parent material: fine-textured alluvium
Elevation: 100 to 400 feet
Slope: 0 to 1 percent
Flooding: frequent; very long duration (low-velocity)
Ponding: frequent; very long duration

This site occurs on the Winkle geomorphic surface. It is characteristic of relict Willamette Valley floodplains (Balster and Parsons, 1968; Reckendorf, 1993).

Table 2. Representative physiographic features

Landforms	(1) Oxbow (2) Flood plain
Flooding duration	Very long (more than 30 days)
Flooding frequency	Frequent
Ponding duration	Very long (more than 30 days)
Ponding frequency	Frequent
Elevation	30–122 m
Slope	0–1%
Aspect	Aspect is not a significant factor

Climatic features

Mean annual air temperature: 50 to 54 degrees F
Mean annual precipitation: 35 to 45 inches
Frost free period: 165 to 210 days

Influencing water features

When flooding occurs, it is low-energy and tends to deposit sediment. In the absence of artificial drainage, the rooting zone is saturated during most of the growing season, and it is not dry for any significant period during the year. Soil saturation is persistent enough for organic matter to accumulate in discreet layers.

Wetland description

Marsh land

Soil features

Drainage class: very poorly drained
Parent material: fine-textured alluvium
Soil restrictive feature(s): none
Soil moisture regime: aquic
Soil moisture subclass: typic
Soil temperature regime: mesic
Particle-size family(s): organic or fine
Soil mineralogy: smectitic (when used)
Soil reaction: strongly acid to neutral (pH increases with depth)

Soils formed in fine-grained alluvium reworked from Missoula Flood sediments. When flooding occurs, it is low-energy and tends to deposit sediment. In the absence of artificial drainage, the rooting zone is saturated during most of the growing season, and it is not dry for any significant period during the year. Soil saturation is persistent enough for organic matter to accumulate in discreet layers. Soils classify as Histosols or Inceptisols.

Soils correlated with this site include Labish, and Semiahmoo.

Table 3. Representative soil features

Parent material	(1) Alluvium
Family particle size	(1) Fine
Drainage class	Very poorly drained

Ecological dynamics

Central Concept

This site occurs in oxbows on relict floodplains. Ponding or low-energy flooding occurs. Soils are very deep, poorly or very poorly drained, and contain layers of organic material. The rooting zone is saturated during at least part of the growing season, and it is not dry for any significant period during the year. Marsh vegetation is typical. Forest does not develop unless the site is drained. The reference plant community consists of broadleaf arrowhead - grasslikes.

Disturbance

The disturbance regime of this site prior to Euro-American settlement is unclear. Cultural burning could have occurred in some cases, but summer inundation may have made it too wet to burn.

Plant Composition

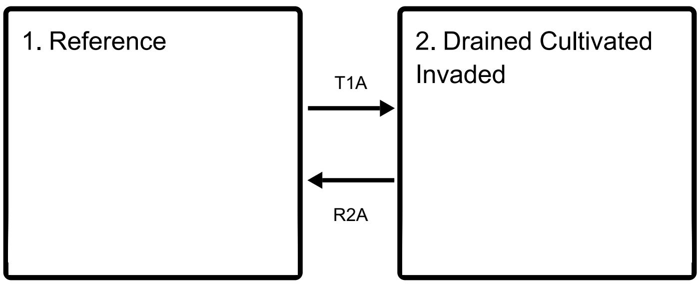
Representative native plants are listed below. Not all species are present within the same community phase. Plant lists (especially for grasses, grasslikes, and forbs) are incomplete. An asterisk (*) indicates plant species representative of the pre-settlement reference community (Christy and Alverson, 2011).

GRASSLIKES/FORBS/OTHER:
broadleaf arrowhead (*Sagittaria latifolia*) *
American skunkcabbage (*Lysichiton americanus*) *
Rocky Mountain pond-lily (*Nuphar lutea* ssp. polysepala) *
sedge (Carex spp.) *
rush (Juncus spp.) *
sphagnum (Sphagnum) *

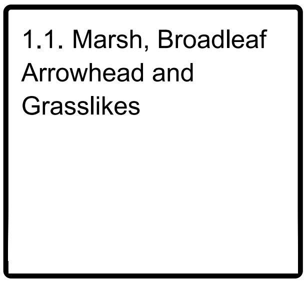
TREES AND SHRUBS:
rose spirea (*Spiraea douglasii*) *
Oregon crab apple (*Malus fusca*) *
willow (Salix spp.) *
Oregon ash (*Fraxinus latifolia*)
black cottonwood (*Populus balsamifera* ssp. trichocarpa)
red alder (*Alnus rubra*)
white alder (*Alnus rhombifolia*)

State and transition model

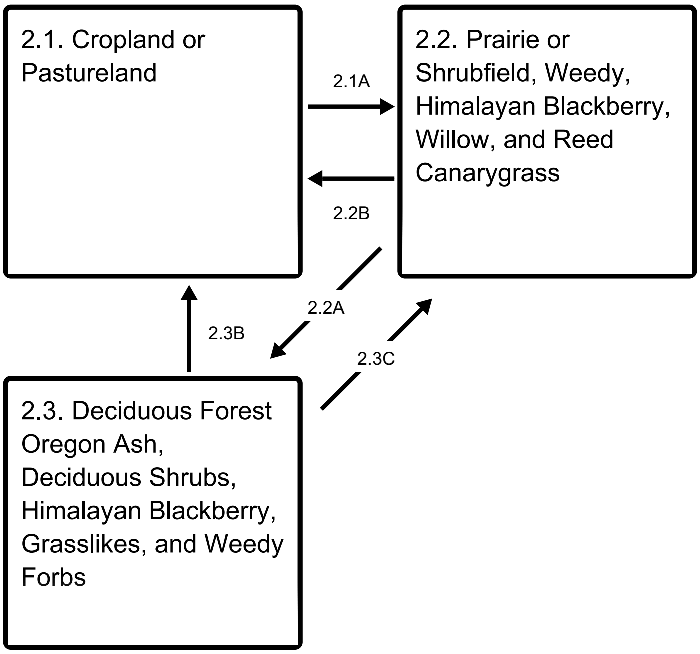
Ecosystem states



State 1 submodel, plant communities



State 2 submodel, plant communities



State 1
Reference

Non-native plants are insignificant in this state.

Community 1.1
Marsh, Broadleaf Arrowhead and Grasslikes

Annual ponding lasts into the summer Structure: herbaceous This community consists of marsh vegetation, including broadleaf arrowhead, American skunkcabbage, and Rocky Mountain pond-lily. Sedges and rushes are also present. The edges of this community may support shrubs such as rose spirea, Oregon crab apple, and willow.

State 2
Drained Cultivated Invaded

This state represents post-cultivation conditions with flood control or drainage that may best fit within land-use models in future work. Inundation is reduced, but soil saturation still occurs. Weedy invasive species are usually present and competitive.

Community 2.1
Cropland or Pastureland

Structure: annual or perennial crop, tame pasture, or orchard

Community 2.2
Prairie or Shrubfield, Weedy, Himalayan Blackberry, Willow, and Reed Canarygrass

Structure is weedy shrubfield or prairie. This community consists mainly of weeds such as reed canarygrass (*Phalaris arundinacea*) and Himalayan blackberry (*Rubus armeniacus*). Introduced perennial pasture grasses including tall fescue (*Schedonorus arundinaceus*) and creeping bentgrass (*Agrostis stolonifera*) may also be present. If flooding occurs, weed seeds can be imported with floodwaters. Willow and other deciduous trees will establish where mineral soil is exposed. Oregon ash and black cottonwood will resprout if they were present in the previous community.

Community 2.3
Deciduous Forest Oregon Ash, Deciduous Shrubs, Himalayan Blackberry, Grasslikes, and Weedy Forbs

Structure is closed deciduous forest. The overstory consists of Oregon ash. Black cottonwood and alder can also occur, but decline as time since ground disturbance lengthens. The understory has low species diversity and consists of weedy, shade-tolerant shrubs, grasslikes, and forbs. Himalayan blackberry may persist under forest canopy. If reed canarygrass was present in the previous community, it will decrease in the shade of a closed forest canopy (Kim, et al. 2006).

Pathway 2.1A
Community 2.1 to 2.2

This pathway represents abandonment. Tillage and other management ceases.

Pathway 2.2B
Community 2.2 to 2.1

This pathway represents resumed tillage and agricultural management.

Pathway 2.2A
Community 2.2 to 2.3

This pathway represents continued abandonment and growth over time. Black cottonwood, willow, and alder become decadent and disappear from the stand as time lengthens since the disturbance event that generated them.

Pathway 2.3B
Community 2.3 to 2.1

This pathway represents tree and stump removal with resumed tillage and agricultural management.

Pathway 2.3C
Community 2.3 to 2.2

This pathway represents tree removal alone.

Transition T1A
State 1 to 2

This pathway represents conversion to agricultural use. Artificial drainage reduces inundation, but the soil still experiences saturation. Tillage oxidizes organic soil materials, causing the land surface to sink.

Restoration pathway R2A
State 2 to 1

This pathway represents restoration of natural hydrology, weed control (if needed), and replanting or inducing germination of native species from seed.

Additional community tables

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Approval

Kirt Walstad, 11/27/2024

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	10/03/2023
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):

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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):**

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):**

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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:

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17. **Perennial plant reproductive capability:**
