Ecological site F002XC001OR
Riparian Group

Last updated: 12/03/2024
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): 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 group fits within the following LANDFIRE Biophysical Setting (BpS):
• LANDFIRE Biophysical Setting: North Pacific Lowland Riparian Forest and Shrubland (0711560)

Ecological site concept

This site occurs on active, high-energy positions on floodplains. Soils are very deep and excessively drained to well drained. The rooting zone is dry 45 to 70 consecutive days during the summer. Occasional to frequent flooding which may scour or deposit sand and gravel, relatively neutral soil reaction, humid microclimate, and connection to the water table favor the development of deciduous forest vegetation.

Table 1. Dominant plant species

Tree	(1) *Populus balsamifera ssp. trichocarpa* (2) *Alnus*
Shrub	Not specified
Herbaceous	Not specified

Physiographic features

Landform: floodplains
Parent material: coarse alluvium
Elevation: 50 to 600 feet
Slope: 0 to 2 percent
Flooding: frequent or occasional; brief duration (high-velocity)
Ponding: none

This site occurs on the Horseshoe geomorphic surface of active Willamette Valley floodplains (Balster and Parsons, 1968; Reckendorf, 1993).

Table 2. Representative physiographic features

Landforms	(1) Flood plain
Flooding duration	Brief (2 to 7 days)
Flooding frequency	Occasional to frequent
Ponding frequency	None
Elevation	50–600 ft
Slope	0–2%

Climatic features

Mean annual air temperature: 50 to 54 degrees F
Mean annual precipitation: 35 to 60 inches
Frost free period: 165 to 210 days

Influencing water features

Occasional to frequent flooding which may scour or deposit sand and gravel, relatively neutral soil reaction, humid

microclimate, and connection to the water table favor the development of deciduous forest vegetation.

Wetland description

None

Soil features

Drainage class: excessively or somewhat excessively drained
Parent material: coarse alluvium
Soil restrictive feature(s): none
Soil moisture regime: xeric
Soil moisture subclass: typic
Soil temperature regime: mesic
Particle-size family(s): Coarse-loamy, sandy or sandy-skeletal
Soil mineralogy: mixed
Cation exchange capacity: superactive (when used)
Soil reaction: slightly acid or neutral

Soils are coarse-textured. Sand and gravel content usually increase with depth. High-energy flooding scours and deposits coarse sediment, but gravelly or cobbly material usually limits further channel incision. The rooting zone for most herbaceous plants is dry 45 to 70 consecutive days during the summer which is longer than most sites in this LRU. However, deeper-rooted plants may extract moisture from the water table. Soils classify as Entisols. Organic matter tends to be low.

Soils correlated with this site include Newberg, Camas, Xeropsamments, Xerofluvents, and Fluvents.

Table 3. Representative soil features

Parent material	(1) Alluvium
Family particle size	(1) Coarse-loamy over sandy or sandy-skeletal
Drainage class	Somewhat excessively drained to excessively drained

Ecological dynamics

This site occurs on active, high-energy positions on floodplains. Soils are very deep and excessively drained to well drained. The rooting zone is dry 45 to 70 consecutive days during the summer which is longer than most sites in this LRU. Occasional to frequent flooding which may scour or deposit sand and gravel, relatively neutral soil reaction, humid microclimate, and connection to the water table favor the development of deciduous forest vegetation. The reference plant community is black cottonwood - alder / shrubs / forbs.

Range in Variability

Floodplain size and gradient may define subtypes with distinct reference communities. Black cottonwood (*Populus balsamifera* ssp. trichocarpa) is most abundant along large floodplains (Franklin and Dyrness, 1973). Alder (Alnus spp.) are predominant along smaller, steeper floodplains.

Disturbance

High-energy floods which destroy plant communities, rearrange channels, and scour or deposit gravelly alluvium are the primary form of disturbance. Flood events occur during winter. Due to flood control measures, high-energy flood events now occur over a smaller area than they did prior to Euro-American settlement. Nonetheless, this geomorphic setting continues to follow stream channels wherever they move across their floodplains. As distance from channels increases and flooding energy decreases, these locations gradually develop physical attributes of Low Floodplain Group or Backswamp Group, and plant communities adjust accordingly.

Cultural burning was not focused here prior to Euro-American settlement. General Land Office (GLO) surveys noted

mainly deciduous riparian forest. Natural fire is infrequent and stand-replacing; the estimated mean fire return interval is 750 years (Henderson and Lesher, 2007).

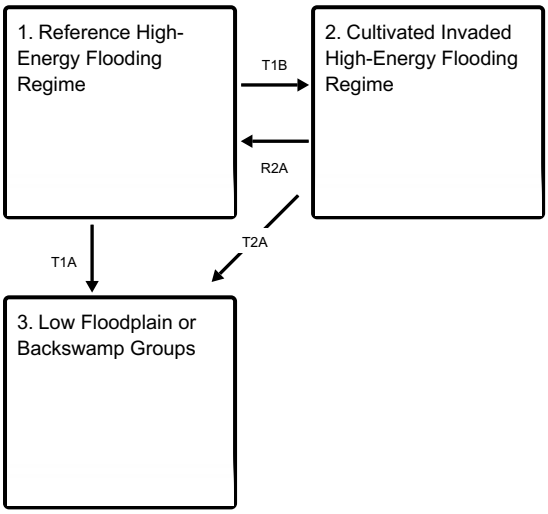
Plant Composition

Representative native plants are listed below. Not all species are present within the same community phase. Plant lists are incomplete.

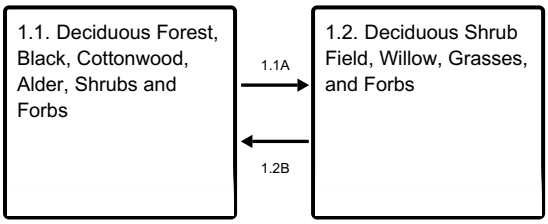
TREES AND SHRUBS:
willow (Salix spp.)
black cottonwood (*Populus balsamifera* ssp. trichocarpa)
red alder (*Alnus rubra*)
white alder (*Alnus rhombifolia*)
Oregon ash (*Fraxinus latifolia*)
redosier dogwood (*Cornus sericea*)
Pacific ninebark (*Physocarpus capitatus*)
California blackberry (*Rubus ursinus*)

State and transition model

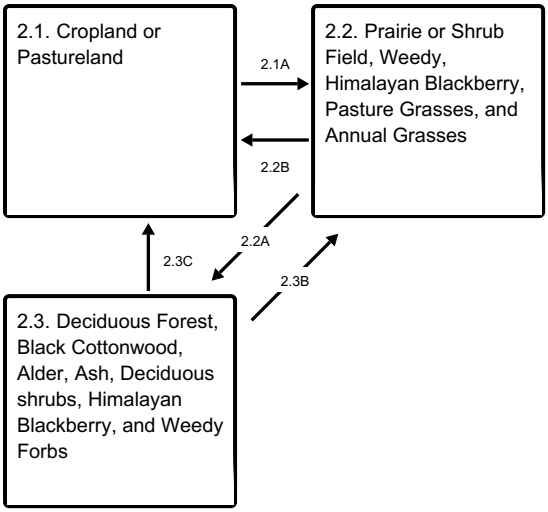
Ecosystem states



State 1 submodel, plant communities



State 2 submodel, plant communities



State 1
Reference High-Energy Flooding Regime

Flooding occurs annually, but high-energy events which rearrange channels, scour, or deposit gravelly alluvium occur less often and are the primary form of disturbance. Invasive plant species are insignificant in this state.

Community 1.1
Deciduous Forest, Black, Cottonwood, Alder, Shrubs and Forbs

Structure: deciduous forest The overstory consists mainly of black cottonwood or alder. Ponderosa pine, Douglas-fir, grand fir, or western redcedar may be occasionally present in the understory at low cover. The shrub layer is deciduous. Willow species are present at low cover but are suppressed by the shade of taller deciduous trees. Bigleaf maple seedlings and saplings may be present. Shade-tolerant forbs are present.

Community 1.2
Deciduous Shrub Field, Willow, Grasses, and Forbs

Structure: deciduous shrubfield This community is dominated by willow. Willow may establish from seed or vegetative fragments on mineral soil. It may also sprout from pre-existing roots after the tree canopy is removed. Black cottonwood or alder saplings may be present, establishing from seed. Black cottonwood can also establish from twigs buried in moist sediment (Adams, et al. 1987). Grasses and forbs are present.

Pathway 1.1A
Community 1.1 to 1.2

This pathway represents a high energy flood that destroys the plant community and either exposes or deposits sandy and gravelly material. Soil litter layer is removed.

Pathway 1.2B
Community 1.2 to 1.1

This pathway represents vegetative growth, entrapment of loamy sediment, and thickening of loamy or silty A horizons. Soil develops a litter layer consisting mainly of leaves.

State 2
Cultivated Invaded High-Energy Flooding Regime

This state represents post-cultivation conditions that may best fit within land-use models in future work. Weedy invasive species are usually present and competitive. Hydrology is not altered by draining or filling.

Community 2.1
Cropland or Pastureland

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

Community 2.2
Prairie or Shrub Field, Weedy, Himalayan Blackberry, Pasture Grasses, and Annual Grasses

Structure: weedy shrubfield or prairie This community consists mainly of aggressive weeds, naturalized pasture grasses, or non-native annual grasses. Himalayan blackberry (*Rubus armeniacus*) is aggressive following ground disturbance. Reed canarygrass (*Phalaris arundinacea*) may occur. Weedy forbs such as Canada thistle (*Cirsium arvense*) and bull thistle (*Cirsium vulgare*) may be present. Saplings of native deciduous trees regenerate from seed when imported by low-energy overbank flooding.

Community 2.3
Deciduous Forest, Black Cottonwood, Alder, Ash, Deciduous shrubs, Himalayan Blackberry, and Weedy Forbs

Structure: Closed deciduous forest The overstory consists of an overstory of black cottonwood, alder, and Oregon ash. The shrub layer is deciduous. The understory has low species diversity and consists of weedy, shade-tolerant shrubs and forbs. Himalayan blackberry may persist under forest canopy.

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. Soil develops a litter layer that consists mainly of leaves.

Pathway 2.3C
Community 2.3 to 2.1

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

Pathway 2.3B
Community 2.3 to 2.2

This pathway represents tree removal alone.

State 3
Low Floodplain or Backswamp Groups

Low-energy flooding regime: accumulation of loamy sediment.

Transition T1B
State 1 to 2

This pathway represents tillage to the extent that root systems and seed banks of native plants are depleted. Soil

litter layer is removed. Invasive plant species are introduced.

Transition T1A
State 1 to 3

This pathway represents a hiatus from high-energy flooding and continued thickening of loamy or silty A horizons. Such horizons are usually more than 20 inches thick in soils belonging to Low Floodplain Group or Backswamp Group. On well drained soils, this transition may also be marked by the decline of willow and appearance of bigleaf maple in the canopy. This transition can result from flood control measures. It can also occur naturally as migrating stream channels move away from the site.

Restoration pathway R2A
State 2 to 1

This pathway represents a high energy flood that destroys the plant community and either exposes or deposits sandy and gravelly material. This pathway requires a migrating stream channel to return to the site.

Transition T2A
State 2 to 3

This pathway represents a hiatus from high-energy flooding and continued thickening of loamy or silty A horizons. Such horizons are usually more than 20 inches thick in soils belonging to Low Floodplain Group or Backswamp Group. On well drained soils, this transition may be marked by the decline of willow, appearance of bigleaf maple in the canopy, or the appearance of conifer seedling and saplings. This transition can result from flood control measures. It can also occur naturally as migrating stream channels move away from the site.

Additional community tables

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Approval

Kirt Walstad, 12/03/2024

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):**

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:**
