

# Ecological site R002XB001OR

## Backswamp Group

Last updated: 5/09/2024  
Accessed: 05/19/2024

---

### 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 Portland Basin and Hills Land Resource Unit (LRU B) is located in northwest Oregon and southwest Washington. It includes the Portland Basin and surrounding hills. Isolated areas of LRU C (Willamette Valley) occur below 400 feet in the Tualitan Valley on loamy or silty Missoula Flood deposits. The Columbia River Gorge borders this LRU on the east. Brackish tidewater beginning near the town of Cathlamet marks the northwestern limit of this LRU along the Columbia River floodplain. Elevation ranges from sea level to about 1200 feet. Topography is flat to steep. Major landforms include the Columbia River floodplain, glaciofluvial terraces, hills, and foothills. The valley floor is underlain by Pleistocene fluvial deposits (Rowland Formation). Hills and foothills are underlain by Eocene to Pliocene sedimentary rocks (Yamhill, Nestucca, Scotts Mills, Molalla, and Troutdale Formations), Miocene Columbia River Basalt, or Plio-Pleistocene Boring Lavas (Orr et al., 1992). Gravelly or sandy Late Pleistocene Missoula Flood deposits can occur below 400 feet elevation. Hills are covered in loess, and fragipans (brittle subsoil layers) are common.

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. Ice storms occur each winter. Locations near the Columbia River Gorge experience strong winds. Most locations experience less summer moisture stress compared with the main Willamette Valley; summertime average daily maximum temperatures at Vancouver, WA are 1 to 3 degrees F cooler compared with Corvallis, OR (Agricultural Climate Information System, 2007a, 2007b).

Cultural fire use prior to Euro-American settlement was apparently less than in the main Willamette Valley, though it

was used in some areas. General Land Office (GLO) land surveys conducted between 1851 and 1910 indicate that forest and woodland communities were more prevalent than prairies and savannas (Hulse et al., 2002). Forested reference community phases have been chosen for these upland ecological sites.

Presence of Oregon white oak (*Quercus garryana*), and absence of western hemlock (*Tsuga heterophylla*) distinguish this area from coast range (MLRA 1) and Cascade mountain (MLRA 3) ecological types in Oregon. Relative abundance of western redcedar (*Thuja plicata*) helps distinguish this area from the Willamette Valley (LRUC).

### Classification relationships

This ecological site group is similar to following plant associations (Christy, 2004) which emphasize observed plant communities with unspecified successional status:

- Black cottonwood/creek dogwood/Dewey sedge association
- Hooker willow - (Sitka willow) association
- Pacific willow/California nettle association

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 the Columbia River floodplain. Adjacent river reaches contain freshwater but may be tidally-influenced. Low-energy, overbank flooding tends to deposit silty or clayey sediment.

**Table 1. Dominant plant species**

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) <i>Sagittaria latifolia</i> (2) <i>Grass-like, perennial</i>

### Physiographic features

Landform: floodplains

Parent material: silty alluvium

Elevation: 10 to 40 feet

Slope: 0 to 1 percent

Flooding: frequent; long duration (low-velocity)

Ponding: frequent; long duration

**Table 2. Representative physiographic features**

Landforms	(1) Flood plain
Flooding duration	Long (7 to 30 days)
Flooding frequency	Frequent
Ponding duration	Long (7 to 30 days)
Ponding frequency	Frequent
Elevation	3–12 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

Prior to flood control, annual flooding peaked during June and July and soils were probably saturated through the summer months.

## Wetland description

Marsh vegetation was probably typical prior to flood control.

## Soil features

Drainage class: very poorly or poorly drained

Parent material: silty alluvium

Soil restrictive feature(s): none

Soil moisture regime: aquic

Soil moisture subclass: typic

Soil temperature regime: mesic

Particle-size family(s): fine or fine-silty

Soil mineralogy: mixed

Cation exchange capacity: superactive

Soil reaction: slightly or moderately acid

Soils are silty or clayey. The rooting zone is saturated during the growing season. Soils classify as Inceptisols or Mollisols.

Soils correlated with this site include Faloma, Moag, Rafton, and Sauvie.

**Table 3. Representative soil features**

Parent material	(1) Alluvium
Family particle size	(1) Fine (2) Fine-silty
Drainage class	Poorly drained to very poorly drained

## Ecological dynamics

### Central Concept

This site occurs on the Columbia River floodplain. Adjacent river reaches contain freshwater but may be tidally-influenced. Low-energy, overbank flooding tends to deposit silty or clayey sediment. Prior to flood control, annual flooding peaked during June and July and soils were probably saturated through the summer months. Marsh vegetation was probably typical prior to flood control. The reference plant community is broadleaf arrowhead - grasslikes.

### Range in Variability

The contemporary hydroperiod varies across space due to constructed levees and pumping systems. This site probably supported a marsh reference community prior to Euro-American settlement, but hydrologic manipulations can enable the development of deciduous forest.

### Disturbance

Low-energy, overbank flooding is the most frequent disturbance. Prior to flood control, annual floods peaked in June or July (Christy 2004). Since flood control, timing, frequency, and duration has decreased. However, if a migrating

stream channel moves across this site, soils and flooding regime change to those of Levee Group, and plant communities will adjust accordingly.

Natural fire regime on adjacent forested riparian sites is infrequent and stand-replacing; the estimated mean fire return interval is 750 years (Henderson and Leshner, 2007). The cultural component of the disturbance regime prior to Euro-American settlement is unclear. Cultural burning could have occurred in some cases, but summer inundation may have made this site 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).

#### FORBS/GRASSLIKES:

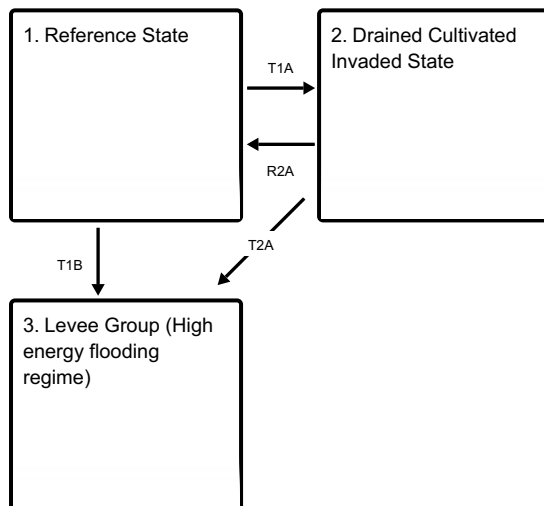
- broadleaf arrowhead (*Sagittaria latifolia*) \*
- American skunkcabbage (*Lysichiton americanus*) \*
- Rocky Mountain pond-lily (*Nuphar lutea* ssp. *polysepala*) \*
- sedge (*Carex* spp.) \*
- Columbian sedge (*Carex aperta*) \*
- rush (*Juncus* spp.) \*

#### TREES AND SHRUBS:

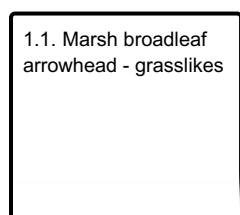
- rose spirea (*Spiraea douglasii*) \*
- willow (*Salix* spp.) \*
- Oregon ash (*Fraxinus latifolia*)
- black cottonwood (*Populus balsamifera* ssp. *trichocarpa*)
- red alder (*Alnus rubra*)

## State and transition model

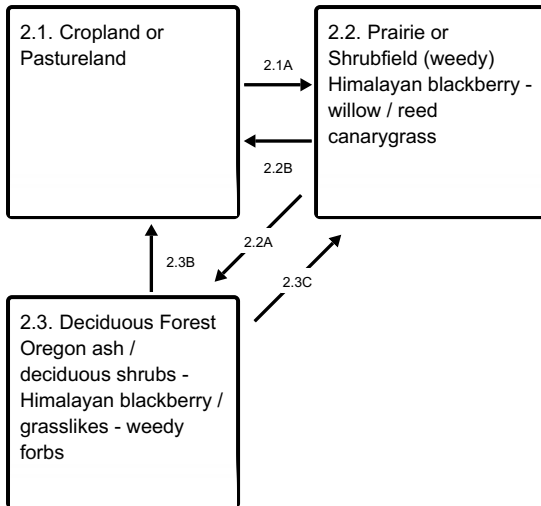
### Ecosystem states



### State 1 submodel, plant communities



## State 2 submodel, plant communities



## State 1 Reference State

### Community 1.1 Marsh broadleaf arrowhead - grasslikes

State 1 Annual ponding lasts into the summer Non-native plants are insignificant in this state. Reference Community Phase 1.1: broadleaf arrowhead -- grasslikes 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 State

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 / reed canarygrass

Structure: 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 - weedy forbs

Structure: 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.

**State 3**  
**Levee Group (High energy flooding regime)**

High energy flooding regime

**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.

**Transition T1B**  
**State 1 to 3**

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. This pathway requires a migrating stream channel to move across the site.

**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.

**Transition T2A**  
**State 2 to 3**

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. This pathway requires a migrating stream channel to move

across the site.

## Additional community tables

### Other references

- Adams, A. B., Dale, V. H., Smith, E. P., and Kruckeberg, A. R. (1987). Plant survival, growth form and regeneration following the 18 May 1980 eruption of Mount St. Helens, Washington. *Northwest Science*, 61(3): 160-170. <http://research.wsulibs.wsu.edu/xmlui/bitstream/handle/2376/1760/v61%20p160%20Adams%20et%20al.PDF?sequence>
- Agricultural Climate Information System. (2007). WETS Station Data for Corvallis State University, OR, 1971-2000. [Online]. Available at <http://agacis.rcc-acis.org/?fips=41003> (accessed on 5/7/2020).
- Agricultural Climate Information System. (2007). WETS Station Data for Vancouver 4 NNE, WA, 1971-2000. [Online]. Available at <http://agacis.rcc-acis.org/?fips=53011> (accessed on 5/7/2020).
- Balster, C.A., and Parsons, R.B. (1968). Geomorphology and soils Willamette Valley, Oregon. Oregon State University Experiment Station Special Report 265. <https://ir.library.oregonstate.edu/downloads/mg74qm961>
- Christy, J., and Alverson, E. (2011). Historical vegetation of the Willamette Valley, Oregon, circa 1850. *Northwest Science*. 85(2):93-107. <https://doi.org/10.3955/046.085.0202>
- Christy, J.A., Alverson, E.R., Dougherty, M.P., Kolar, S.C., Alton, C.W., Hawes, S.M., Ashkenas, L., and Minear, P. (2011). GLO historical vegetation of the Willamette Valley, Oregon, 1851-1910. ArcMap shapefile, Version 2011\_04. Oregon Biodiversity Information Center, Portland State University. Available at [http://www.pdx.edu/sites/www.pdx.edu.pnwlamp/files/glo\\_willamette\\_2011\\_04.zip](http://www.pdx.edu/sites/www.pdx.edu.pnwlamp/files/glo_willamette_2011_04.zip) (accessed on 11/14/2019).
- Christy, J. (2004). Native freshwater plant associations of northwestern Oregon. Oregon Natural Heritage Information Center, Oregon State University. <https://ir.library.oregonstate.edu/concern/defaults/2z10wt98x>
- Franklin, J., and Dyrness, C. (1973). Interior valleys of western Oregon. p. 110-129. In *Natural Vegetation of Oregon and Washington*. United States Department of Agriculture Forest Service, Pacific Northwest Forest and Range Experiment Station. General Technical Report PNW-8.
- Henderson, J., and Leshner, R. (2007). North Pacific Lowland Riparian Forest and Shrubland. p. 311-314. In *LANDFIRE Biophysical Setting Model Descriptions*. [Online]. Available at [https://www.landfire.gov/national\\_veg\\_models\\_op2.php](https://www.landfire.gov/national_veg_models_op2.php) (accessed on 6/3/2020).
- Hulse, D., Gregory, S., and Baker, J. (2002). Presettlement Vegetation circa 1850. p. 38-39. In *Pacific Northwest Ecosystem Research Consortium (ed.) Willamette River Basin Planning Atlas: Trajectories of Environmental and Ecological Change*. [Online]. Available at [http://www.fsl.orst.edu/pnwerc/wrb/Atlas\\_web\\_compressed/4.Biotic\\_Systems/4b.presetveg\\_web.pdf](http://www.fsl.orst.edu/pnwerc/wrb/Atlas_web_compressed/4.Biotic_Systems/4b.presetveg_web.pdf) (accessed on 9/28/2015).
- Johannessen, C. L., Davenport, W.A., Millet, A., and McWilliams, S. (1971). The vegetation of the Willamette Valley. *Annals of the Association of American Geographers*. 61(2):286-302.
- Kim, K.D., Ewing, K., and Giblin, D. E. (2006). Controlling *Phalaris arundinacea* (reed canarygrass) with live willow stakes: a density-dependent response. *Ecological Engineering*. 27(3): 219-227. <http://depts.washington.edu/waipc/docs/Phalaris%20arundinacea.pdf>
- Orr, E., Orr, W., and Baldwin, E. (1992). Willamette Valley. p. 203-221. In *Geology of Oregon*. 4th ed. Kendall/Hunt Publishing Company.
- Reckendorf, F. (1993). Geomorphology, stratigraphy, and soil interpretations, Willamette Valley, Oregon. p. 178-199. In J.M. Kimble (ed.) *Proceedings of the Eighth International Soil Management Workshop: Utilization of Soil Survey Information for Sustainable Land Use*. Oregon, California, and Nevada. 11-24 July 1992; May 1993. United

States Department of Agriculture Soil Conservation Service National Soil Survey Center.

Schoeneberger, P.J., Wysocki, D.A., Benham, E.C., and Soil Survey Staff. (2012). Field book for describing and sampling soils, Version 3.0. Natural Resources Conservation Service, National Soil Survey Center, Lincoln, NE.

Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. (2006). Land Resource Regions and Major Land Resource Areas of the United States, the Caribbean, and the Pacific Basin. Agricultural Handbook 296. [https://www.nrcs.usda.gov/Internet/FSE\\_DOCUMENTS/nrcs142p2\\_050898.pdf](https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_050898.pdf)

Soil Survey Staff. (2014). Keys to Soil Taxonomy, 12th ed. USDA-Natural Resources Conservation Service, Washington, DC.

Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. Official Soil Series Descriptions. Online. Available at [https://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/survey/geo/?cid=nrcs142p2\\_053587](https://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/survey/geo/?cid=nrcs142p2_053587) (accessed 2019 to 2020).

Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. Soil Survey Geographic (SSURGO) Database for Oregon (multiple counties). [Online]. Available at <https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm> (accessed in 2020).

Yeats, R.S., Graven, E.P., Werner, K.S., Goldfinger, C. and Popowski, T. (1996). Tectonics of the Willamette Valley, Oregon. p. 183-222. In Rogers, Albert M., Walsh, Timothy J., Kockelman, William J., and Priest, George R. (ed.) Assessing earthquake hazards and reducing risk in the Pacific Northwest. US Geological Survey Professional Paper 1560.

## Approval

Kirt Walstad, 5/09/2024

## 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:**

---

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:**

---