USDA Natural Resources
Conservation Service

Ecological site AX002X01X008
Puget Lowlands Riparian Forest

Last updated: 12/03/2024
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 in western parts of Washington and Oregon. It occupies a forearc basin between the Coast Ranges and the Cascade Mountain volcanic arc. The northern part contains Pleistocene drift, outwash, and 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, and the growing season is long. Mean annual precipitation ranges from 20 to 60 inches, received mostly in fall, winter, and spring. Summers are dry. The soil temperature regime is mesic, and the 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 grows in areas close to saltwater. Western hemlock (Tsuga heterophylla) is codominant with Douglas-fir in the north. Flood plains typically contain Brayshaw 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 (USDA, Agriculture Handbook 296, 2022).

LRU notes

This ecological site occurs in both the Puget Sound Trough Lowlands Land Resource Unit (LRU) and the Portland Basin and Hills LRU. The Puget Sound Trough LRU is bounded to the north by the Frasier River Valley at the international border with Canada and extends south to the Cowlitz River. To the west lie Puget Sound and the Strait of Juan De Fuca; to the east lie the foothills of the Cascade Range. The LRU is affected by the proximity of climate-moderating saltwater. Modest annual swings in temperature, winters that seldom experience freezing temperatures, adequate rainfall, and warm, dry summers support small-scale agriculture and forestry. This climate also supports the largest population and highest population density in the Northwest. Aside from isolated areas affected by local rain shadows and marine-influenced fog, the climate is consistent throughout the Puget Lowlands.

The LRU represents the furthest southern extent of repeated advances of continental glaciers in western Washington. Glacial drift is the predominant parent material. The LRU also includes intermittent areas of glacially modified, resistant bedrock and several alluvial systems. Volcanic ash is present but intermittent. Soil moisture varies considerably over short distances. This variability creates a mosaic of small plant communities. Soil drainage can be restricted by dense glaciomarine sediments or till. This restriction can create widespread areas of seasonal high water tables and ponding. In places, soils that developed in deep, unconsolidated, coarse-textured sandy drift or in bedrock- restricted colluvium have low available water capacity. South-facing areas near shorelines and minor outwash plains are typically some of the drier areas in the LRU. Precipitation increases with elevation and distance from Puget Sound.

The Portland Basin and Hills Land Resource Unit (LRU B) is in southwestern Washington and northwestern Oregon. The LRU extends north to the Cowlitz River and transitions to the Willamette Valley in the south. The Columbia River Gorge limits the eastern extent, and influence of tidewater at Cathlamet identifies the northwestern extent. Elevation ranges from sea level to about 2,000 feet. Major landforms include glaciofluvial terraces along the Columbia River, as well as residual hills and foothills surrounding the basin. Minor areas of Columbia River flood plain are present in Washington and more extensively in Oregon. Residual hills are composed primarily of Quaternary-Pliocene and Tertiary volcanic and sedimentary rocks. The lower-relief basin is composed primarily of sediment from catastrophic Quaternary glacial flooding from Glacial Lake Missoula.

In Washington, 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 220 days. Locations near the Columbia River Gorge experience strong winds and infrequent ice storms with little winter snow. Average daily maximum temperatures in summer at Vancouver, Washington, are 1 to 3 degrees F warmer compared to Seattle or Olympia, Washington (Agricultural Climate Information System, 2007a, 2007b).

Oregon white oak and Douglas-fir are common north of the Columbia River in Washington. Western redcedar and western hemlock grow in areas of higher moisture, at higher elevations, or on protected aspects.

Ecological site concept

This ecological site is in riparian corridors on stream terraces and flood plain steps. The soils are alluvial. The site is at lower elevations that have abundant precipitation. The climate has warm, moist summers and cool, wet winters with rare snowfall that does not persist.

Soil parent material is alluvium. The soils are typically subject to flooding from November to April. The smaller, more frequent flood events typically cause only minor scouring in comparison with the greater- magnitude, 100- to 500-year floods.

Associated sites

AX002X01X007	**Puget Lowlands Wet Hemlock Forest**
AX002X01X002	**Puget Lowlands Tidal Flat**
AX002X01X003	**Puget Lowlands Peat Wetlands**

Similar sites

AX002X01X007	**Puget Lowlands Wet Hemlock Forest**

Table 1. Dominant plant species

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

Legacy ID

F002XA008WA

Physiographic features

Table 2. Representative physiographic features

Landforms	(1) Stream terrace (2) Flood plain
Flooding duration	Brief (2 to 7 days) to very long (more than 30 days)

Flooding frequency	Occasional to frequent
Ponding duration	Brief (2 to 7 days)
Ponding frequency	None to frequent
Elevation	0–152 m
Slope	0–5%
Ponding depth	0–13 cm
Aspect	W, NW, N, NE, E, SE, S, SW

Table 3. Representative physiographic features (actual ranges)

Flooding duration	Not specified
Flooding frequency	Not specified
Ponding duration	Not specified
Ponding frequency	Not specified
Elevation	0–457 m
Slope	0–15%
Ponding depth	Not specified

Climatic features

Mean annual air temperature: 48 to 52 degrees Fahrenheit

Table 4. Representative climatic features

Frost-free period (characteristic range)	48-52 days
Freeze-free period (characteristic range)	
Precipitation total (characteristic range)	762-2,032 mm

Influencing water features

Soil features

Surface textures: Silt loams, loams, and silty clay loams
Soil family textures: Sandy, coarse-loamy, loamy-skeletal, and sandy-skeletal
Parent material: Alluvium
Soil depth: Greater than 60 inches
Soil drainage: Somewhat poorly to somewhat excessively drained
Available water capacity in the top 40 inches: 3 to 15 in/in

pH in water: 5.1 to 6.5

Ecological dynamics

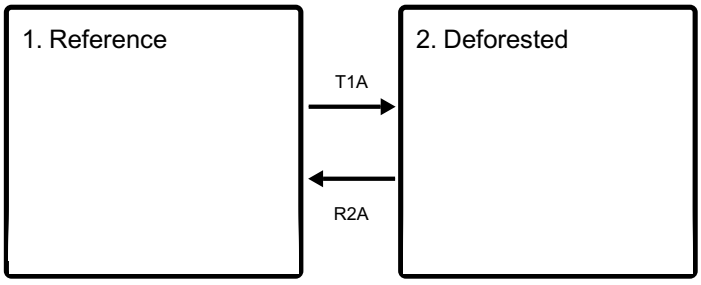
Black cottonwood (*Populus balsamifera* spp. Trichocarpa), Oregon ash (*Fraxinus latifolia*), and red alder (*Alnus rubra*) are the most common trees in the overstory. Black cottonwood is prevalent throughout the range of the site; Oregon ash is more common in areas south of Seattle (Owston 1949). Other trees include bigleaf maple (*Acer macrophyllum*), and cascara (*Frangula purshiana*). Conifers, such as Douglas-fir (*Pseudotsuga menziesii*), western redcedar (*Thuja plicata*), and grand fir (*Abies grandis*), can grow in late seral sites or on terraces.

Understory species diversity is greatest near the streams because erosion and deposition create small openings for pioneering species. Understory species include willow (Salix), salmonberry (*Rubus spectabilis*), thimbleberry (*Rubus parviflorus*), elderberry (*Sambucus racemosa*), red osier dogwood (*Cornus sericea*), vine maple (*Acer circinatum*), and western swordfern (*Polystichum munitum*).

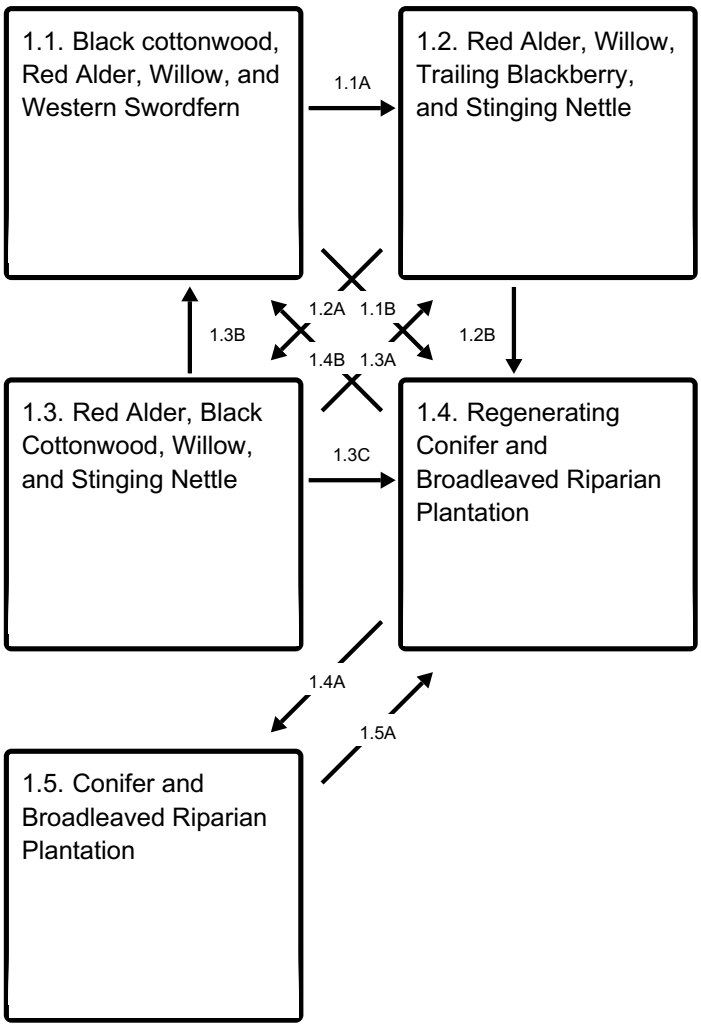
The most common natural disturbance is flooding. The volume and longevity of the flooding determine the effect on the dynamics of the forest. Although wildfire is uncommon in this ecological site, stand-replacing fires can occur at intervals of greater than 450 years, and local tribes likely used fire for specific resource management within this ecological site. Fallen trees that have exposed root systems are common. The presence of large woody debris is also common.

State and transition model

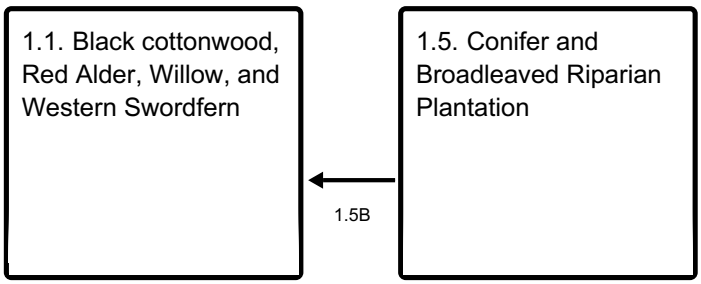
Ecosystem states



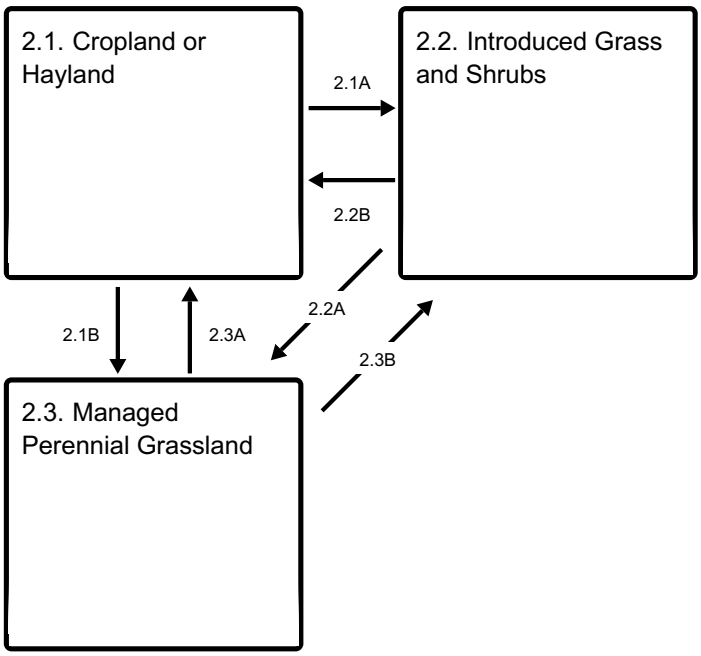
State 1 submodel, plant communities



Communities 1 and 5 (additional pathways)



State 2 submodel, plant communities



State 1
Reference

Lowlands Riparian Forest

Community 1.1
Black cottonwood, Red Alder, Willow, and Western Swordfern

Structure is mature deciduous forest with a mix of shrubs in the understory. Black cottonwood and red alder are the most dominant overstory species in this community. Western hemlock, Douglas-fir, western redcedar, and grand fir may also be present, but periodic major flooding restricts aging of conifers so that they typically do not reach very old age in this ESD, and broadleaved species remain dominant. Conifers are more common further from the active alluvial areas. Regeneration of trees generally is restricted by canopy cover and commonly limited to gaps where sunlight and exposed mineral soil are most available. Community 1.1 represents a lack of major flooding for at least 75 years, allowing pioneering species to form a mature canopy. Black cottonwood is fast growing, and this amount of time allows them to become quite large trees and dominate the overstory. The lack of flooding also permits growth of understory shrubs, including salmonberry, vine maple, stink currant, thimbleberry, and snowberry (*Symphoricarpos albus*). Common forbs are western swordfern, false lily of the valley (*Maianthemum dilatatum*), and ladyfern (*Athyrium filix-femina*). Disturbances include small gap dynamics (1/2-acre openings or smaller) following the decline of the red alder canopy, minor scouring from flooding, and mass movement. Soil deposition following minor scouring from smaller scale and periodic flooding temporarily affects the understory community, but it does not alter the composition of the overstory. Animal activity, such as dam-building by North American beaver (Castor canadensis), can change the hydrology.

Dominant plant species

- black cottonwood (*Populus balsamifera ssp. trichocarpa*), tree
- red alder (*Alnus rubra*), tree
- Oregon ash (*Fraxinus latifolia*), tree
- willow (*Salix*), shrub
- vine maple (*Acer circinatum*), shrub
- salmonberry (*Rubus spectabilis*), shrub
- stink currant (*Ribes bracteosum*), shrub
- thimbleberry (*Rubus parviflorus*), shrub
- common snowberry (*Symphoricarpos albus*), shrub
- red elderberry (*Sambucus racemosa*), shrub
- redosier dogwood (*Cornus sericea*), shrub
- western swordfern (*Polystichum munitum*), other herbaceous
- false lily of the valley (*Maianthemum dilatatum*), other herbaceous
- common ladyfern (*Athyrium filix-femina*), other herbaceous

Community 1.2
Red Alder, Willow, Trailing Blackberry, and Stinging Nettle

Structure is bare ground with scattered tree, shrub, and grass establishment. This community consists of riparian forest undergoing regeneration or stand initiation immediately following major flooding disturbance. The soil surface quite often has been scoured or covered by alluvial sediment. Some mature trees may be present. Increased amounts of downed woody debris can also be present. Bare ground permits rapid spread of pioneering species. Red alder typically establishes from large numbers of seed very quickly, especially on deposits of finer sediment. Willow (Salix sp) will often establish in abundance from vegetative sprouting of buried stems or roots within areas where alluvial deposits have covered previously rooted willow stems or new stems carried downstream in floodwaters. If Oregon ash is present, it may also establish quickly from vegetative regeneration as underground roots and buried stems may re-sprout. Salmonberry, trailing blackberry (*Rubus ursinus*), and stinging nettle (Urdica dioica) also establish quickly during this phase.

Dominant plant species

- red alder (*Alnus rubra*), tree
- Oregon ash (*Fraxinus latifolia*), tree
- willow (*Salix*), shrub
- salmonberry (*Rubus spectabilis*), shrub
- California blackberry (*Rubus ursinus*), shrub
- stinging nettle (*Urtica dioica*), other herbaceous

Community 1.3
Red Alder, Black Cottonwood, Willow, and Stinging Nettle

Structure: Dense single story with diminished understory This community consists of early

seral forest with scattered remnant mature trees in places. Competition is increased among individual trees for available water, light, and nutrients. Red alder dominates the overstory and is typically very dense. Because of a limited lifespan of 40 to 70 years, red alder trees will eventually decline and permit more light to penetrate. Black cottonwood is regenerating and beginning to push through the red alder and Oregon ash canopy. Shade tolerant forbs, such as western swordfern, begin to establish during this phase.

Dominant plant species

- black cottonwood (*Populus balsamifera ssp. trichocarpa*), tree
- red alder (*Alnus rubra*), tree
- salmonberry (*Rubus spectabilis*), shrub
- willow (*Salix*), shrub
- stinging nettle (*Urtica dioica*), other herbaceous

Community 1.4
Regenerating Conifer and Broadleaved Riparian Plantation

Structure is single story small trees and shrubs. This community consists of regenerating conifers that have been planted into a young riparian forest or on a riparian site with recent major disturbance. Red alder often regenerates naturally at very high densities, resulting in a dense, young forest. Riparian broadleaved trees, shrubs and mixed herbaceous species typically occupy space between planted saplings. These may include red alder, willow, Oregon ash, black cottonwood, salmon berry, thimbleberry, snowberry, and sword fern, among others. Introduced Himalayan blackberry (*Rubus armeniacus*) may present, usually at the expense of native shrubs or planted trees. Snags are very few or absent. Downed woody debris may be abundant or limited depending on thoroughness of its reduction during any prior timber harvest.

Dominant plant species

- red alder (*Alnus rubra*), tree
- Douglas-fir (*Pseudotsuga menziesii*), tree
- western hemlock (*Tsuga heterophylla*), tree
- western redcedar (*Thuja plicata*), tree
- grand fir (*Abies grandis*), tree
- willow (*Salix*), shrub
- salmonberry (*Rubus spectabilis*), shrub
- thimbleberry (*Rubus parviflorus*), shrub

Community 1.5
Conifer and Broadleaved Riparian Plantation

Structure is single story forest of even-aged trees. This community is the management-controlled climax condition for conifers in this ecological site. The overstory is even-aged and is a mix of conifers and typical riparian broadleaved species. Trees are usually less

than 100 years old. The understory is usually relatively well-vegetated with a mix of shrubs, small understory trees and herbaceous species, especially salmon berry, thimbleberry, skunk cabbage, and sedges. Large snags are few or absent.

Dominant plant species

- Douglas-fir (*Pseudotsuga menziesii*), tree
- western redcedar (*Thuja plicata*), tree
- grand fir (*Abies grandis*), tree
- western hemlock (*Tsuga heterophylla*), tree
- red alder (*Alnus rubra*), tree
- cottonwood (*Populus*), tree
- salmonberry (*Rubus spectabilis*), shrub
- redosier dogwood (*Cornus sericea*), shrub
- willow (*Salix*), shrub
- red elderberry (*Sambucus racemosa*), shrub
- thimbleberry (*Rubus parviflorus*), shrub
- western swordfern (*Polystichum munitum*), other herbaceous

Pathway 1.1A
Community 1.1 to 1.2

This pathway represents a stand-replacing wildfire, catastrophic windstorm, major 100- or 500-year flood event, or mass movement that scours the stream channel, removes understory and overstory vegetation, and may alter the stream flow. This type of disturbance can completely reconfigure sediment loads and dramatically reduce or eliminate the forest overstory.

Pathway 1.1B
Community 1.1 to 1.4

This pathway represents a stand-replacing wildfire, catastrophic windstorm, major 100- or 500-year flood event, harvest of riparian forest, or mass movement that scours the stream channel, removes understory and overstory vegetation, and may alter the stream flow. This is followed by an effort to replant conifers for a plantation. This type of disturbance can completely reconfigure sediment loads and dramatically reduce or eliminate the forest overstory.

Pathway 1.2A
Community 1.2 to 1.3

This pathway represents growth over time with no further major disturbance. Minor disturbances open space for regeneration of black cottonwood.

Pathway 1.2B

Community 1.2 to 1.4

This pathway represents an effort to establish conifers among the young broadleaved riparian forest. Minor disturbances open space for regeneration of black cottonwood and other regenerating broadleaved species.

Pathway 1.3B
Community 1.3 to 1.1

This pathway represents growth over time with only minor disturbances and overstory alder mortality that opens up space for black cottonwood and conifers to regenerate.

Pathway 1.3A
Community 1.3 to 1.2

This pathway represents a stand-replacing wildfire, catastrophic windstorm, major 100- or 500-year flood event, or mass movement that scours the stream channel, removes understory and overstory vegetation, and may alter the stream flow. This type of disturbance may completely reconfigure sediment loads and dramatically reduce or eliminate the forest overstory.

Pathway 1.3C
Community 1.3 to 1.4

This pathway represents a stand-replacing wildfire, catastrophic windstorm, major 100- or 500-year flood event, timber harvest, or mass movement that scours the stream channel, removes understory and overstory vegetation, and may alter the stream flow. This is followed by an effort to replant conifers for a plantation. This type of disturbance may completely reconfigure sediment loads and dramatically reduce or eliminate the forest overstory.

Pathway 1.4B
Community 1.4 to 1.1

This pathway represents a stand-replacing wildfire, catastrophic windstorm, major 100- or 500-year flood event, or mass movement that scours the stream channel, removes understory and overstory vegetation, and may alter the stream flow. This type of disturbance may completely reconfigure sediment loads and dramatically reduce or eliminate the forest overstory.

Pathway 1.4A
Community 1.4 to 1.5

This pathway represents growth over time with only minor disturbances and overstory alder mortality that opens up space for black cottonwood and conifers to regenerate and

ascend to canopy dominance.

Pathway 1.5B
Community 1.5 to 1.1

This pathway represents a stand-replacing wildfire, catastrophic windstorm, major 100- or 500-year flood event, or mass movement that scours the stream channel, removes understory and overstory vegetation, and may alter the stream flow. This type of disturbance may completely reconfigure sediment loads and dramatically reduce or eliminate the forest overstory.

Pathway 1.5A
Community 1.5 to 1.4

This pathway represents a stand-replacing wildfire, catastrophic windstorm, major 100- or 500-year flood event, timber harvest, or mass movement that scours the stream channel, removes understory and overstory vegetation, and may alter the stream flow. This is followed by an effort to replant conifers for a plantation. This type of disturbance may completely reconfigure sediment loads and dramatically reduce or eliminate the forest overstory.

State 2
Deforested

Community 2.1
Cropland or Hayland

Structure: Annual or perennial non-native species monoculture This community phase consists of a range of crops, including annually planted species, short-lived perennial species, and more permanent perennial crops. Hay and grasses and legumes for silage are included in this community.

Community 2.2
Introduced Grass and Shrubs

Structure: Annual or perennial herbaceous or shrubby species Community 2.2 is characterized by low-level or more intermittent management activity such as occasional or light grazing or sporadic mowing. This plant community is dominated by introduced weedy species and the less frequent disturbance supports a shrubbier character with thickets of regenerating broadleaved trees. The site is grazed, mowed or burned often enough to prevent re-establishment of forest. Dominant shrubs are typically invasive rhizomatous species that form thickets such as Himalayan blackberry (*Rubus armeniacus*). Some tougher native shrub species such as California blackberry (*Rubus ursinus*) and salmonberry may be interspersed. Areas where ponding or brief inundation occurs

commonly support non-native rhizomatous grasses. Between shrub thickets introduced pasture species such as tall fescue (*Schedonorus arundinaceus*), orchardgrass (*Dactylis glomerata*), and common velvet grass (*Holcus lanatus*) are dominant. Alder and black cottonwood are regularly present in seedling thickets or as individual small seedlings.

Dominant plant species

- red alder (*Alnus rubra*), tree
- Himalayan blackberry (*Rubus armeniacus*), shrub
- California blackberry (*Rubus ursinus*), shrub
- salmonberry (*Rubus spectabilis*), shrub
- tall fescue (*Schedonorus arundinaceus*), grass
- orchardgrass (*Dactylis glomerata*), grass
- common velvetgrass (*Holcus lanatus*), other herbaceous

Community 2.3
Managed Perennial Grassland

Structure is perennial herbaceous species. This community phase is an introduced grassland that receives regular grazing or mowing disturbance and may include soil amendments such as fertilizers or lime. Weeds are aggressively controlled and desired herbaceous species are reseeded as necessary. Grazing, mowing and other weed control actions prevent the phase from transitioning to a forested state. This plant community is typically dominated by introduced perennial pasture species that are seeded after clearing or invade the site from nearby areas. Common species include tall fescue (*Schedonorus arundinaceus*), orchardgrass (*Dactylis glomerata*), velvet grass (*Holcus lanatus*), and red fescue (*Festuca rubra*).

Dominant plant species

- tall fescue (*Schedonorus arundinaceus*), grass
- orchardgrass (*Dactylis glomerata*), grass
- common velvetgrass (*Holcus lanatus*), grass
- red fescue (*Festuca rubra*), grass

Pathway 2.1A
Community 2.1 to 2.2

In the absence of agronomic and livestock management activities, seeds from surrounding weedy plant communities are transported to the site by wind, animals, or vehicle traffic, and the adapted species become established. Management activities include tilling; adding soil nutrients and other soil amendments, such as lime; mowing; burning; harvesting or chemically controlling vegetation; planting desirable herbaceous species; and implementing grazing management plans.

Pathway 2.1B
Community 2.1 to 2.3

This pathway occurs by intentional establishment of a perennial grass-dominated plant community. Often, the site will be prepped for seeding and desired pasture species artificially sown. In some cases, simply discontinuing crop production activities may allow the site to transition to grass, provided emergence of woody shrubs or trees is actively controlled with mowing, fire, or chemical treatment. Consistent grazing is essential to the maintenance of this community and to prevent establishment of woody shrubs. Other maintenance practices, such as targeted mowing, prescribed fire, chemical treatment, or other mechanical treatment are utilized as needed.

Pathway 2.2B
Community 2.2 to 2.1

This pathway represents agronomic activities. Examples include tilling; adding soil nutrients and other soil amendments, such as lime; mowing; burning; harvesting or chemically controlling vegetation; and planting desirable crop species.

Pathway 2.2A
Community 2.2 to 2.3

This pathway represents agronomic and livestock management activities. Examples include tilling; adding soil nutrients and other soil amendments, such as lime; mowing; burning; harvesting or chemically controlling vegetation; planting desirable herbaceous species; and implementing grazing management plans.

Pathway 2.3A
Community 2.3 to 2.1

This pathway represents agronomic activities. Examples include tilling; adding soil nutrients and other soil amendments, such as lime; mowing; burning; harvesting or chemically controlling vegetation; and planting desirable crop species.

Pathway 2.3B
Community 2.3 to 2.2

In the absence of agronomic and livestock management activities, seeds from surrounding weedy plant communities are transported to the area by wind, floodwater, animals, or vehicle traffic, and the adapted species become established. Management activities include tilling; adding soil nutrients and other soil amendments, such as lime; mowing; burning; harvesting or chemically controlling vegetation; planting desirable herbaceous species; and implementing grazing management plans.

Transition T1A
State 1 to 2

This transition is caused by an intentional clearing of land or a major disturbance such as a stand replacing fire or major flood in state 1, followed by intense, frequent disturbance such as grazing, mowing, crop production, or frequent fire to prevent trees from re-establishing. This transition can be initiated from any community phase in state 1. Disruption of the hydrologic regime by ditching and draining the site or building levies may or may not occur.

Transition R2A
State 2 to 1

This restoration occurs by artificial or natural re-establishment over time of species resembling overstory and understory diversity typical of the reference state. This transition can be initiated from any community phase in state 2. If the hydrologic regime is intact and flooding can occur regularly, allowing the site to naturally regenerate to shrubs and forest is usually all that is needed. In some cases, treatment of invasive species such as Himalayan blackberry may improve the rate of restoration. If levies or drainage ditches interrupt the hydrologic disturbance process, then removal of ditches, water control structure and levies will be required to restore the reference state.

Additional community tables

Inventory data references

Relationship to Other Established Classifications:

National Vegetation Classification Group: G851 North-Central Pacific Lowland Riparian Forest Group and A3743 Oregon Ash–Black cottonwood–Alder Riparian Forest Alliance

Washington Department of Natural Resources, Ecological Systems of Washington State: North Pacific Lowland Riparian Forest and Shrubland

Other references

United States National Vegetation Classification. 2016. United States National Vegetation Classification Database, V2.0. Federal Geographic Data Committee, Vegetation Subcommittee, Washington DC. (accessed 11 October 2020).

Owston, P. W. (1949). *Fraxinus latifolia* Benth. Oregon Ash. Agriculture Handbook, 2(654), 339.

Washington Department of Natural Resources, Natural Heritage Program. 2015. Ecological systems of Washington State. A Guide to identification.

Contributors

Erik Dahlke
Erin Kreutz
Marty Chaney
Stephanie Shoemaker
Mathew Cocking

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	05/21/2025
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):**

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5. **Number of gullies and erosion associated with gullies:**

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6. **Extent of wind scoured, blowouts and/or depositional areas:**

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7. **Amount of litter movement (describe size and distance expected to travel):**

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8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):**

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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:

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:**