Ecological site AX001X02X001
Mesic Udic Riparian Forest

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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 North Pacific Coast Range land resource unit (LRU 2) of MLRA 1 is located in the northwestern corner on the Olympic Peninsula and within the Olympic National Forest in Washington State. LRU 2 is bounded on the west by MLRA 4a Sitka Spruce Belt and MLRA 2 Willamette and Puget Sound Valleys to the east. LRU 2 encircles the Olympic National Park (LRU 1). Several major rivers have headwaters in this LRU or carved valleys through the landscape depositing more recent alluvium. These include the Duckabush, Elwha, Queets, Quinault, Skokomish, Sol Duc, and Wynoochee Rivers.

Ecological site concept

This ecological site is found on the western Coast Range on the Olympic Peninsula in Washington state. It is found in riparian corridors on stream terraces and flood plain steps on alluvial soils. It is located at low elevations (less than 1,000 ft.) with abundant precipitation. These areas are subject to stream overflow. Riparian ecological sites typically differ in topography, vegetation, geomorphology, and microclimate from the surrounding uplands of the forest ecosystem (Dwire, 2003). Conifers such as western hemlock (Tsuga heterophylla), Douglas-fir (Pseudotsuga menziesii), western redcedar (Thuja plicata), and grand fir (Abies grandis) occur in late seral sites or on terraces. Recently disturbed areas are dominated by hardwoods such as black cottonwood (Populus balsamifera ssp. trichocarpa), red alder (Alnus rubra), and bigleaf maple (Acer macrophyllum). Regeneration is restricted by canopy cover and often limited to gaps where sunlight is most available and mineral soil is exposed from scouring (Pabst, 1999). Understory species diversity is greatest near the streams as a result of erosion and deposition creating openings for opportunistic species as well as the abundance of microsites which create unique environments (Spies, et. al, 2002). Common understory species include willows (Salix spp.), salmonberry (Rubus spectabilis), thimbleberry (Rubus parviflorus), elderberry (Sambucus racemosa), redosier dogwood (Cornus sericea), vine maple (Acer circinatum), western swordfern (Polystichum munitum), ladyfern (Athyrium filix-femina), and Oregon oxalis (Oxalis oregana). The most common natural disturbance is flooding, with the volume and longevity of the flooding determining the effect on the dynamics of the forest. Although wildfire is uncommon in this ecological site (greater than 450-year return interval) when it does occur, it may be stand replacing (Balian, 2005). Fallen trees with exposed root systems and large woody debris is common.

Associated sites

AX001X02X003	**Mesic Aquic Forest** Mesic Udic Riparian Forest is located adjacent to Mesic Aquic Forest. Mesic Udic Riparian Forest is located on flood plain steps and riparian corridors that are affected by flooding. Mesic Aquic Forest is prone to ponding disturbance.

Similar sites

AX001X03X001	**Mesic Udic Riparian Forest** This site is similar in ecological function and shares many similar vegetative components. However, this site is located further south in the MLRA and is within LRU C. The presence of Oregon Ash (Fraxinus latifolia) is a strong indicator for LRU C.

Table 1. Dominant plant species

Tree	(1) *Tsuga heterophylla* (2) *Pseudotsuga menziesii*
Shrub	(1) *Rubus spectabilis*
Herbaceous	(1) *Polystichum munitum* (2) *Oxalis oregana*

Legacy ID

F001XB001WA

Physiographic features

This ecological site occurs across many landscape positions in the valleys, floodplains, and terraces. The site is most commonly found between 0 to 10 percent on floodplains and terraces of river valley bottoms.

Table 2. Representative physiographic features

Landforms	(1) River valley > Flood plain (2) River valley > Fluvial terrace
Flooding frequency	None to frequent
Ponding frequency	None
Elevation	0 – 310 m
Slope	0 – 10 %
Aspect	N, NE, E, SE, S

Climatic features

The climate has warm, moist summers and cool, wet winters. Precipitation occurs as rain, and the mean annual precipitation ranges from 50 to 100 inches. Mean annual temperatures range from 48 to 52 degrees F (PRISM Climate Group, 2019).

Table 3 Representative climatic features

Frost-free period (characteristic range)	150-150 days
Freeze-free period (characteristic range)	220-220 days
Precipitation total (characteristic range)	1,270-2,540 mm

Climate stations used

- (1) ABERDEEN 20NNE [USC00450013], Aberdeen, WA
- (2) FORKS 1 E [USC00452914], Forks, WA

Influencing water features

This site is located at low elevations on terraces and floodplains. This site does not experience ponding. Flooding frequency is rare, however 100 or 500-year floods may dramatically alter the landscape. The soils water table will typically rise during the spring months and recede in the fall.

Soil features

Soils that support this ecological site occur in the mesic soil temperature regime and the udic soil moisture regime. They are formed in alluvium on flood plain step and steam terrace positions. Soil moisture is not a limiting factor to forest growth due to the abundance of precipitation. These soils are typically subject to flood events from November to April. The smaller, more frequent flood events typically only cause minor scouring in comparison with greater-magnitude 100- to 500-year floods.

Table 4. Representative soil features

Parent material	(1) Alluvium
Surface texture	(1) Silt loam (2) Loamy sand (3) Sandy loam
Family particle size	(1) Sandy or sandy-skeletal (2) Medial
Drainage class	Moderately well drained to somewhat excessively drained
Permeability class	Moderately rapid to rapid
Soil depth	150 cm

Surface fragment cover <=3"	0 – 30 %
Surface fragment cover >3"	Not specified
Clay content (Depth not specified)	0 – 30 %
Subsurface fragment volume <=3" (Depth not specified)	0 – 40 %
Subsurface fragment volume >3" (Depth not specified)	Not specified

Ecological dynamics

State and transition model

Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 6. Community 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 7. Community 1.3 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 8. Community 1.4 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 9. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 10. Community 2.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 11. Community 2.3 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Inventory data references

Other Established Classifications for Ecological Site National vegetation classification: G851 North-Central Pacific Lowland Riparian Forest Forest alliance: A3746 Sitka Spruce-Western Hemlock-Red Alder Forest Alliance and A3745 Bigleaf Maple- Red alder Riparian Forest Alliance Ecological Systems of Washington State community type: North Pacific Lowland Riparian Forest and Shrubland

Other references

Balian, E., Naiman, R. 2005. Abundance and Production of Riparian Trees in the Lowland Floodplain of the Queets River, Washington. Ecosystems, Vol 8 pg 841-861.
Dwire, K. and Kauffman, J. 2003. Fire and Riparian Ecosystems in Landscapes in the Western United States. Forest Ecology and Management, Vol. 178 pp 61-74.
Fonda, R.W. 1974. Forest Succession in Relation to River Terrace Development in Olympic National Park, Washington. Ecology, 55(5): 927-942.
Franklin, J.F., and Dyrness C.T. 1973. Natural Vegetation of Oregon and Washington. Oregon State University press, Corvallis, USA.
Goheen, E.M. and Willhite, E.A. 2006. Field Guide to Common Diseases and Inspect Pests of Oregon and Washington Conifers. Portland, Oregon: USDA Forest Service, Pacific Northwest Region R6-NR-FID-PR-01-06.
Naiman, R., Bechtold, S., Beechie, T., Latterell, J., Van Pelt, R. 2009. A Process-Based View of Floodplain Forest Patterns in Coastal River Valleys of the Pacific Northwest. Ecosystems, Vol 13 pp 1-31.
Henderson, J., Peter, D., Lesher, R., Shaw, D. 1989. Forested Plant Associations of the Olympic National Forest. United States Department of Agriculture Forest Service, Pacific Northwest Region. Technical Paper R6-ECOL-TP 001-88.

Pabst, R., Spies, T. (1999). Structure and composition of unmanaged riparian forest in the coastal mountains of Oregon, U.S.A. Canadian Journal for Forestry Research, Vol 29 pp 1557-1573.
Packee, E.C. 1990. Tsuga heterophylla. Silvics of North American [Online]. U.S. Department of Agriculture, Forest Service, Northeastern Area.
Pojar J., and MacKinnon. 1994. Plants of the Pacific Northwest Coast. Lone Pine, Vancouver, British Columbia. 528 pages.
PRISM Climate Group, Oregon State University, http://prism.orgeonstate.edu, visited Feb., 2015.
Roccio, J., Crawford, R. 2015. Ecological Systems of Washington State. A Guide to Identification. Washington Department of Natural Resources Natural Heritage Report 2015-04.
Spies, T., Hibbs, D., Ohmann, J., Reeves, G., Pabst, R., Swanson, F., Whitlock, C., Jones, J., Wemple, B., Parendes, L., Schrader, B. (2002). The ecological basis of forest ecosystem management in the Oregon Coast Range. Forest and Stream Management in the Oregon Coast Range. Oregon State University Press, Corvallis, Oregon, USA. Pp 31-67.
Soil Survey Staff. 2014. Keys to Soil Taxonomy, 12th ed. USDA-Natural Resources Conservation Service, Washington, DC.
Soil Survey Staff. 1999. Soil Taxonomy: A Basic System of Soil classification for Making and Interpreting Soil Surveys. 2nd ed. USDA-Natural Resources Conservation Service. U.S. Department of Agriculture Handbook 436.
Steinberg, Peter D. 2001. Populus balsamifera subsp. trichocarpa. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory
Stolnack, S., Naiman, R. 2010. Patterns of Conifer establishment and Vigor on Montane River Floodplains in Olympic National Park, Washington, USA. Canadian Journal of Forest Resources, Vol. 40, pp 410-422.
United States National Vegetation Classification. 2016. United States National Vegetation Classification Database, V2.0. Federal Geographic Data Committee, Vegetation Subcommittee, Washington DC. (accessed 28, November, 2016.
Van Pelt, R., O'Keefe, T., Latterell, J., Naiman, R., 2006. Riparian forest stand development along the Queets River in Olympic National Park, Washington. Ecological Monographs, 76(2) pp. 277-298
Villarin, L., Chapin, D., Jones, J., 2009. Riparian forest structure and succession in second-growth stands of the central Cascade Mountains, Washington, USA. Forest Ecology and Management, Vol 257 pp. 1375-1385
Washington Department of Natural Resources, Natural Heritage Program. 2015. Ecological Systems of Washington State. A Guide to Identification.
Wimberly, M., Spies, T. (2001). Influences of Environmental and Disturbance on Forest Patterns in Coast Oregon Watersheds. Ecology, Vol 82 pp. 1443-1459.

Contributors

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Approval

Kirt Walstad, 1/23/2025

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	05/06/2024
Approved by	
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:**
