Ecological site R002XC011OR
Low Hill Group

Last updated: 11/27/2024
Accessed: 09/03/2026

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 is similar to following USDA Forest Service Plant Associations (McCain and Diaz, 2001) which emphasize late-successional plant communities: • grand fir / poison oak (CWS622) • grand fir / California hazel / inside-out flower (CWS555) • grand fir / oceanspray / sword fern (CWS529); grand fir / vine maple / sword fern (CWS527) • Douglas-fir / poison oak (CDC124) • Douglas-fir / California hazel - snowberry / sword fern (CDS312) • Douglas-fir / oceanspray - snowberry (CDS217) This ecological site group fits within the following LANDFIRE Biophysical Setting (BpS): • LANDFIRE Biophysical Setting: Willamette Valley Upland Prairie and Savanna (0211200)

Ecological site concept

This site occurs on hills. Soils are very deep to moderately deep, and well or moderately well drained. The rooting zone is dry 45 to 60 consecutive days during the summer.

Table 1. Dominant plant species

Tree	(1) *Quercus garryana* (2) *Pseudotsuga menziesii*
Shrub	Not specified
Herbaceous	(1) *Festuca idahoensis ssp. roemeri* (2) *Forb, perennial*

Physiographic features

Landform: sideslopes and footslopes of hills; high terraces, alluvial fans
Parent material: silty or loamy glaciolacustrine deposits or local alluvium over residuum
Elevation: 100 to 600 feet
Slope: 2 to 30 percent
Flooding: none
Ponding: none

This site occurs on the Dolph and Brateng geomorphic surfaces located around the edges of the Willamette Valley (Balster and Parsons, 1968; Reckendorf, 1993).

Table 2. Representative physiographic features

Hillslope profile	(1) Footslope (2) Backslope
Landforms	(1) Hill (2) Terrace (3) Alluvial fan
Flooding frequency	None
Ponding frequency	None
Elevation	30 − 180 m
Slope	0 − 30 %

Climatic features

Mean annual air temperature: 50 to 54 degrees F
Mean annual precipitation: 40 to 55 inches
Frost free period: 165 to 210 days

Influencing water features

None

Wetland description

None

Soil features

Drainage class: well drained or moderately well drained
Parent material: silty or loamy glaciolacustrine deposits or local alluvium over residuum Soil restrictive feature(s): none
Soil moisture regime: xeric
Soil moisture subclass: typic, oxyaquic, or aquic
Soil temperature regime: mesic
Particle-size family(s): fine, fine-loamy, or fine-silty
Soil mineralogy: mixed
Cation exchange capacity: superactive or active
Soil reaction: moderately or strongly acid

The rooting zone is usually dry 45 to 60 consecutive days during the summer which is typical of upland sites in this LRU. Soils usually classify as Alfisols, but those formed in basalt or with Missoula Flood deposits in the upper part can be Mollisols. In comparison to soils formed entirely in glaciolacustrine deposits (Valley Terrace Group) all soils here are more weathered and have lower native fertility.

Soils correlated with this site include Carlton, Dixonville, Gellatly, Goodin, Helvetia, Salkum, Santiam, Sawtell, Silverton, Sitton, Steiwer, Veneta, Wellsdale, and Willakenzie.

Table 3. Representative soil features

Parent material	(1) Glaciolacustrine deposits (2) Alluvium (3) Residuum
Family particle size	(1) Fine (2) Fine-loamy (3) Fine-silty
Drainage class	Moderately well drained to well drained

Ecological dynamics

Central Concept

This site occurs on hills. Soils are very deep to moderately deep, and well or moderately well drained. The rooting zone is dry 45 to 60 consecutive days during the summer which is typical for upland sites in this LRU. Conifer forest tends to develop, but the reference plant community is a savanna maintained through cultural burning. This savanna consists of Oregon white oak - Douglas-fir / Roemer’s fescue - forbs.

Range in Variability

Variation in soils and landscape position define subtypes with distinct reference communities. Thilenius (1968) recognized characteristic understory communities occurring within the range of settings described by this ecological site group: a beaked hazelnut/swordfern community on moist north aspects; a poison oak community on dry south aspects; and a Saskatoon serviceberry-common snowberry community in intermediate positions. Buechling et al. (2008) concluded that succession to conifer forest is most rapid on moist, well

drained sites. The water table present in moderately well drained soils may restrict rooting depth for conifers.

Disturbance

This site developed under a cultural burning regime. Fire return interval was approximately 1 to 10 years (Christy and Alverson, 2011). Fire has been generally excluded from this site since Euro-American settlement began around 1850. Tree-throw occurs in forested communities, especially where a seasonal water table exists in the soil profile. Camas pocket gophers (Thomomys bulbivorus) make burrows and mounds in early-seral communities (Oregon Department of Fish and Wildlife).

Plant Composition

Savanna (prairie with scattered trees) was typical prior to Euro-American settlement, but forested vegetation tends to develop in the absence of fire. Agee (1993) suggested 20 trees per acre as the maximum tree density for savannas in the Pacific Northwest. Day (2005) found as few as 7 trees per acre in savannas located on the Willamette National Forest.

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).

GRASSES:
Roemer's fescue (Festuca roemeri) *
Sandberg bluegrass (Poa secunda) *
prairie Junegrass (Koeleria macrantha) *
Lemmon's needlegrass (Achnatherum lemmonii) *
slender wheatgrass (Elymus trachycaulus) *
California oatgrass (Danthonia californica) *

FORBS:
small camas (Camassia quamash ssp. maxima) *
Suksdorf's large camas (Camassia leichtlinii ssp. suksdorfii) *
brodiaea (Brodiaea spp.) *
triteleia (Triteleia spp.) *
checker lily (Fritillaria affinis) *
desertparsley (Lomatium spp.) *
yampah (Perideridia spp.) *
tarweed (Madia spp.) *
balsamroot (Balsamorhiza spp.) *

TREES:
Oregon white oak (Quercus garryana) *
Douglas-fir (Pseudotsuga menziesii) *
ponderosa pine (Pinus ponderosa) *
bigleaf maple (Acer macrophyllum)
grand fir (Abies grandis)
Pacific madrone (Arbutus menziesii)
cascara buckthorn (Frangula purshiana)

SHRUBS:
common snowberry (Symphoricarpos albus)
creeping snowberry (Symphoricarpos mollis)
Saskatoon serviceberry (Amelanchier alnifolia)
beaked hazelnut (Corylus cornuta)
Indian plum (Oemleria cerasiformis)
rose (Rosa spp.)
California blackberry (Rubus ursinus)
black hawthorn (Crataegus douglasii)
Pacific poison oak (Toxicodendron diversilobum)
oceanspray (Holodiscus discolor)
hollyleaved barberry (Mahonia aquifolium)

State and transition model

Additional community tables

Table 4. Community 1.1 plant community composition

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

Table 5. Community 1.2 plant community composition

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

Table 6. Community 1.3 plant community composition

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

Table 7. Community 2.1 plant community composition

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

Table 8. Community 2.2 plant community composition

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

Table 9. Community 2.3 plant community composition

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

Table 10. Community 2.4 plant community composition

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

Table 11. Community 2.5 plant community composition

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

Table 12. Community 3.1 plant community composition

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

Table 13. Community 3.2 plant community composition

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

Table 14. Community 3.3 plant community composition

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

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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	
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:**
