Ecological site F002XC013OR
Foothill Group

Last updated: 12/03/2024
Accessed: 08/20/2026

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 / dwarf Oregon grape - salal (CWS528) • grand fir / oceanspray / sword fern (CWS529) • grand fir / vine maple / sword fern (CWS527) • Douglas-fir / poison oak (CDC124) • Douglas-fir / dwarf Oregon grape - salal (CDS512) • Douglas-fir / oceanspray - dwarf Oregon grape (CDS216) • Douglas-fir / dwarf Oregon grape (CDC711) • Douglas-fir / California hazel - snowberry / sword fern (CDS312) • Douglas-fir / oceanspray - snowberry (CDS217) This ecological site group also fits within the following LANDFIRE Biophysical Setting (BpS): •

Ecological site concept

This site occurs on steep foothills. Soils are brownish, well drained, and acidic. The rooting zone is dry 45 to 60 consecutive days during the summer.

Table 1. Dominant plant species

Tree	(1) *Abies grandis* (2) *Pseudotsuga menziesii*
Shrub	Not specified
Herbaceous	Not specified

Physiographic features

Landform: foothills
Parent material: colluvium and residuum from igneous and sedimentary rocks
Elevation: 400 to 1500 feet
Slope: 0 to 90 percent
Flooding: none
Ponding: none

This site occurs on the Looney surface (Balster and Parsons, 1968; Reckendorf, 1993).

Table 2. Representative physiographic features

Landforms	(1) Foothills > Hillside or mountainside
Flooding frequency	None
Ponding frequency	None
Elevation	120 – 460 m
Slope	0 – 90 %

Climatic features

Mean annual air temperature: 50 to 54 degrees F
Mean annual precipitation: 45 to 60 inches
Frost free period: 160 to 210 days

Influencing water features

No water influence of this ecological site.

Wetland description

None

Soil features

Drainage class: well drained
Parent material: colluvium and residuum from igneous and sedimentary rocks
Soil restrictive feature(s): usually none, but bedrock may occur below 20 inches
Soil moisture regime: xeric
Soil moisture subclass: typic
Soil temperature regime: mesic
Particle-size family(s): fine or clayey-skeletal
Soil mineralogy: mixed
Cation exchange capacity: superactive
Soil reaction: moderately or strongly acid

This site occurs on foothills at the edges of this LRU. Slopes are usually steep, and soil movement via tree-throw and other soil-creep processes is relatively rapid. Soils have brown to reddish hues. The rooting zone is usually dry 45 to 60 consecutive days during the summer which is typical of upland sites in this LRU. Soils classify as Inceptisols.

Soils correlated with this site include Price, MacDunn, Ritner, and Hullt.

Table 3. Representative soil features

Parent material	(1) Colluvium – igneous and sedimentary rock (2) Residuum – igneous and sedimentary rock
Family particle size	(1) Fine (2) Clayey-skeletal
Drainage class	Well drained

Ecological dynamics

Central Concept

This site occurs on steep foothills. Soils are brownish, well drained, and acidic. 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. The reference plant community is grand fir - Douglas-fir.

Range in Variability

Variation in soils and landscape position may define subtypes with distinct reference communities. Some southern exposures and convex hillslopes support drought-tolerant communities. Northern exposures and concave hillslopes may support plant communities where grand fir (Abies grandis) regenerates in the understory (McCain and Diaz, 2001). Salal (Gaultheria shallon) is common on sites transitional to MLRA 1 or 3. The water table present in moderately well drained soils may give hardwood trees competitive advantage by restricting rooting depth for conifers. Soils located on landslide deposits tend to have higher pH and base saturation (Parsons and Balster, 1966).

Disturbance

Fire is the dominant natural landscape level driver. Mixed severity and low severity fires dominate in this vegetation type. This type is transitional from the high frequency/low severity of the valley floor (likely assisted by cultural burning) and the lower frequency mixed severity regime of the higher elevation western hemlock types. Frequency of cultural burning generally decreased with distance from human settlements (Christy and Alverson, 2011). Given the location of this type, fire frequency may be quite variable. Historical fire has varied from 20-100 years mean fire return intervals (MFRI) (Weisberg 1997, Robbins 2004, Spies et al. 2018). Fire has been suppressed since modern wildland fire suppression efforts began. Wind, insects and pathogens, and infrequent landslides may also shape forest composition and pattern at finer scales. Human management is prevalent in this type, with activities such as regeneration harvest and thinning occurring within its range and dominating phase trajectories over fire (Spies et al. 2013). Tree-throw occurs in forested communities. Pocket gophers (Thomomys spp.) make burrows and mounds in early-seral communities (Oregon Department of Fish and

Wildlife).

Plant Composition

Conifer forest was typical prior to Euro-American settlement but fire suppression has generally led to denser forest stands. Savanna can be created and maintained on this site with difficulty due to competing woody vegetation and lack of frequent fire.

Grand fir - Douglas-fir forests have some of the highest levels of plant diversity compared with all western Oregon forests (McCain and Diaz 2001). Representative native plants are listed below. Not all species are present within the same community phase. Plant lists (especially for graminoids and herbs) are incomplete.

TREES:
Douglas-fir (Pseudotsuga menziesii (Mirb.) Franco)
grand fir (Abies grandis (Douglas ex D. Don) Lindl)
bigleaf maple (Acer macrophyllum Pursh)
Oregon white oak (Quercus garryana Douglas ex Hook)
ponderosa pine (Pinus ponderosa Lawson & C. Lawson)
Pacific madrone (Arbutus menziesii Pursh)
California black oak (Quercus kelloggii Newberry)
incense cedar (Calocedrus decurrens (Torr.) Florin)

SHRUBS:
vine maple (Acer circinatum Pursh)
Cascade barberry (Mahonia nervosa (Pursh) Nutt.)
cascara buckthorn (Frangula purshiana (DC.) A. Gray ssp. Purshiana)
salal (Gaultheria shallon Pursh)
common snowberry (Symphoricarpos albus (L.) S.F. Blake)
creeping snowberry (Symphoricarpos mollis Nutt.)
beaked hazelnut (Corylus cornuta Marshall)
dwarf rose (Rosa gymnocarpa Nutt.)
California blackberry (Rubus ursinus Cham. & Schltdl.)
Pacific poison oak (Toxicodendron diversilobum (Torr. & A. Gray) Greene)
oceanspray (Holodiscus discolor (Pursh) Maxim)
hollyleaved barberry (Mahonia aquifolium (Pursh) Nutt)
common whipplea (Whipplea modesta Torr.)

HERBS:
western swordfern (Polystichum munitum (Kaulf.) C. Presl)
sweetcicely (Osmorhiza berteroi DC.)
white insideout flower (Vancouveria hexandra (Hook.) C. Morren & Decne.)
starflower (Trientalis borealis Raf.)
woodland strawberry (Fragaria vesca L)
American trailplant (Adenocaulon bicolor Hook.)
sweet after death (Achlys triphylla (Sm.) DC.)
Columbian windflower (Anemone deltoidea Hook)
pale bellflower (Campanula scouleri Hook. ex A. DC.)
largeleaf sandwort (Moehringia macrophylla (Hook.) Fenzl)
western brackenfern (Pteridium aquilinum (L.) Kuhn)
snowqueen (Synthyris reniformis (Douglas ex Benth.) Benth.)
sweetscented bedstraw (Galium odoratum (L.) Scop.)
houndstongue hawkweed (Hieracium cynoglossoides Arv. -Touv.)
evergreen violet (Viola sempervirens Greene)
twinflower (Linnaea borealis L)
yerba Buena (Clinopodium douglasii (Benth.) Kuntze)

GRAMINOIDS:
Columbia brome (Bromus vulgaris (Hook.) Shear)
western fescue (Festuca occidentalis Hook.)
bearded fescue (Festuca subulata Trin.)
California fescue (Festuca californica Vasey)
sedge species (Carex L.)

Structural Descriptions Used in State and Transition Model
Phases are described by size class, cover class and layering. Size class description refers to either the average diameter of the dominant

and co-dominant trees (quadratic mean diameter or qmd) in the state and transition model or the general sizes by species in the following narrative.
Size Class
Grass Forb/Seedling Sapling Pole Small Medium Large/Giant
DBH (inches) NA 0.1-4.9 5-9.9 10-19.9 20-29.9 =30
Canopy Cover Class
Open Moderate Closed
Canopy cover (%) 60

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 1.4 plant community composition

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

Table 8. Community 1.5 plant community composition

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

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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	
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:**

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17. **Perennial plant reproductive capability:**
