

Appendix 7. Summary Descriptions of Terrestrial Ecological Systems Used as Conservation Targets in the Willamette Valley-Puget Trough-Georgia Basin Ecoregion

Systems are listed by type in the following order: marine associated, freshwater wetlands, dry herbaceous, oak woodlands and conifer forests.

Intertidal Salt Marshes

Intertidal saltwater and brackish marshes are small patch systems, confined to specific environments defined by salinity gradient, tidal inundation regime, and soil texture. They usually occur as zonal mosaics of multiple communities. Low marshes are located in areas that flood every day and are dominated by a variety of low-growing forbs and low to medium-height graminoids, especially *Salicornia virginica*, *Distichlis spicata*, and *Carex lyngbyei*. High marshes are located in areas that flood infrequently and are dominated by medium-tall graminoids and low forbs, especially *Deschampsia cespitosa*, *Argentina egedii* (*Potentilla pacifica*), and *Juncus balticus*.

Coastal Spits, Dunes, and Strand

These are linear communities dependent upon longshore drift and wind. Most of these are spits or berms behind sandy beaches, dunes are very rare in this ecoregion. In their natural state these are dominated by short to medium-tall grasses, sedges, or forbs, often with abundant bare sandy or gravelly surface exposed. *Leymus mollis* and *Festuca rubra* are the two most common dominant species, many other species are largely restricted to this environment.

Depressional Wetland Shrublands

These are medium to tall deciduous broadleaf shrub swamps that are located in depressions, or around lakes or ponds, where water tables fluctuate seasonally (seasonally to semi-permanently flooded). These are nutrient-rich systems that have muck or mineral soils. Various species of *Salix*, *Spirea douglasii*, *Malus fusca*, or *Cornus sericea* are typical. Some of these associations also occur in Sphagnum Bogs and Fens system or in Riparian Forests and Shrublands: fens are distinguished by their peat soils and an abundance of brown mosses, riparian by their riverine setting.

Depressional Wetland Broadleaf Forests

These are deciduous broadleaf forested wetlands that are located in depressions, or around lakes or ponds, where water tables fluctuate seasonally (mostly seasonally flooded regime). These are nutrient-rich systems that have muck or mineral soils. *Fraxinus latifolia* and *Alnus rubra* are the major dominant species. Some of these associations also may occur as Riparian Forests and Shrublands.

Riparian Forests and Shrublands

These forests and tall shrublands are linear in character, occurring on floodplains or terraces of rivers and streams. Riverine flooding and the succession that occurs after major flooding events are the major natural processes that drive this system. Very early successional stages can be sparsely vegetated or dominated by herbaceous vegetation. Conifers tend to increase with succession in the absence of major disturbance. Conifer-dominated types are now very rare and not well described, *Abies grandis*, *Pseudotsuga menziesii*, *Picea sitchensis*, and *Thuja plicata* are important. Major broadleaf dominant species are *Acer macrophyllum*, *Alnus rubra*, *Populus balsamifera* ssp. *trichocarpa*, *Salix sitchensis*, *Salix lucida* ssp. *lasiandra*, *Cornus sericea*, and *Fraxinus latifolia*. Some of these associations may also occur as Depressional Wetland Broadleaf Forests, Coniferous Forested Wetlands, or Depressional Wetland Shrublands.

Coniferous Forested Wetlands

Conifer-dominated swamps are mostly small patch size, occurring sporadically in glacial depressions, in river valleys, around the edges of lakes and marshes, or on slopes with seeps that form subirrigated soils. They typically have muck or mineral soils and are seasonally flooded or permanently subirrigated. They were probably never common or extensive in the landscape of WPG. Major dominant species are *Tsuga heterophylla*, *Thuja plicata*, and *Picea sitchensis*. Some of these associations may also occur as Riparian Forests and Shrublands or Tidally-influenced Freshwater Wetlands.

Tidally-influenced Freshwater Wetlands

Tidally-influenced Freshwater Wetlands occur as narrow strips to more extensive patches along tidally-influenced portions of rivers. This system is driven by daily tidal flooding of freshwater. Vegetation structure and composition is varied and depends on substrate characteristics and tidal flooding regime of particular sites. Many of these associations also occur in other systems including Autumnal Freshwater Mudflats, Freshwater Marshes, Intertidal Salt Marshes, Riparian Forests and Shrublands, and Coniferous Forested Wetlands. There has been little vegetation data collection in this type in this ecoregion.

Freshwater Aquatic Beds

Freshwater aquatic beds are small patch size, confined to lakes, ponds, rivers and streams. In large bodies of water, they are usually restricted to the littoral region where penetration of light is the limiting factor for growth. A variety of rooted or floating aquatic herbaceous species may dominate. These communities occur in water too deep for emergent vegetation.

Freshwater Marshes

Freshwater marshes are mostly small patch, confined to limited areas in suitable floodplain or basin topography. They are mostly seasonally to semi-permanently flooded. Soils are muck or mineral, and water is high nutrient. There is some compositional overlap with fens, which are distinguished by peat soils and an abundance of brown mosses, and with Tidally-influenced Freshwater wetlands, which differ by their tidal flooding regime. By definition, freshwater marshes are dominated by herbaceous species, mostly graminoids (*Carex*, *Scirpus*, *Eleocharis*, *Juncus*), but also some forbs (especially *Typha latifolia*). Marshes dominated by *Typha* or *Scirpus acutus* that occur in transition zones between salt and fresh marshes are included here in the freshwater marshes system. A few of these associations may also occur in Tidally-influenced Freshwater Wetlands or Intertidal Salt Marshes systems.

Autumnal Freshwater Mudflats

Autumnal freshwater mudflats are linear in nature along major rivers or in seasonally-flooded shallow lakebeds or floodplains that lack inflow and outflow where they may be small patch in character. They are flooded for significant portions during the wet season and exposed for significant portions of the dry season. They are dominated by a variety of forbs or graminoids. Some of these associations also occur in Tidally-influenced Freshwater Wetlands system.

Sphagnum Bogs and Fens

Sphagnum bogs and fens are distinguished from other wetlands by an abundance of sphagnum or brown mosses, and the presence of peat soils. Decomposition is so slow that peat accumulates, and the water ranges from very nutrient poor in bogs to rich in rich fens. Bogs tend to be influenced mostly by rainwater, whereas fens are significantly influenced by surface water or flowing ground water. Bogs and fens are often found together in the same wetland system. This system may be dominated by graminoids, evergreen or deciduous broadleaf shrubs, or evergreen needleleaf trees. Many plant species are confined to this system. Some of these associations, especially those in fens, also occur in Freshwater Marshes or Depressional Wetland Shrublands systems.

Wet Prairies

Wet prairies historically covered large areas of the Willamette Valley where they were maintained by a combination of wetland soil hydrology and frequent burning. These are high nutrient wetlands that are temporarily to seasonally flooded. They have been reduced to tiny fragments of their former extent. They are dominated primarily by graminoids, especially *Deschampsia cespitosa* and *Carex* spp., and to a lesser degree by forbs or shrubs.

Vernal Pools

Vernal pools are rare in the ecoregion being restricted to the Willamette Valley, Gulf Islands and San Juan Islands. They are characterized by freshwater inundation for much of the winter and spring, followed by dramatic lowering of the water table at the approach of summer, such that soils are dry in the summer. They are found in isolated small depressions with no inflow or outflow and a restrictive subsurface soil layer (clay or bedrock). Vegetation is dominated primarily by annual forbs.

Upland Prairies and Savannas

This ecosystem formed a complex mosaic of varying patch sizes with wet prairies and riparian forests over much of the Willamette Valley during the pre-European settlement era. In parts of the Puget Trough, it occurred as large patches in more forested landscapes, usually associated with deep, coarse outwash deposits. It occurs on well-drained soils and was maintained historically by frequent anthropogenic burning. In the absence of disturbance, many of them have succeeded to forest and others continue to do so. Dominant vegetation is perennial bunchgrasses, especially *Festuca roemerii*, and to a lesser degree, *Danthonia californica*, with abundant and diverse forbs. Scattered deciduous (*Quercus garryana*) and/or conifer (*Pseudotsuga menziesii*, *Pinus ponderosa*) trees are rarely found now, but such savannas historically covered about 1/3 of the total acreage.

Herbaceous Balds and Bluffs

Herbaceous balds and bluffs occur in the driest environmental settings within the ecoregion that support continuous vegetation: generally south- to west-facing slopes on shallow or sandy/gravelly soils. They are most numerous in the driest climatic portion of the ecoregion in the Gulf Islands, San Juan Islands, and southeastern Vancouver Island. They typically occur as isolated sites within a forest matrix or on coastal bluffs. Fire was probably an important process historically on most of these sites, and some of them are threatened by invasion of trees in the absence of disturbance. Vegetation is dominated by perennial bunchgrasses, forbs, and mosses. Scattered trees, especially *Pseudotsuga menziesii*, are often present.

Dry Evergreen Forests and Woodlands

This system occupies small to large patches associated with dry sites or prairie landscapes throughout the ecoregion. In the Willamette Valley section, this system becomes the dominant upland conifer forest type. It acts as a matrix type on foothills around the perimeter of the ecoregion in the Willamette Valley section, but historically was probably more like a large patch type in those areas. This system historically had moderate- to low-severity fires moderately frequently. Historically, these communities were either part of larger forested landscapes or occupied sheltered topographic positions in prairie-dominated landscapes. They now also occur on some sites that formerly supported prairies or tall shrublands (*Coylus cornuta*) with scattered trees. This is a forest or woodland primarily dominated by the long-lived conifer *Pseudotsuga menziesii*. The evergreen broadleaf *Arbutus menziesii*, the short-lived conifer *Pinus contorta*, the broadleaf deciduous *Acer macrophyllum*, and the shade-tolerant conifer *Abies grandis* are local dominant or co-dominant species. These sites are too dry and warm or have been too frequently and extensively burned for anything more than small amounts of *Tsuga heterophylla* or *Thuja plicata* present as regeneration.

Douglas-fir – Western Hemlock – Western Redcedar Forests

These communities together formed the matrix in much of the ecoregion, occurring on moderately dry to moist sites. In the Willamette Valley section, this system is less extensive and occurs mostly as large patches around the periphery of the ecoregion. Most of these associations occur as a mosaic of large patches across the landscape, differing in vegetation with their response to moisture and nutrient gradients. This system for the most part formerly supported a moderate-severity fire regime involving occasional stand-replacement fires and more frequent moderate-severity fires. This fire regime would create a

complex mosaic of stand structures across the landscape. The dominant vegetation is evergreen conifer forest, especially the very long-lived seral *Pseudotsuga menziesii*, and the shade-tolerant *Abies grandis*, *Tsuga heterophylla* and *Thuja plicata*. The deciduous broadleaf trees *Alnus rubra* and *Acer macrophyllum* are common but subordinate. The short-lived *Pinus contorta* can dominate on some sites after high-severity fires if an adequate seed source is present.

Willamette Oak Woodlands

By definition, this system occurs only in the Willamette Valley section where oak woodlands were historically a large patch type dependent on aboriginal burning activity. Soils are generally mesic yet well-drained. Succession in the absence of fire tends to favor increased shrub dominance in the understory, increased tree density, and increased importance of conifers, with the end result being conversion to a conifer forest. The vegetation is a woodland or forest dominated by deciduous broadleaf trees, mostly *Quercus garryana*. Co-dominance by the evergreen conifer *Pseudotsuga menziesii* is common.

Northern Oak Woodlands

This small patch system is associated with dry sites and frequent pre-settlement fires north of the Willamette Valley section, i.e., from the Portland Basin north. It is typically found on either shallow bedrock soils or deep gravelly glacial outwash soils. Succession in the absence of fire tends to favor increased shrub dominance in the understory, increased tree density, and increased importance of conifers, with the end result being conversion to a conifer forest. The vegetation is a woodland or forest dominated by deciduous broadleaf trees, mostly *Quercus garryana*. Co-dominance by the evergreen conifer *Pseudotsuga menziesii* is common.