

# Appendix F

## Description of Wetland Types, Complexes, and Mitigation Banks in the Chehalis Basin

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## Wetland Types

### Open Water Wetlands

The open water cover class includes areas that are primarily composed of deep (greater than 6.6 feet), permanent open water with less than 25% cover by vegetation or exposed soil (Ecology 2013). These areas are not technically considered to be wetlands under the Cowardin system, but rather deepwater habitats (Cowardin et al. 1979).

Areas mapped as open water in the Chehalis Basin include the Pacific Ocean, deeper portions of Grays Harbor (including the Grays Harbor Navigation Channel), much of the mainstem Chehalis River, lower portions of many of the larger rivers in the Chehalis Basin (including the Humptulips River, Johns River, Elk River, Hoquiam River, East Hoquiam River, Wishkah River, Wynoochee River, Satsop River, Black River, Newaukum River, Elliot Slough, Grass Creek, and Dempsey Creek), and most lakes, reservoirs, and larger borrow and mine pits in the Chehalis Basin (including Horseshoe Lake, Plummer Lake, Fort Borst Lake, Hayes Lake, Skookumchuck Reservoir, Scott Lake, Deep Lake, Pitman Lake, Black Lake, Moores Lake, Vance Creek Lake, Huttula Lake, Sylvia Lake, Lake Aberdeen, Failor Lake, Wynoochee Lake, Nahwatzel Lake, Lystair Lake, Lake Arrowhead, Stump Lake, and others). The excavated canal system in Ocean Shores, on the Point Brown Peninsula of Grays Harbor, is also classified as open water.

### Estuarine Wetlands

The estuarine wetland type includes tidally influenced wetlands that occur in coastal areas where ocean water is at least occasionally diluted by freshwater runoff from the land, and where salinity, due to ocean-derived salts, is equal to or greater than 0.5‰ (Cowardin et al. 1979). Estuarine wetlands commonly occur in estuaries, on the deltas and lower reaches of ocean-flowing rivers, and in coastal bays and harbors that have some degree of access to the open ocean. In the Chehalis Basin, estuarine wetlands occur in Water Resource Inventory Area (WRIA) 22 in Grays Harbor. Estuarine wetlands provide many important functions, including floodwater retention, sediment and pollutant filtration and removal, shoreline erosion control, groundwater recharge, carbon sequestration, and fish and wildlife habitat.

The 2011 *Modeled Wetlands Inventory* further divides the estuarine wetland type into cover classes based on the dominant type of vegetation present. Three of these cover classes occur in the Chehalis Basin as follows:

- Estuarine scrub-shrub wetlands
- Estuarine emergent wetlands
- Estuarine aquatic bed wetlands

Estuarine scrub-shrub wetlands are estuarine wetlands with greater than 20% cover of woody vegetation less than 20 feet in height (Ecology 2013). Wetlands mapped as estuarine scrub-shrub in the

Chehalis Basin occur in only limited locations along the shorelines of the harbor. Plants typically found in, and adjacent to, these wetland types include western crabapple, red elderberry, Hooker's willow, Sitka willow, red Osier dogwood, Pacific ninebark, salmonberry, red alder, western red cedar, and Sitka spruce.

Estuarine emergent wetlands are estuarine wetlands with greater than 80% cover of erect, rooted, herbaceous plants (excluding mosses and lichens) that are present for the majority of the growing season in most years (Ecology 2013). In the Chehalis Basin, estuarine emergent wetlands include both low and high saltmarsh and occur in multiple locations in Grays Harbor, including along the shoreline of North Bay, in Bowerman Basin, around Rennie Island, along the central and southern portions of Point Brown Peninsula, along the southern shoreline of the harbor, around the mouth and along the channel of Johns River, and in South Bay along the eastern shoreline of Point Chehalis Peninsula. Large areas of estuarine emergent wetlands are also found at the southern end of South Bay where multiple streams and sloughs flow into Grays Harbor. Common plants found in these types of estuarine wetlands include pickleweed, salt grass, seaside arrowgrass, Lyngby's sedge, Jaumea, salt-marsh sandspurry, Olney's three square bulrush, tufted hairgrass, common spikerush, redtop, Pacific silverweed, hardstem bulrush, and broadleaf cattail.

Estuarine aquatic bed wetlands are estuarine wetlands and deepwater habitats with greater than 80% cover of plants that grow and form a continuous cover principally on or at the surface of water (Ecology 2013). They include algal mats, kelp beds, and rooted vascular plant assemblages such as eelgrass and macroalgae beds. Estuarine aquatic bed wetlands mapped in the Chehalis Basin occur in several locations throughout North Bay and South Bay, in Bowerman Basin, and in the eastern portion of the harbor to the west of Rennie Island. Common vegetation found in these types of estuarine wetlands includes eelgrass, various kinds of kelp, and multiple types of green algae.

## **Palustrine Wetlands**

The palustrine wetland type includes tidal and non-tidal wetlands dominated by trees, shrubs, and persistent emergents, where salinity due to ocean-derived salts is below 0.5% (Cowardin et al. 1979). It also includes unvegetated areas of ponded freshwater that are less than 20 acres in size and less than 6.6 feet deep (e.g., freshwater ponds). Palustrine wetlands occur in coastal sand dunes; in lowlands and floodplains adjacent to estuaries, rivers, and lakes; in old oxbows and side channels; in and adjacent to small and headwater streams and drainages; along shorelines and in backwaters of reservoirs; adjacent to springs and seeps; in isolated depressions; in beaver ponds; and in agricultural areas and other disturbed landscapes. Functions provided by palustrine wetlands include water storage and flood attenuation; sediment, nutrient, heavy metal, and organic toxin removal; bank stabilization; downstream erosion reduction; thermoregulation; food export; groundwater recharge; and a variety of habitat functions.

The 2011 *Modeled Wetlands Inventory* divides the palustrine wetland type into cover classes based on whether the dominant vegetation is forested, scrub-shrub, emergent, or aquatic bed. Four of these wetland cover classes are mapped in the Chehalis Basin as follows:

- Palustrine forested wetland
- Palustrine scrub-shrub wetland
- Palustrine emergent wetland
- Palustrine aquatic bed wetland

Palustrine forested wetlands and palustrine scrub-shrub wetlands are both dominated by woody vegetation, with the primary difference being the height of the vegetation. Palustrine forested wetlands contain greater than 20% cover of woody vegetation that is more than 20 feet in height, whereas palustrine scrub-shrub wetlands contain greater than 20% cover of woody vegetation that is less than 20 feet high (Ecology 2013). Both of these wetland cover classes often include herbaceous and woody vine layers in their understories. In the Chehalis Basin, these wetland types commonly occur in and around major streams and rivers. Rivers and streams that feature large areas of mapped palustrine forested and scrub-shrub wetlands include the following: Chehalis River, Newaukum River and its tributaries, Skookumchuck River and its tributaries, Scatter Creek, upper and middle portions of Black River and its tributaries, Satsop River and its tributaries, Wishkah River, Hoquiam River, East Fork Hoquiam River, Humptulips River, Johns River, and Elk River. Large areas of palustrine forested and scrub-shrub wetland also exist in the Chehalis River surge plain, along the northern edge of Grays Harbor, and on the peninsulas that separate Grays Harbor from the Pacific Ocean. Most of the palustrine forested and scrub-shrub wetlands in the Chehalis Basin have seasonally or temporarily flooded water regimes.

Vegetation commonly found in palustrine scrub-shrub and forested wetlands in the Chehalis Basin includes the following: black cottonwood, Oregon ash, red alder, western red cedar, Sitka spruce, various willows, red Osier dogwood, salmonberry, Douglas spiraea, black hawthorn, Pacific ninebark, Pacific crabapple, swamp rose, and Nootka rose. Common herbaceous plants found in these areas include slough sedge and other sedges, tall manna grass, and skunk cabbage.

Palustrine emergent wetlands are palustrine wetlands with greater than 80% cover of persistent emergent plants and emergent mosses or lichens (Ecology 2013). These types of wetlands occur throughout the Chehalis Basin, especially in and around the major rivers and streams as well as in and adjacent to smaller streams and headwaters. The palustrine emergent wetlands of the Chehalis Basin frequently occur in association with palustrine forested and scrub-shrub wetlands. Large expanses of palustrine emergent wetlands are found in river valleys along many of the major tributaries to the Chehalis River, including the following: Salzer Creek, Newaukum River, Skookumchuck River and its tributaries (including Hanaford Creek, South Hanaford Creek, and Snyder Creek), in between Scatter Creek and the Black River, along the Chehalis River just upstream of its confluence with

Satsop River, in the Chehalis River surge plain, along Humptulips River and its tributaries, and along the northern and southern margins of Grays Harbor. Many of the palustrine emergent wetlands that exist in these locations have seasonally flooded water regimes, with overbank flooding being the major hydrologic source.

Palustrine emergent wetlands are dominated by herbaceous vegetation growing up through permanent or seasonal standing water (e.g., freshwater marshes, bogs, fens, sloughs) as well as grass, rush, and sedge-dominated wetlands growing in saturated soils that are only periodically or rarely inundated (e.g., wet meadows, wet prairies, swales). Vegetation commonly found in the palustrine emergent wetlands that experience seasonal or permanent inundation include broadleaf cattail, creeping spikerush, hardstem bulrush, softstem bulrush, American skunk cabbage, fowl mannagrass, narrowleaf bur-reed, American speedwell, watercress, yellow cress, yellow water lily, broadleaf arrowhead, water plantain, and various smartweeds. Vegetation commonly found in the palustrine emergent wetlands that occur in primarily saturated areas that experience limited seasonal or temporary ponding include reed canarygrass, slough sedge and other sedge species, soft rush, grooved rush, small-fruited bulrush, common velvetgrass, colonial bentgrass, and redtop.

Palustrine aquatic bed wetlands are palustrine wetlands and deepwater habitats with greater than 80% cover of plants that grow and form a continuous cover principally on, or at the surface of, water (Ecology 2013). These include algal mats, detached floating mats, and rooted vascular plant assemblages. These wetland types typically occur in both natural and artificially created ponds, sparsely vegetated oxbow lakes, abandoned river and stream channels, farm ponds, stock ponds, irrigation ponds, personal recreations ponds, stormwater detention ponds, golf course ponds, and water-filled borrow, quarry, and mine pits. Typical vegetation found in palustrine aquatic bed wetlands includes duckweed, watermeal, waterlilies, and various types of pondweed, waterweed, watermilfoil, and water buttercup. Common water moss and various types of algae are also common.

### **Unconsolidated Shore**

The unconsolidated shore cover class includes areas of silt, sand, or gravel subject to inundation and redistribution due to the action of water (Ecology 2013). Such substrates lack vegetation except for pioneering plants that become established during brief periods when growing conditions are favorable. Portions of the Chehalis Basin mapped as unconsolidated shore include extensive neointertidal mudflats and shallow areas in Grays Harbor, as well as gravel bars and unvegetated shorelines composed of loose materials in the mainstem Chehalis River and other rivers and larger streams. The beaches along the Point Brown and Point Chehalis peninsulas are also mapped as unconsolidated shore.

### **Potentially (Previously) Disturbed Wetlands**

Historically, the principal causes of wetland degradation and loss in Washington have been associated with the expansion of agriculture and the siting of ports and industrial facilities, leading to the loss of 30% to 50% of the wetlands that once existed in this area prior to settlement (Lane and Taylor 1996).

More recently, the major causes of wetland loss in Western Washington have been associated with urban expansion, forestry, agriculture, and the invasion of non-native plants and animals. In an attempt to capture areas of wetland that may have been converted to agricultural uses, the Washington State Department of Ecology included a “potentially disturbed wetlands” cover class in the 2011 *Modeled Wetlands Inventory*. This cover class was applied to areas that have a high potential to be wetland, but where observed land cover appears to be pasture, hayfield, or cultivated (Ecology 2015a) and previously disturbed.

Potentially (previously) disturbed wetlands in the Chehalis Basin primarily occur in WRIA 23 within the floodplains of rivers and streams, including the Chehalis River and many of its tributaries. Large areas of potentially (previously) disturbed wetlands are mapped around Jones and Stowe creeks to the east of Pe Ell; along the South Fork Chehalis and Newaukum rivers and their tributaries; adjacent to Stearns, Dillenbaugh, Benwick, and Salzer creeks to the south and southwest of Chehalis; along Coffee Creek, Hanaford Creek, and the upper Skookumchuck River to the north and east of Centralia; adjacent to Lincoln and Independence creeks in their respective river valleys; and in lower portions of Black River and Scatter Creek. In WRIA 23, potentially (previously) disturbed wetlands are mapped in various locations of the Chehalis River floodplain, including a few relatively larger areas to the south and southwest of Satsop, the lower portion of Wynoochee River, along the upper Wishkah River, along the upper shoreline of Ocean Shores, and in coastal areas in the southwestern corner of Grays Harbor County.

Typical vegetation in these potentially (previously) disturbed areas includes a mix of predominantly non-native grasses, including reed canarygrass, tall fescue, common velvetgrass, and colonial bentgrass, among others.

## Wetland Complexes

### **Black River Wetlands**

The Black River is a slow-flowing river with a wide floodplain that extends from Black Lake in the southwestern portion of Thurston County to the Chehalis River in Grays Harbor County. Throughout its course, it meanders through a dense mosaic of riparian areas and palustrine forested, scrub-shrub, and emergent wetlands that are said to represent one of the largest remaining undisturbed freshwater wetland systems in Puget Sound (USFWS 2015a). Habitat present in this area includes prairie oak woodlands, sphagnum bogs, wet prairies, alder bottoms, and wetland conifer forests. These wetlands provide habitat for at least 150 species of migratory birds, including waterfowl and neotropical songbirds, and are one of only a few places where the Oregon spotted frog (a state-listed endangered species) has been documented in Washington. Approximately 3,800 acres along the Black River are part of the Black River Unit of U.S. Fish and Wildlife Service’s (USFWS’) Nisqually National Wildlife Refuge.

## **Chehalis River Surge Plain**

The Chehalis River surge plain is a 3,018-acre area in Grays Harbor County that extends upstream along the Chehalis River from the eastern side of Aberdeen to the river's confluence with the Wynoochee River. In this area, heavier saltwater from incoming high tides forms a wedge under the fresh river water, lifting it up and forcing it to surge out over low-lying floodplain areas. This natural phenomenon forms a unique type of wetland system known as a freshwater tidal surge plain, which is characterized by tidal sloughs, intermittently flooded areas, and regularly flooded areas. The variety of water regimes provided in this area supports a diverse array of palustrine forested, scrub-shrub, and emergent wetlands, including the largest Sitka spruce-dominated coastal surge plain wetland in Washington (DNR 2009). Because of its large size, flat topography, and minimal development, the surge plain provides important ecosystem services to the surrounding communities by slowing and storing floodwaters and filtering sediments as they move downstream toward the Grays Harbor Estuary. The surge plain provides extensive wildlife habitat for a variety of amphibians, reptiles, various small and large mammals, and a variety of birds (including bald eagle and other special-status species). It also provides important habitat for anadromous fish and critical spawning habitat for resident fish. Approximately 2,345 acres of the Chehalis River surge plain are managed and protected by Washington Department of Natural Resources (DNR) as part of the Chehalis River Surge Plain Natural Area Preserve.

## **Grays Harbor**

Grays Harbor is a large, relatively undisturbed estuary that is fed by a 2,600-square-mile drainage basin (Northwest Area Committee 2013). It includes a variety of estuarine habitats such as subtidal open water areas and intertidal wetlands. Estuarine wetland types present include low and high saltmarshes, rocky shores, large eelgrass and macroalgae beds, and extensive mudflats. Palustrine emergent, forested, and scrub-shrub wetlands are also present around the perimeter of Grays Harbor. The wetlands and special aquatic sites of the estuary provide many important functions, including floodwater retention, sediment and pollutant filtration and removal, shoreline erosion control, groundwater recharge, carbon sequestration, and fish and wildlife habitat provisions. A 1,500-acre portion along the northeastern shoreline that includes the Bowerman Basin is designated as the Grays Harbor National Wildlife Refuge. This area, which is managed by USFWS, provides crucial habitat for more than a dozen species of migrating shorebirds (USFWS 2015b). Several other wetland and non-wetland DNR-managed natural areas occur in, and adjacent to, Grays Harbor. Wetland natural areas include Elk River Natural Resources Conservation Area and North Bay Natural Area Preserve. Non-wetland natural areas in the estuary are associated with sandy accretion islands and include Goose Island Natural Area Preserve, Sand Island Natural Area Preserve, and Whitcomb Flats Natural Area Preserve.

## **Elk River Natural Resources Conservation Area**

The Elk River Natural Resources Conservation Area consists of 5,413 acres located along the Elk River and several of its tributaries on the south side of Grays Harbor in Grays Harbor County. It is the largest,

highest-quality estuarine system remaining in Washington, and it supports a wide variety of estuarine and palustrine wetland systems, including intertidal mudflats, sloughs, five types of saltmarshes, and freshwater emergent, scrub-shrub, and forested wetlands (DNR 2015a). Seven of the aquatic and wetland ecological communities present in the Elk River Natural Resources Conservation Area are listed as priority habitats in Washington’s Natural Heritage Plan. These include transition zone wetland; silty, low salinity, low marsh; mudflat; silty, moderate salinity, low marsh; moderate salinity, high marsh; low salinity, high marsh; and muddy channel/slough (WWRC 2015a). This conservation area is in the Pacific Flyway and provides an important stopover for a variety of shorebirds and waterfowl, as well as a nesting site for bald eagles, and significant habitat for a variety of mammals, including elk, bears, beavers, and river otters.

### **North Bay Natural Area Preserve**

The North Bay Natural Area Preserve consists of 1,215 acres located along the northern shoreline of Grays Harbor in Grays Harbor County. It contains one of the highest-quality coastal freshwater and sphagnum bog systems remaining in Washington (DNR 2015b). It includes a diverse array of saltwater and freshwater wetland types, such as coastal marsh, estuarine scrub-shrub, freshwater wetland, sphagnum bog, and bog forest communities, intermixed with second-growth, upland forested communities (WWRC 2015b). Unique plant associations present include the shore pine-western red cedar/sweetgale/sphagnum plant community and the western red cedar-western hemlock/skunk cabbage plant community (DNR 2015b). The North Bay Natural Area Preserve provides habitat for a variety of common and rare wetland and upland wildlife, including confirmed habitat for two state-listed species—Olympic mudminnow and Queen Charlotte’s copper butterfly—as well as shorebird and waterfowl concentration areas, harbor seal haul-out and pupping areas, and Roosevelt elk and peregrine falcon wintering areas.

## **Wetland Mitigation Banks**

### **North Fork Newaukum Mitigation Bank**

The North Fork Newaukum Mitigation Bank is a 230-acre, approved wetland mitigation bank located southeast of Chehalis at the confluence of the North and Middle forks of the Newaukum River in Lewis County (Ecology 2015b). It includes restored and enhanced palustrine forested, scrub-shrub, and emergent floodplain wetlands as well as enhanced forested uplands and riparian areas (WSDOT 2016). The North Fork Newaukum Mitigation Bank is owned by the Washington State Department of Transportation (WSDOT) and is used to provide compensatory mitigation for authorized WSDOT construction projects in WRIA 23.

### **Chehalis Basin Mitigation Bank**

The Chehalis Basin Mitigation Bank is a privately owned, 177-acre, approved wetland mitigation bank located northeast of Centralia along Big Hanaford Creek near the Centralia Steam Plant and former



TransAlta-Centralia coal mine in Lewis County (Ecology 2015c). The wetland mitigation area includes 175 acres of forested, scrub-shrub, and emergent wetlands as well as small areas of uplands. The Chehalis Basin Mitigation Bank provides compensatory mitigation credits to the general public for authorized projects in WRIA 23.

### **Weatherwax Wetland and Habitat Mitigation Bank**

The Weatherwax Wetland and Habitat Mitigation Bank is a pending, 120-acre wetland mitigation and mature forest preservation bank located in Ocean Shores on the Point Brown Peninsula of Grays Harbor in Grays Harbor County (Ecology 2015d). The proposed mitigation site includes a mature interdunal wetland system with a mosaic of palustrine forested, emergent, and lacustrine fringe wetlands, intermixed with mature upland forest and lacustrine deepwater habitats. The Weatherwax Wetland and Habitat Mitigation Bank is owned by the City of Ocean Shores and is proposed to provide mitigation credits for authorized projects with impacts on freshwater depressional or lacustrine fringe wetlands that either do not have an outlet or that drain to Grays Harbor, north Willapa Bay, or the Pacific Ocean. The proposed service area for this bank is limited to the coastal plain from Copalis Beach to Heather.

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