databases were cross-referenced to assemble an all-inclusive permit database for the time period from 2001 to 2011.

Permits were then classified by the type of shoreline use (e.g. residential, commercial) or shoreline modification (e.g. bank stabilization, boat launch) permitted. Where a single permit application involved multiple uses or modifications, a single permit was counted in each applicable use or modification category. Permits were recorded by year the permit was issued (not the application date). When the data did not state the year a permit was issued, it was assumed that the permit was issued the same year as the application.

Notably, the permit data reflect all permits issued in any area under the jurisdiction of Cowlitz County, including unincorporated urban growth areas, at the time the permit was issued. Therefore, permit data for unincorporated UGAs is reported in the permit totals for the unincorporated County assessment units rather than the City assessment units. It is also worth noting that shoreline exemptions are generally not captured in the permit data. Therefore, no data on the type and extent of development actions exempt from shoreline permits (such as single-family residential housing development or single-family residential bulkhead construction) are available. Moreover, any unpermitted development is not reflected in the data.

4 SUMMARY OF COUNTY ECOSYSTEM CONDITIONS

The Lower Columbia Salmon Recovery and Fish and Wildlife Subbasin Plan (LCFRB 2010) provides detailed descriptions of each of the watersheds and major subbasins within Cowlitz County. The information presented below is drawn from this plan, with additional information and details specific to Cowlitz County shorelines added where applicable.

4.1 Climate

The climate in Cowlitz County is typical of the West Coast marine areas with mild, wet winters and warm, dry summers. Annual precipitation varies from 45 inches near Kelso to over 150 inches on Mount Rainier, Adams, and St. Helens (Wade 2000a), and precipitation is concentrated in the period between October and March. Snow and freezing temperatures are common at higher elevations. Rain-on-snow events in intermediate elevations can result in significant flooding events.

4.2 Geography, Topography, Geology, and Drainage Patterns

Portions of four major watersheds are located within Cowlitz County, the Lewis watershed, the Cowlitz Watershed, the Grays/Elochoman Watershed, and the Chehalis Watershed. Generally, these watersheds are identified by the state as Water Resource Inventory Areas (WRIA). A map of the WRIAs within Cowlitz County is provided in Figure 4-1. Table 4-1 provides a summary of subbasins and WRIAs within Cowlitz County, as well as anadromous salmonids associated with each basin. Priority wildlife species and habitats in Cowlitz County are identified in Table 4-2, and rare plant species in Cowlitz County are listed in Table 4-3. Note that not all listed species or habitats necessarily occur within shoreline jurisdiction in the county.

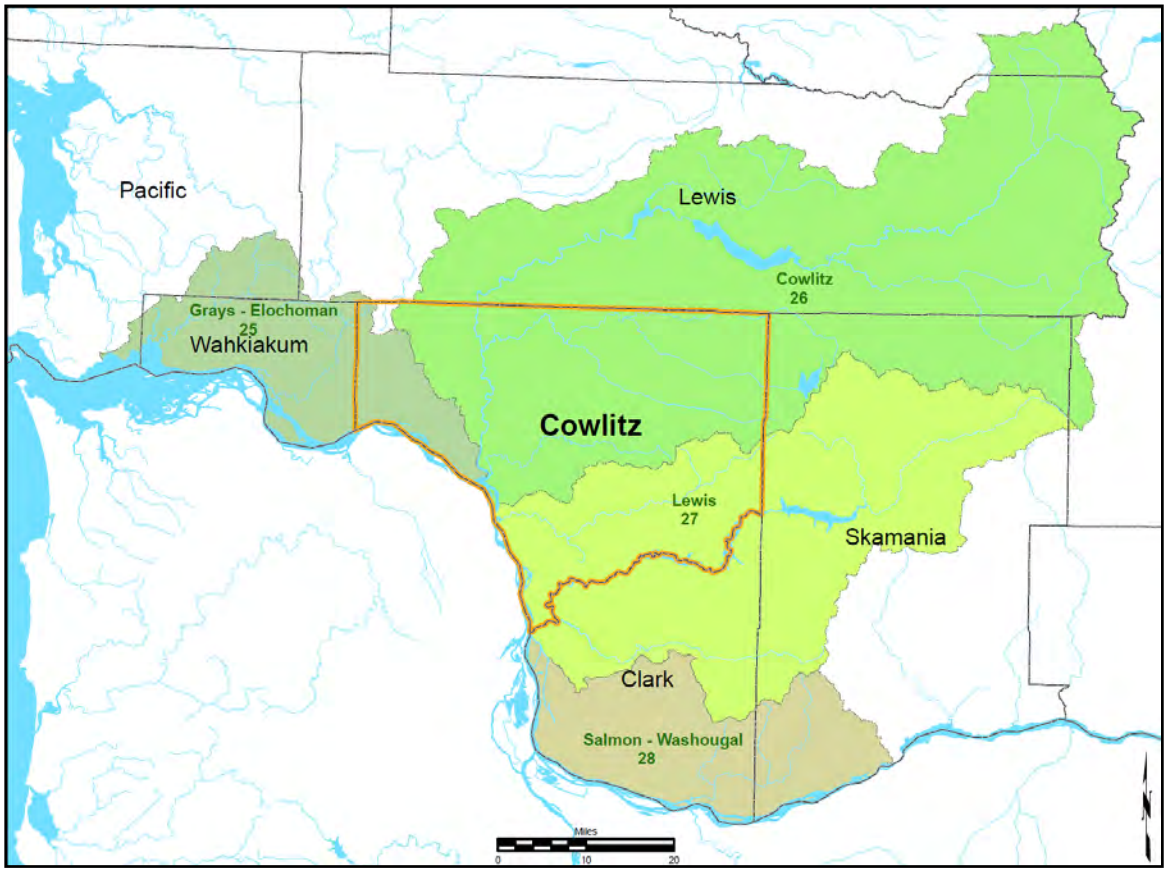

Figure 4-1. Map of Water Resource Inventory Areas in Cowlitz County (Source: Washington Department of Ecology, GIS Technical Services).

4.2.1 Columbia River

The Columbia River estuary was formed by the forces of glaciation, volcanism, hydrology, and erosion and accretion of sediments. The Cascade mountain range was formed 50 to 35 million years ago, at which time, uplift of the Rocky Mountains combined with subduction of the oceanic plates of the Pacific Ocean, creating the flow

path for the River (Simenstad et al. 2011). Subsequent glaciation restructured and expanded the extent of the Columbia River basin (Simenstad et al. 2011). Near the end of the last glacial period, the Missoula Floods shaped the physical landscape, transporting and depositing silt, sand, and gravel that now form much of the landscape in the Columbia River basin (Simenstad et al. 2011). Volcanism, lava flows, and lahars occurring in the Holocene period, have contributed much of the bedload of the lower Columbia River (Simenstad et al. 2011). Circulation of sediments and nutrients throughout the lower river and estuary are driven by river hydrology and coastal oceanography. Sea level rise since the late Pleistocene period has submerged river channels and caused deposition of coarse and fine sands (Marriott et al. 2001), which shape today's shallow estuarine habitats.

The hydrology of the Columbia River Basin reflects the interaction of topography geology, and climate. Most of the drainage of the Columbia River falls as snow in the Rocky Mountains and in the Cascade Range (Simenstad et al. 2011). Annual peak discharges occur in the spring (April to June), and generally result from snowmelt in the interior subbasin. Historically, flood flows peaked at 1.2 million cfs (Simenstad et al. 2011). Today, as a result of dam regulation, the highest flows occur from April to June, with discharge at the mouth of the river ranging from 100,000 to 500,000 cfs (Neal 1972, Marriott et al. 2002). The lower basin, where precipitation generally occurs as rain, contributes to peak winter discharges (Simenstad et al. 2011).

Within Cowlitz County, the Columbia River transitions from a confined valley to the east into broad bottomlands to the west. The River includes large, mid-channel islands with forested and scrub-shrub wetlands, distributary channels and sloughs, and floodplains.

Tidal impacts in water level have been observed as far upstream as Bonneville Dam (RM 146) during low flow, reversal of river flow has been measured as far upstream as Oak Point, west of Longview (RM 53) (LCFRB 2010). The mean daily tidal fluctuation is approximately 3 feet in Cowlitz County near the City of Kelso (Johnson 2010). The extent of saltwater intrusion is limited to the River downstream from Harrington Point (RM 23) (LCFRB 2010).

4.2.2 Lewis River

The Lewis basin developed as a result of volcanic, glacial, and erosional processes. Intermittent eruptions of Mt. St. Helens and Mt. Adams over the last 400,000 years have provided volcanic material that has formed the Lewis River basin. More recent pyroclastic flows and lahars have shaped the current landscape (LCFRB 2010). Steep

slopes resulting from glaciation, combined with the abundance of volcanic material, have created a high potential for erosion throughout the basin (LCFRB 2010).

A series of three dams and three reservoirs, Lake Merwin, Yale Lake, and Swift Reservoir, are located in the upper portion of the Lewis River Basin. Below Merwin Dam, the Lewis River flows through a steep canyon for approximately 4 miles. The lower twelve miles of River flow through a broad alluvial valley, where the River is extensively channelized. Tidal influence extends to approximately RM 11 (LCFRB 2010).

Precipitation is primarily rainfall dominated, but much of the upper basin receives abundant snowfall, and experiences rain-on-snow zone events. As a result, the basin is subject to winter freshets and flooding, although dam operations moderate peak flows (LCFRB 2010).

4.2.3 Kalama River

The topography of the upper subbasin is mountainous, leveling out in the lower eight miles. The geology of the Kalama River subbasin have been extensively shaped by volcanic activity of Mt. St. Helens in the last 20,000 years (USFS 1996 cited in Wade 2000b). Steep slopes and erodible material allow for the significant mass wasting potential in the upper watershed (Wade 2000b). Keefe et al. (2004) summarized geologic data presented in Washington Department of Natural Resource's *Geologic Map of Washington – Southwest Quadrant* (Walsh et al., 1987) as follows:

> "The upper Kalama River flows through volcaniclastic deposits of pyroclastic flows, lahars, and debris avalanches, from its headwaters downstream to below Bush Creek near river mile (RM) 30 (Walsh et al. 1987). These deposits produce fine sediments that are typically composed of fine to medium size grains. There are isolated lahar areas distributed as patches throughout the middle Kalama River section, containing mixtures of cobble and boulders supported by a matrix of sand or mud."

Merrill Lake formed when these lahar deposits from Mt. St. Helens blocked the historic stream valley.

Keefe et al. (2004) go on to describe the geology of the Lower Kalama River Basin:

> Between RM 30 and Marietta Falls, near RM 6, the mainstem flows through fine grained igneous, Lower Oligocene to upper Eocene andesite flows. Most of the tributaries to the Kalama River entering below upper Kalama Falls also flow through the same fine grained igneous andesite flow material as the middle

> mainstem river (Walsh et al. 1987; Foster 1983). Below Marietta Falls, the Kalama River flows through predominantly alluvial deposits containing sand and gravel."

Hydrology is driven by rainfall from fall through spring as only a small portion of the basin is above the snowline. Tidal influence of the Columbia extends up to approximately Modrow Bridge at RM 2.8 (Wade 2000b). Tidal elevations at the mouth of the Kalama River vary from 6 to 14 feet (Powers and Tyler 2009).

4.2.4 Cowlitz Watershed

The Cowlitz River watershed originates in steep, volcanic peaks of Mount Rainier, Mouth Saint Helens, and Mount Adams. The eastern part of the Cowlitz River valley is located in the Cascade physiographic province, and it is characterized by a deeply cut trough and flat bottomlands, and terraces (Wade 2000a). The river flows west through a valley heavily influenced by alpine glaciers, where the river has moderate relief and broad floodplain areas (Wade 2000a).

Wade (2000) described the geology of the Cowlitz Watershed as follows,

> "During the Pleistocene (3 million years to 8,000 years ago) several alpine glaciers moved down the Cowlitz River valley depositing till and outwash (glacial river sand and gravel deposits). These glaciers, 1000 feet thick or more, cut down into the former river channel and underlying bedrock (Coombs 1989 as cited in Harza 1999c). At least six alpine glacial advances have been documented. Glacial outwash sands and gravels form terraces in the vicinity of the Cowlitz River and were deposited by streams from the melting alpine glaciers located up the valley. Silt-loam loess, representing windblown glacial silt, blankets large areas of the basin (Crandall and Miller 1974 as cited in Harza 1999c). The thickness of the loess varies from a few feet to 20 feet.
>
> Following deposition of the youngest glacial deposits, approximately 13,000 to 25,000 years ago, the Cowlitz River eroded and reworked the glacial deposits. The resulting alluvial deposits range from coarse boulders to cobbly gravel to fine sand and silty sand. Thick alluvium is generally confined to the area of the immediate Cowlitz River flood plain (Harza 1999c)."

The 1980 eruption of Mt. St. Helens is an important factor in soil composition and channel form. The Corps predicts that without dredging operations, the bed elevation of the Cowlitz River will rise between 0 to 2 feet near the Toutle River confluence, and between 3 to 5 feet in downstream areas (Corps 2002). A rise in water surface elevations

related to the sedimentation is expected to be approximately 1.5 feet downstream from the Toutle River confluence (Corps 2002).

Soils derived from the volcanic deposits range from gravelly coarse sands to silt loams. As a result of its geology and soils, the Cowlitz watershed is prone to potentially severe erosion. In fact, 83 percent of the land in the watershed would be highly erodible if vegetative cover was removed (Wade 2000a). Over 81 percent of the land with severe to very severe erosion hazard is in commercial forest use (USSCS 1974 cited in Wade 2000a).

The hydrologic regime is driven by a mix of rainfall at lower elevations and snowmelt from the headwaters. A few major tributaries drain glaciers on Cascade peaks and contribute glacial meltwater during the summer months (Wade 2000a). The majority of peak flows occur between November and February, as a result of winter rain or rain-on-snow events.

Three major hydroelectric projects have been constructed on the mainstem Cowlitz River. Cowlitz Falls Dam, Mossyrock Dam, and Mayfield Dam in Lewis County are maintained for flood control and hydropower production. Mayfield Dam and Mossyrock Dam are operated by Tacoma Power, and Cowlitz Falls Dam, a smaller, run-of-the-river dam, is operated by Public Utility District No. 1 of Lewis County. Historically, the portion of the stream inundated by the three reservoirs was made up of a series of deep canyons. Today, dam operations limit the frequency and intensity of flood flows and result in higher flows during the summer low-flow period. In November 1997, an agreement was reached between Tacoma Power and the Washington Department of Fish and Wildlife regarding flow operations intended to protect salmon and steelhead resources in the lower Cowlitz mainstem.

The Toutle and Coweeman Rivers are unregulated, contributing to flow variability in the lower Cowlitz River. The annual hydrograph of the Toutle River has been altered since the Mt. St. Helens eruption, in part because sediment load in the river and its floodplains reduced the capacity of the river, and in part because deforestation resulting eruption reduced infiltration capacity, creating a flashier system (Tetra Tech 2007).

Silver Lake, the largest lake in Cowlitz County, was formed approximately 2,500 years ago, when lahars from Mt. St. Helens blocked the drainage of Outlet Creek (Cowlitz Conservation District 1994). A control structure was built in the 19070's to moderate seasonal fluctuations in the lake level and accommodate increasing development along the Lake's shorelines (Cowlitz Conservation District 1994).

4.2.5 Mill, Abernathy, Germany Creeks

The Mill/Abernathy/Germany subbasin is a low elevation system with an average slope of 21 percent (Wade 2002). The subbasin is comprised primarily of volcanic (85 percent) and sedimentary and metamorphic rocks (13 percent) (Wade 2002). Given the lower elevation of these watersheds, the hydrologic regime is driven by rainfall, with peak flows occurring during winter months. Less than 10 percent of the watershed area is within the rain-on-snow zone (Wade 2002). Wade (2002) provides a detailed description of soils in the subbasin.

4.2.6 South Fork Chehalis River

Tectonic and glacial activity gave rise to the Chehalis River valley. During the Pleistocene period, glacial drift from the Cascade and Olympic mountains and the Puget lobe of the Cordilleran Ice Sheet drained to the ocean through the Chehalis River valley (Gendazsek 2011). Recent alluvium overlies much of the glacial deposits (Gendazsek 2011).

The Chehalis River system is a low gradient, and therefore, slow moving river compared to other large rivers in Washington State. Its headwaters drains four mountain ranges (or hills), including the western side of the Willapa Hills, the Black Hills, the west side of the Cascade Range, and the lower south slopes of the Olympic Range. As a result of the low elevation headwaters, precipitation primarily falls in the form of rain, although snowfall in the upper elevations of the watershed allows for floods relating to rain-on-snow events. Mean annual (1971–2000) precipitation ranges from more than 250 in. in the headwaters of the Wynoochee and Humptulips Rivers to 43 in. near the cities of Chehalis and Centralia (PRISM 2011 cited in Gendazsek 2011). The majority of precipitation generally falls between October and March (Gendazsek 2011).

The lower South Fork Chehalis has a low gradient from its mouth until RM 16.8. In the upper South Fork, within Cowlitz County, the river narrows substantially as it flows through steep terrain.

4.3 Ecosystem Context

The Lower Columbia River and tributaries can be considered a distinct ecosystem region within the entire Columbia River watersheds. The complexity of topography, stream gradient, flow and other features, however, tends to distinguish ecological functions of the Columbia River and tributaries. The Lower Columbia River itself functions largely as an estuary. Tributaries tend to function more as headwater streams. Portions of four major watersheds are located within Cowlitz County, the Lewis watershed, the Cowlitz Watershed, the Grays/Elochoman Watershed, and the Chehalis Watershed. Generally,

these watersheds are identified by the state as Water Resource Inventory Areas (WRIA). A map of the WRIAs within Cowlitz County is provided in Figure 4-1. Table 4-1 provides a summary of subbasins and WRIAs within Cowlitz County, as well as anadromous salmonids associated with each basin.

Table 4-1. Summaries of Cowlitz County subbasins from the Lower Columbia Salmon Recovery and Fish and Wildlife Subbasin Plan (2010).

Subbasin	Strata WRIA	County(s)	Watershed Area	Elevation (max)	Historic Anadromous Stream Miles	Focal Species[1]
Mill, Abernathy, Germany	Coast 25	Cowlitz, Wahkiakum	100 mi^2	1300 ft	110	CHF, Chum, Coho, STW
Cowlitz (lower)	Cascade 26	Cowlitz, Lewis	440 mi^2	1,000 ft	360	CHF, Chum, Coho, STW
Cowlitz (upper)		Lewis, Pierce, Skamania	1,400 mi^2	14,000 ft	110	CHF, CHS, STW, Coho
Coweeman		Cowlitz	200 mi^2	3,000 ft	90	CHF, STW, Chum, Coho,
Toutle		Cowlitz	510 mi^2	8,000 ft	310	CHF, CHS, STW, Chum, Coho,
Kalama	Cascade 27	Cowlitz	210 mi^2	8,000 ft	120	CHF, CHS, Chum, Coho, STW, STS
North Fork Lewis		Clark, Cowlitz, Skamania	830 mi^2	12,000 ft	100	CHF, CHS, Chum, Coho, STW, STS, BT

1 CHF= fall Chinook, CHS= spring Chinook, STW= winter steelhead, STS= summer steelhead, BT= bull trout

Table 4-2. Priority species and habitats in Cowlitz County (WDFW 2010).

	Species/ Habitats	State Status	Federal Status
Habitats	Aspen Stands		
	Biodiversity Areas and Corridors		
	Herbaceous Balds		
	Old-Growth/Mature Forest		
	Oregon White Oak Woodlands		
	West Side Prairie		
	Riparian		

	Species/ Habitats	State Status	Federal Status
	Freshwater Wetlands & Fresh Deepwater		
	Instream		
	Caves		
	Cliffs		
	Snags and Logs		
	Talus		
Fishes	Pacific Lamprey		Species of Concern
	River Lamprey	Candidate	Species of Concern
	Green Sturgeon		Threatened
	White Sturgeon		
	Olympic Mudminnow	Sensitive	
	Leopard Dace	Candidate	
	Mountain Sucker	Candidate	
	Eulachon	Candidate	Threatened
	Bull Trout	Candidate *	Threatened *
	Chinook Salmon	Candidate	Threatened (Upper Columbia Spring run is Endangered)
	Chum Salmon	Candidate	Threatened
	Coastal Res./ Searun Cutthroat		Species of Concern
	Coho		Threatened – Lower Columbia
	Kokanee		
	Pink Salmon		
	Steelhead Trout	Candidate **	Threatened **
	Sockeye Salmon	Candidate	
Amphibians	Cascade Torrent Salamander	Candidate	
	Dunn's Salamander	Candidate	
	Larch Mountain Salamander	Sensitive	Species of Concern
	Van Dyke's Salamander	Candidate	Species of Concern
	Western Toad	Candidate	Species of Concern
Reptiles	Pacific Pond Turtle (also known as Western Pond Turtle)	Endangered	Species of Concern
Birds	Western grebe	Candidate	
	Great Blue Heron		
	Cavity-nesting ducks: Wood Duck, Barrow's Goldeneye, Common Goldeneye, Bufflehead, Hooded Merganser		
	Nonbreeding concentrations of: Barrow's Goldeneye, Common Goldeneye, Bufflehead		
	Harlequin Duck		

	Species/ Habitats	State Status	Federal Status
	Trumpeter Swan		
	Tundra Swan		
	Waterfowl Concentrations		
	Bald Eagle	Sensitive	Species of Concern
	Golden Eagle	Candidate	
	Northern Goshawk	Candidate	Species of Concern
	Peregrine Falcon	Sensitive	Species of Concern
	Sooty Grouse		
	Wild Turkey		
	Sandhill Crane	Endangered	
	Nonbreeding concentrations of: Charadriidae, Scolopacidae, Phalaropodidae		
	Band-tailed Pigeon		
	Yellow-billed Cuckoo	Candidate	Candidate
	Spotted Owl	Endangered	Threatened
	Vaux's Swift	Candidate	
	Pileated Woodpecker	Candidate	
	Purple Martin	Candidate	
	Slender-billed White-breasted Nuthatch	Candidate	Species of Concern
Mammals	Harbor Seal		
	Roosting Concentrations of: Big-brown Bat, Myotis bats, Pallid Bat		
	Townsend's Big-eared Bat	Candidate	Species of Concern
	Fisher	Endangered	Candidate
	Marten		
	Wolverine	Candidate	Candidate
	Columbian Black-tailed Deer		
	Columbian White-tailed Deer	Endangered	Endangered
	Elk		
Invertebrates	Blue-gray Taildropper	Candidate	
	Valley Silverspot	Candidate	Species of Concern

Table 4-3. Threatened and endangered plant species in Cowlitz County.

Scientific Name	Common Name	Status[1]	Historic Record[2]
Agoseris elata	Tall agoseris	WS	
Cimicifuga elata var. elata	Tall bugbane	SC, WS	H
Corydalis aquae-gelidae	Clackamas corydalis	SC, WS	
Erythronium revolutum	Pink fawn-lily	WS	

Euonymus occidentalis var. occidentalis	Western wahoo	WS	
Isoetes nuttallii	Nuttall's quillwort	WS	
Physostegia parviflora	Western false dragonhead	WS	H
Poa laxiflora	Loose-flowered bluegrass	WS	
Poa nervosa	Wheeler's bluegrass	WS	
Salix sessilifolia	Soft-leaved willow	WS	
Sidalcea nelsoniana	Nelson's checker-mallow	FT, WE	

1 Listing status: FT = Federal threatened, FE = Federal endangered, FC = Federal candidate, FS = Federal species of concern, WE = Washington endangered, WT = Washington threatened, WS = Washington sensitive.

2 H indicates that most recent record in the County was before 1977.

In addition to rare plant species identified in Table 4-3, the following rare plant communities have also been documented to occur in Cowlitz County.

- Pacific Silver Fir / Oval-leaf Blueberry
- Noble Fir Forest
- Bluejoint Reedgrass
- Sitka Sedge
- Western Inflated Sedge
- Shore Sedge
- Northwest Territory Sedge
- Creeping Spikerush
- Idaho Fescue Community
- Mid-elevation Freshwater Wetland WC
- Lodgepole Pine / Kinikinnick
- Douglas-fir - Western Hemlock / Swordfern
- Douglas-fir / Beaked Hazel / Swordfern
- Oregon White Oak / Oval-leaf Viburnum - Poison-oak
- Sitka Willow
- Western Hemlock / Swordfern
- Western Hemlock / Oval-leaf Blueberry

4.3.1 Columbia River

The Columbia River is the largest river in the Pacific Northwest, and the fourth largest river in the United States by volume. The Columbia River watershed originates in Canada, and the drainage area of over 258,000 square miles includes areas of Washington, Oregon, Montana, Idaho, Wyoming, and Nevada.

Cowlitz County is located along the lower Columbia River, in the tidal freshwater subsystem. The Willamette River is the largest tributary to the lower Columbia River.

Major tributaries originating in the Cascades include the Lewis, Kalama and Cowlitz Rivers in Cowlitz County, as well as the Sandy River in Oregon and the Washougal River, in Washington. Major Coast Range tributaries include the Elochoman and Grays Rivers, the Lewis and Clark, Young, and Clatskanie Rivers in Oregon.

The Columbia River Estuary and Lower Columbia Subbasin support an abundance of fish and wildlife species. Columbia River populations compose 12 of the 26 evolutionary significant units of Pacific salmon protected under the Endangered Species Act of 1973 (Bottom *et al.* 2005).

Estuaries provide a variety of functions critical to a variety of species. Estuarine habitats also provide young salmonids with a productive feeding area, protection from large piscivorous predators, and an area where smolts can undergo the physiological changes necessary to acclimate to the saltwater environment. The natural structure including sinuous channels, overhanging vegetation, and undercut banks in these habitats offers high densities of insect prey and potential refuge from predators (McIvor and Odum 1988). The connectedness of these habitats likely determines the extent to which juvenile salmonids access the spectrum of available estuarine habitats (Beamer et al. 2005).

Smelt (eulachon) in the Northwest Pacific Ocean depend on the lower Columbia River and its tributaries to support the largest known spawning run, which historically represented half of the species' abundance. The mainstem of the lower Columbia River provides spawning and incubation sites, as well as a migratory corridor to spawning areas in the tributaries. Spawning grounds are typically in the lower reaches of larger rivers. Eggs commonly adhere to sand or pea-sized gravel. Eggs found in areas of silt or organic debris reportedly suffer much higher mortality (NMFS 2011).

4.3.2 Lewis River

The Lewis River is part of WRIA 27, which covers 1,310 square miles, including the eastern portion of Cowlitz County. Originating on the slopes of Mount Adams and Mount St. Helens, the Lewis River has two major forks, the North Fork, which forms the southeastern boundary of Cowlitz County, and the East Fork, which is located in Skamania and Clark Counties. The North Fork Lewis River includes three significant impoundments: Swift Reservoir (RM 47.9), Yale Reservoir (RM 34.2), and Merwin Lake (RM 19.5). The northern shorelines of Yale Reservoir and Merwin Lake are located in Cowlitz County, and Swift Reservoir is located to the east in Skamania County. Major tributaries to the Lower Lewis include the EF Lewis, Cougar Creek, and Speelyai Creek. The majority of WRIA 27 is in managed forest lands, primarily concentrated in the upper watershed.

Anadromous fish species in WRIA 27 include chum salmon, coho salmon, Chinook salmon, steelhead, bull trout, and sockeye salmon. Each of these anadromous salmonid species are federally listed as threatened under the Endangered Species Act with the exception of sockeye, which are rare in the county. Merwin Dam at RM 19.5, is a complete barrier to for anadromous fish passage (LCFRB 2010). Below Merwin Dam, the lower North Fork flows through a deep canyon until it opens to a broad alluvial valley at RM 12 (LCFRB 2010). Tidal influence extends up to RM 11 (LCFRB 2010).

The Lewis River has produced very large smelt runs periodically. During spawning, eulachon typically move upstream about 16 km (10 miles; to Eagle Island), but they have been observed upstream to the Merwin Dam (NMFS 2011).

4.3.3 Kalama River

The Kalama River originates on the southwest slope of Mt. St. Helens, from the Dryer Glacier, and flows 44 miles west-southwest to the Columbia River. Nearly all of the 205 square mile drainage area is within Cowlitz County. Shorelines of the State in the Kalama River basin include the North Fork Kalama River, Fossil, Langdon, Elk, Jacks, Arnold, Gobar, and Wild Horse Creeks. Dry Creek and Merrill Lake are also shorelines of the state within the Kalama River basin.

The lower basin is low gradient. Historically, Lower Kalama Falls blocked most anadromous passage at RM 10. A fish ladder, constructed in 1936, allows passage above the falls; however, only steelhead and excess spring chinook are passed above the lower falls by Washington Department of Fish and Wildlife (WDFW) (Wagemann 1999, personal comm. cited in Wade 2000b). Above RM 10 the river flows in a narrow valley. An impassable falls blocks all anadromous passage at RM 35 (Wade 2000b). Many of the tributaries to the Kalama have steep gradients, with only the lower portions of the streams accessible to anadromous fish.

The extent of smelt spawning within the Kalama River is from the confluence with the Columbia River to the confluence with Indian Creek (NMFS 2011).

4.3.4 Cowlitz River

The Cowlitz River drains approximately 2,480 square miles over a distance of 151 miles. Originating on the west slope of the Cascade Mountain Range and draining portions of Mount Rainier, Mount Adams and Mount St. Helens, the River flows west, then south to its confluence with the Columbia River at Kelso. The Toutle and Coweeman Rivers are the largest tributaries of the Cowlitz River. Other tributaries to the Cowlitz River that qualify as shorelines of the state in Cowlitz County include Olequa, Arkansas,

Delameter, and Ostrander Creeks. Two major dams, Mayfield dam and Mossyrock dam, occur in Lewis County on the Upper Cowlitz River.

The Toutle River originates on Mt. St. Helens, with headwaters near 8,000 feet in elevation, and drains the north and west sides of the mountain, flowing westward to its confluence with the Cowlitz River at RM 20. The subbasin includes three main drainages, the North Fork Toutle, the South Fork Toutle, and the Green River. Much of the upper basin is within the Mt. St. Helens National Volcanic Monument. Other shorelines of the state along the Toutle River include the following: Shultz, Studebaker, Coldwater, Maratta, Hoffstadt, Bear (2), Deer, Alder, Wyant, Hemlock, Outlet, Johnson, Harrington, Trouble, and Coldspring Creeks. Castle Lake, Coldwater Lake, and Fawn Lake each drain to the North Fork Toutle River. Silver Lake drains to the mainstem Toutle River via Outlet Creek.

The Coweeman River originates in the cascade foothills around 3,000 feet in elevation. Principal tributaries that are shorelines of the state include Goble, Mulholland, and Baird Creeks. The Coweeman River joins the mainstem Cowlitz at RM 1.7.

The 1980 eruption of Mount St. Helens had a significant influence on watershed conditions including significant effect on fisheries populations and their habitats in the North and South Fork Toutle River watersheds (Jones and Salo 1986). Debris flows buried a 23 square mile area to an average depth of 150 feet, including more than 27 miles of anadromous stream habitat (Jones and Salo 1986).

Populations of anadromous salmon, although present, are substantially reduced from historic numbers. Sturgeon and pacific lamprey are present in the lower reaches in reduced numbers, and smelt runs still occur cyclically. The Cowlitz River is likely the most productive and important spawning river for smelt within the Columbia River system. Spawning adults typically move upstream about 26 km (16 miles) to Castle Rock or beyond to the confluence with the Toutle River and are occasionally sighted as far as 80 km (50 miles) upstream (NMFS 2011).

4.3.5 Mill, Abernathy, Germany Creeks

Mill, Abernathy, and Germany Creeks are a part of WRIA 25 (the Grays/Elochoman watershed). The watershed consists of several small, low elevation, rain dominated systems that experience tidal influences from the Columbia. In addition to the above listed Creeks, Cameron Creek and Ordway Creek occur in WRIA 25 in Cowlitz County. The upper reaches of the Elochoman River also extend into the westernmost portion of Cowlitz County.

Focal salmonid species include chum, coho, winter steelhead, and fall Chinook. Salmon and steelhead numbers have declined to only a fraction of historical levels and extinction risks are significant for all focal species. Returns of winter steelhead and coho include both natural and hatchery produced fish. Natural fall Chinook spawning returns have been highly influenced by the release of Spring Creek Hatchery stock released at the Abernathy Creek NFH which was discontinued in 1995. Fall Chinook hatchery strays continue to be present in the subbasin.

4.3.6 South Fork Chehalis River

A portion of the northwestern corner of Cowlitz County forms the headwaters of the South Fork Chehalis River. The River flows north into Lewis County where it joins the North Fork Chehalis River before heading west toward Grays Harbor. Other tributaries to the mainstem Chehalis River include the Newaukum, Skookumchuck, Black, Satsop, and Wynoochee Rivers.

The South Fork Chehalis River is used by fall and spring Chinook salmon, coho salmon, cutthroat, and steelhead (Grays Harbor County Lead Entity 2011).

4.4 Major Land Use Changes and Current Shoreline Condition

4.4.1 Columbia River

Human influences have resulted in substantial changes to the shorelines of the Columbia River. The most significant changes to the River's shorelines have resulted from European settlement following the Lewis and Clark expedition in the early 1800s. Grazing and farming activities along the estuarine floodplain for expanded between the early 1800s through the early 1900's. Extensive diking of the shorelines occurred to protect agricultural fields from flooding, and as a consequence, large areas of the floodplain were isolated from the river.

Concurrent with the expansion of agriculture, commercial fishing, processing, and canning emerged as major industrial activities on the Columbia. The commercial fishing industry led to the extensive construction of canneries, warehouses, fish traps, and other similar structures along the shores and in the river (Christy and Putera 1992, Lichatowich 1999). The piles associated with many derelict structures are still present today in many places along the River. Timber production and transport also developed during this period, shaping the vegetative landscape.

Today, the Columbia River Basin supports significant water-dependent or water-oriented commercial and industrial uses including pulp mills, aluminum plants, and commercial fishing (see Appendix G, Demand for Water-oriented Uses). Agriculture is

also a significant land use in the basin. Recreational activities include fishing, boating, and hiking.

Flow regulation and diking in the Columbia River have eliminated or limited tidal inundation and disconnected the river from its floodplain, limiting natural disruptions that form new wetlands and create shifting mosaics of wetland habitats (Bottom et al. 2005). Furthermore, channel dredging and flow regulation in the Columbia River have combined to consolidate the river current into a single channel and reduce flow through peripheral wetland and marsh habitats (Bottom et al. 2005). The combination of dikes and water flow regulation has contributed to a 62 percent loss in the shallow water habitat available to juvenile Chinook salmon in the lower estuary (Kukulka and Jay 2003).

The 21 dams built in the Columbia and Snake Rivers since 1933 have substantially altered the Columbia River hydrograph. Dam operations have reduced the frequency of spring freshets, which historically aided the migration of juvenile salmon and helped maintain floodplain habitat connectivity. Today, over-bank flows and associated large woody debris recruitment and sediment transport processes have been substantially reduced.

Historic and ongoing dredging operations are responsible for maintaining a viable navigation channel to support five deep-water ports (two in Cowlitz County), which transport 30 million tons of goods annually. However, the dredge operations also have limited the natural formation of new estuarine marshes (Bottom and Simenstad 2001).

Today, hundreds of fish and wildlife species reside in or migrate through the Lower Columbia River and its estuary. Current wild populations of salmon in the Columbia River basin represent only 12 percent of their historic numbers (Bottom et al. 2005). The period of estuarine residency provides opportunities for juvenile salmon (particularly fall Chinook salmon). Shallow water habitats may provide spatial separation from aquatic predators that reside in deeper waters, improved protection from predators through higher turbidity levels (Gregory and Levings 1998), as well improved foraging capacity (Levings et al. 1991). In the Lower Columbia, salmonids are impacted by primarily impacted by disconnected or lost habitats. Predation impacts from Caspian terns and northern pikeminnow are also significant.

4.4.2 Lewis River

Three dams in the upper watershed have significant effects throughout the basin. The dams block access to approximately 80 percent of historic steelhead spawning habitat.

Per provisions in the FERC settlement agreement (PacifiCorp 2004), PacifiCorp began a program in 2011 to reintroduce anadromous fish to 170 miles of habitat upstream of the dams. The dams affect peak flows and baseflows, restrict downstream transport of LWD, and affect natural sediment transport processes. To offset habitat impacts resulting from continued operation of its hydroelectric projects on the Lewis River, PacifiCorp Energy manages 10,085 acres around the reservoirs in accordance with the Lewis River Shoreline Management Plan (PacifiCorp 2008a) and the Lewis River Wildlife Habitat Management Plan (PacifiCorp 2008b). The Wildlife Habitat Plan includes goals, objectives, actions, and monitoring plans for habitats within the managed area (PacifiCorp, 2008b). Despite sediment retention above the dams, landslides below the dams on the North Fork Lewis River appear to provide sufficient spawning gravels to the lower North Fork (Steel et al. 2007).

Levees were built in the lower Lewis River in an effort to control flooding. The first successful levee was built near Woodland in 1921 (Steel et al. 2007). Today, the lower seven miles of the Lewis River are disconnected from the floodplain as a result of extensive diking and levee construction (Wade 2000). Riparian vegetation is largely lacking in the lower River as a result of levees and floodplain development (Wade 2000).

The upper watershed is heavily-forested and largely managed for public and private industrial timber production. However, in recent years, the area has seen increased demand for recreational use and residential development (EA Engineering in Wade 2000). Road densities in the basin range from 4.96 miles/square mile in the lower North Fork below Merwin Dam (Lewis County GIS 1999 cited in Wade 2000b) to as low as 2.01 miles/square mile in the upper portions of the watershed on Forest Service lands (USFS 1995c cited in Wade 2000b).

Most of the Upper North Fork is within the Gifford Pinchot National Forest or the Mt. St. Helens National Volcanic Monument. The majority of the headwaters of the basin are forested and in public ownership; active logging was common until the 1980s, but current logging activities are greatly reduced. Current vegetation in the Upper North Fork Lewis watershed is a mix of early, mid, and late seral stage forests, various aged clear-cuts, native grasslands, shrubs, burned areas, and rock and snow in the higher elevations (Steel et al. 2007). Agriculture and residential uses dominate the lower valley. The only urban area in the subbasin is the City of Woodland.

4.4.3 Kalama River

The watershed is heavily-forested and approximately 96 percent of the Kalama River Watershed is owned and managed by private timber companies. Most of the watershed

was logged in the 1960s through the early 1980s. As a result, existing forest stands are young, and an extensive road network (1,292 miles of roads) covers the forestry lands, with a road density of 5.75-miles/square mile of area (Lewis County GIS 1999 cited in LCFRB 2010). Although the banks of the Kalama River are generally considered to be stable, the proportion of fine sediment in the River substrate is likely related to past forestry practices and road densities (Wade 2000). The upper watershed is within the Mount St. Helens National Volcanic Monument, which is primarily managed for natural resource conservation.

Stand replacing fires, which burned large portions of the basin between 1902 and 1952, have had lasting effects on basin hydrology, sediment transport, soil conditions, and riparian function. Large Woody Debris (LWD) is limited throughout the mainstem river and all of the major tributaries, and given the degraded nature of existing riparian conditions, future recruitment of LWD is also limited (Wade 2000).

The City of Kalama is the only urban area in the subbasin. Extensive industrial development has occurred within the historic floodplains in the lower two miles of the Kalama, especially to the west of I-5 (see Appendix G, Demand for Water-oriented Uses). Most of the lower river has been channelized and diked to facilitate this development. Given the naturally steep topography of the Kalama River throughout much of the basin, isolation of floodplain habitats in the lower river exacerbates a natural limiting factor (Wade 2000). Residential development has increased along the lower river as well. The lower ten miles of the Kalama River are impaired by high water temperatures.

4.4.4 Cowlitz Watershed

Forestry is by far the most dominant land use for all subbasins within the Cowlitz watershed. Forestry activities have the potential to affect temperature and hydrologic regime in the watershed. Despite a history of logging, the watershed still includes several areas of mature forests. Within Cowlitz County, nearly 20 percent of the watershed's shorelines are in agricultural use.

The construction of Mayfield and Mossyrock Dams contributed to the decline of anadromous fish populations. Historically, all of the spring Chinook salmon, 46 percent of the fall Chinook salmon, 77 percent of the coho salmon and 80 percent of the steelhead were estimated to have spawned in the upper watershed (GAIA 1994 cited in Dammers et al. 2002). The construction of the two dams effectively cut off any use of the upper watershed by anadromous salmon. In 1994, a trap and haul program began to reintroduce anadromous salmonids to the watershed above the dam complex. Today,

adults collected at the hatchery complex below the dams are trucked upstream and released to spawn naturally, and juveniles produced at the hatchery are released in the upper watershed to produce additional smolts.

The 1980 eruption of Mt. St. Helens dramatically degraded the habitat conditions of the Toutle River system and the mainstem Cowlitz River below the mouth of the Toutle. Melted ice, ash, and pumice eroded down the Toutle Valley into the Cowlitz River, and carried coarse sandy material and debris to the Columbia River. The eruption wiped out areas of existing forests, which are now recovering in young vegetative conditions.

Following the eruption, the debris flows filling the rivers caused concern for potential flooding of the Cities of Castle Rock, Kelso, and Longview. In response to this concern, the U.S. Army Corps of Engineers (Corps) removed over 74 million cubic yards of material from the Cowlitz River. Floodplain areas along portions of the lower Cowlitz and Toutle Rivers were filled with the fine sediment from dredge spoils. In order to limit future downstream sedimentation and associated flood risk in the North Fork Toutle River, the Corps constructed a sediment retention structure (SRS) on the North Fork Toutle River. The 125 foot tall and 2,200 foot long SRS totally blocked volitional upstream access to as many as 50 miles of habitat for anadromous fish (Corps 2007). Despite the SRS, a significant quantity of sediment is continuing to move through the Toutle system into the Lower Toutle and Lower Cowlitz Rivers. Because of continued filling of the sediment retention structure, the Corps is planning to raise the height of the spillway by 10 feet within the next year in order to reduce downstream sediment delivery and provide additional flood control measures in the Cowlitz River downstream of the Toutle confluence (Corps 2012).

Also following the eruption of Mount St. Helens, two new shoreline lakes, Coldwater Lake and Castle Lake, were created by lahars blocking the North Fork Toutle channel. In order to prevent catastrophic failure of the new earthen berms that formed these lakes, the Corps of Engineers constructed hardened spillway channels at their outlets.

The mainstem Cowlitz and many tributaries have experienced losses in key habitat areas and habitat diversity for most salmonid life-stages due to channel simplification and diking. Below the confluence with the Toutle River, the Cowlitz River channel is extensively armored and diked, and most of the floodplain has been filled with deposits from the eruption of Mt. St. Helens (Wade 2000). Grazing, agriculture, forestry, and residential and commercial development have contributed to a reduction in riparian function, increased bank instability, and added fine sediments. The watershed includes a significant area of highly erodible soils. The greatest erosion problems occur as a result

of ground disturbance from road building and other activities associated with logging. Water quality is generally good within the Cowlitz River, but elevated water temperatures and turbidity are a concern in the Coweeman watershed.

Incorporated urban areas include the Cities of Kelso, Longview, and Castle Rock.

4.4.5 Mill, Abernathy, Germany Creeks

The upper watershed area is heavily-forested and largely managed for public and private industrial timber production. Historic logging contributed to the degradation of riparian and instream habitat, although riparian and forest conditions are recovering. The middle reaches have considerable agricultural and development impacts, including limited vegetated riparian areas and disconnected floodplains. The lower reaches of Germany Creek flows through predominantly agricultural land uses, and the Creek is somewhat entrenched. Large woody debris has the potential to restore a more natural channel form, but large woody debris has been periodically removed from the Creek by local residents (Wade 2002). Floodplain connectivity throughout lower Mill Creek has been impaired by historic splash damming, which has resulted in an incised channel along most of the lower 1.5 miles (Wade 2002). Similarly, the lower five miles of Abernathy Creek are incised and confined by adjacent roads and railroads (Wade 2002). Excessive fine sediment has been observed in lower Germany Creek; the source of fine sediment may be a combination of adjacent agricultural erosion and upstream mass wasting (Wade 2002).

4.4.6 South Fork Chehalis River

Dominant land use in the upper South Fork is commercial forestry, and agricultural uses predominate in the lower river. Both agricultural and forestry uses have resulted in significant alterations to the shorelines of the South Fork Chehalis River. Today, riparian vegetation is limited in extent and maturity compared to historic conditions (Grays Harbor County Lead Entity 2011). The South Fork contributes to high sediment loads in the mainstem Chehalis River; these sediment loads are likely related to a high density of forest roads and logging practices that affect headwater streams, as well as erosion associated with agriculture (Grays Harbor County Lead Entity 2011). Culverts throughout the South Fork Chehalis River present fish passage barriers for anadromous salmonids (Grays Harbor County Lead Entity 2011).

5 INVENTORY AND ANALYSIS OF CONDITIONS

The following section discusses conditions and characteristics of each shoreline assessment unit with respect to both ecological characterization (physical processes,

landscape conditions, shoreline modifications, priority habitats and species use, water quality, etc.) and land use characterization (land use changes, development potential, and existing and potential public access). This includes an evaluation of existing ecological functions provided at a reach scale (as described in Chapter 3). In addition, identification of general restoration opportunities is provided. A more comprehensive restoration plan for the County will be prepared as a separate document later.

Table 5-1 expands upon the relevant required inventory elements, providing specific detail and data for each assessment unit. Unless otherwise noted, Table 5-1 considers only information available within the boundaries of shoreline jurisdiction of each assessment unit. Following Table 5-1, additional tables are provided which report water quality listings which are identified by Ecology's 303(d) listing (see Tables 5-2 through 5-4).

Table 5-1. Summary of shoreline inventory by assessment unit.

Assessment unit	Unit Shoreline Area (Acres – excluding open water)	Unit Length (Miles)	Inventory Elements							
			Land Use Patterns1, 2	Impervious Surfaces	Vegetation1, 3	Levees (County/Cities) Armoring (Cities) (% of shoreline length)	Overwater Structures (#)	Floodplain, Floodway, and Channel Migration Hazard Area	Parks and Public Lands	Critical Areas
Columbia River	2,505	59.1	Current Land Use: Agriculture: 19.6% Diking Right-of-Way: 1.1% Industrial: 9.9% Other: 1.4% Ports: 0.7% Single Family Residential: 3.5% Transportation: 2.7% Undeveloped Land: 43.7% Not Classified (e.g., Water, ROW): 16.6%	4.5%	Cultivated: 2.6% Deciduous Forest: 1.0% Developed Open Space: 1.1% Grassland: 7.2% Developed: 10.3% Palustrine Emergent Wetland: 17.6% Palustrine Forested Wetland: 23.2% Palustrine Shrub/Scrub Wetland: 14.3% Pasture/Hay: 11.7% Shrub/Scrub: 2.3% Unconsolidated Shore: 5.2%	Levees: 30,367 LF – 9.7%	Riverine: Bridge: 6 Building: 2 Dock\Pier: 36 Other: 8	Floodplain: 75.3% Floodway: <0.0% Channel migration zone area: 73.6%	19 acres – 0.6% parks 160 acres – 5.5% public lands • County Line Park • Kalama Sportsman's Park Area • Willow Grove Park	**Wetlands:** 1,649 acres – 65.8% Geologic Hazard Areas: 4 acres – 0.1% Priority Habitat Areas: Bald Eagle: 57 acres Biodiversity Areas and Corridor: 33 acres Canada Goose: 362 acres Cavity-nesting Ducks: 313 acres Cliffs/bluffs: 55 acres Great Blue Heron: 7 acres Islands: 597 acres Oak Woodland: 3 acres Roosevelt Elk: 143 acres Waterfowl Concentrations: 978 acres Wetland Habitats: 142 acres
Lewis River	2,288	44.0	Current Land Use: Diking Right-of-Way: 1.1% Forestland: 19.5% Recreation: 7.1% Single Family Residential: 8.7% Undeveloped Land: 41.8% Utilities: 12.4% Not Classified (e.g., Water, ROW): 7.9%	2.0%	Deciduous Forest: 9.8% Evergreen Forest: 39.3% Grassland: 2.6% Developed: 5.3% Mixed Forest: 12.4% Palustrine Emergent Wetland: 3.8% Palustrine Forested Wetland: 8.2% Palustrine Shrub/Scrub Wetland: 5.0% Pasture/Hay: 2.0% Shrub/Scrub: 7.2%	Levees: 23,136 LF – 10.0%	Riverine: Bridge: 8 Buoy\Float: 8 Dock\Pier: 47 Other: 15	Floodplain: 23.5% Floodway: 0% Channel migration zone area: 23.5%	259 acres – 10.9% parks 625 acres – 26.3% public lands and PacifiCorp lands • Beaver Bay Campground • Merwin Park • Saddle Dam Park • Speelyai Bay Park • Yale Park • Gifford Pinchot National Forest	**Wetlands:** 305 acres – 13.3% Geologic Hazard Areas: 32 acres – 1.4% Priority Habitat Areas: Bald Eagle: 206 acres Cavity-nesting Ducks: 33 acres Elk: 2,027 acres Mule and Black-tailed Deer: 78 acres Oak Woodland: 10 acres Snag-rich Areas: 48 acres Waterfowl Concentrations: 18 acres

Assessment unit	Unit Shoreline Area (Acres – excluding open water)	Unit Length (Miles)	Inventory Elements							
			Land Use Patterns1, 2	Impervious Surfaces	Vegetation1, 3	Levees (County/Cities) Armoring (Cities) (% of shoreline length)	Overwater Structures (#)	Floodplain, Floodway, and Channel Migration Hazard Area	Parks and Public Lands	Critical Areas
Kalama River	4,054	115.8	Current Land Use: Fishing Activities: 1.3% Forestland: 70.9% Industrial: 1.3% Single Family Residential: 5.2% Undeveloped Land: 16.7% Not Classified (e.g., Water, ROW): 3.6%	1.1%	Deciduous Forest: 7.3% Evergreen Forest: 55.5% Grassland: 1.7% Developed: 2.0% Mixed Forest: 10.4% Palustrine Emergent Wetland: 1.4% Palustrine Forested Wetland: 8.6% Palustrine Shrub/Scrub Wetland: 3.6% Shrub/Scrub: 8.0%	Levees: 3,662 LF – 0.6%	Riverine: Bridge: 11 Dock\Pier: 19 Lakes: Dock\Pier: 8	Floodplain: 18.6% Floodway: 0% Channel migration zone area: 17.0%	491 acres – 11.9% parks 649 acres – 15.8% public lands • Kress Lake • Merrill Lake Campground • Gifford Pinchot National Forest • Kalama Sportsman's Park Area	**Wetlands:** 451 acres – 11.1% Geologic Hazard Areas: 52 acres – 1.3% Priority Habitat Areas: Bald Eagle: 306 acres Cavity-nesting Ducks: 105 acres Elk: 3,504 acres Islands: 6 acres Oak Woodland: 0 acres Snag-rich Areas: 127 acres Waterfowl Concentrations: 0 acres Wetland Habitats: 105 acres
Cowlitz River	16,230	379.5	Current Land Use: Agriculture: 2.4% Forestland: 43.7% Single Family Residential: 10.4% Undeveloped Land: 39.7% Not Classified (e.g., Water, ROW): 1.7%	1.3%	Bare Land: 1.5% Deciduous Forest: 5.9% Evergreen Forest: 23.5% Grassland: 3.6% Developed: 2.6% Mixed Forest: 8.3% Palustrine Emergent Wetland: 4.7% Palustrine Forested Wetland: 7.8% Palustrine Shrub/Scrub Wetland: 8.1% Pasture/Hay: 3.7% Shrub/Scrub: 17.0% Unconsolidated Shore: 9.5%	Levees: 14,865 LF – 0.7%	Riverine: Bridge: 27 Dock\Pier: 2 Other: 1 Lakes: Bridge: 5 Building: 3 Dock\Pier: 94 Fill: 11 Other: 5	Floodplain: 32.8% Floodway: <0.0% Channel migration zone area: 30.6 %	2,066 acres – 12.2% parks 4,159 acres – 24.6% • Riverside Park • Seaquest State Park • Coldwater Lake Facilities • Gifford Pinchot National Forest	**Wetlands:** 4,906 acres – 30.2% Geologic Hazard Areas: 1,660 acres – 9.8% Priority Habitat Areas: Bald Eagle: 1,940 acres Cavity-nesting Ducks: 173 acres Elk: 11,766 acres Mule and Black-tailed Deer: 828 acres Roosevelt Elk: 1,199 acres Snag-rich Areas: 69 acres Waterfowl Concentrations: 2,010 acres Wetland Habitats: 31 acres

Assessment unit	Unit Shoreline Area (Acres – excluding open water)	Unit Length (Miles)	Inventory Elements							
			Land Use Patterns1, 2	Impervious Surfaces	Vegetation1, 3	Levees (County/Cities) Armoring (Cities) (% of shoreline length)	Overwater Structures (#)	Floodplain, Floodway, and Channel Migration Hazard Area	Parks and Public Lands	Critical Areas
Mill, Abernathy, Germany Creeks	2,745	57.6	Current Land Use: Forestland: 23.5% Other: 2.8% Ports: 5.6% Single Family Residential: 23.2% Undeveloped Land: 37.7% Not Classified (e.g., Water, ROW): 3.4%	2.3%	Cultivated: 1.9% Deciduous Forest: 14.8% Evergreen Forest: 12.5% Grassland: 2.0% Developed: 4.3% Mixed Forest: 12.3% Palustrine Emergent Wetland: 6.0% Palustrine Forested Wetland: 17.1% Palustrine Shrub/Scrub Wetland: 10.5% Pasture/Hay: 9.6% Shrub/Scrub: 6.8%	Levees: 6,417 LF – 2.1%	Riverine: Bridge: 3 Dock\Pier: 2	Floodplain: 31.4% Floodway: 0% Channel migration zone area: 30.4%	0 acres – 0% parks 192 acres- 6.5% public lands	**Wetlands:** 912 acres – 33.2% Geologic Hazard Areas: 42 acres – 1.4% Priority Habitat Areas: Biodiversity Areas and Corridor: 806 acres Cavity-nesting Ducks: 819 acres Roosevelt Elk: 1,769 acres Waterfowl Concentrations: 270 acres Wetland Habitats: 562 acres
South Fork Chehalis River	121	2.5	Current Land Use: Forestland: 98.3% Not Classified (e.g., Water, ROW): 1.7%	0.5%	Deciduous Forest: 33.5% Evergreen Forest: 14.2% Mixed Forest: 15.7% Palustrine Emergent Wetland: 1.5% Palustrine Forested Wetland: 8.9% Palustrine Shrub/Scrub Wetland: 7.0% Shrub/Scrub: 18.6%	Levees: 0 LF - 0%	0	Floodplain: 0% Floodway: 0% Channel migration zone area: 0%	0 acres – 0%	**Wetlands:** 0 acres – 0% Geologic Hazard Areas: 0 acres – 0% Priority Habitat Areas: Roosevelt Elk: 121 acres

Assessment unit	Unit Shoreline Area (Acres – excluding open water)	Unit Length (Miles)	Inventory Elements							
			Land Use Patterns1, 2	Impervious Surfaces	Vegetation1, 3	Levees (County/Cities) Armoring (Cities) (% of shoreline length)	Overwater Structures (#)	Floodplain, Floodway, and Channel Migration Hazard Area	Parks and Public Lands	Critical Areas
City of Castle Rock	170	6.6	Comprehensive Plan Zoning: Commercial: 1.1% HDR: 2.9% Heavy Commercial/ Light Industrial: 3.4% Industrial: 17.5% Mixed-use Commercial/ Industrial: 1.4% Public / Quasi-Public: 3.3% Recreational/Open Space: 42.8% River: 9.6% SFR: 6.1% Not Classified (e.g., Water, UGA): 11.2% Current Land Use: Public/Education/Assembly: 1.2% Recreation: 2.7% Single Family Residential: 8.8% Transportation: 5.2% Undeveloped Land: 39.1% Not Classified (e.g., Water, ROW): 41.4%	12.6%	Cultivated: 3.1% Deciduous Forest: 2.2% Developed Open Space: 2.0% Evergreen Forest: 2.1% Grassland: 1.4% Developed: 28.1% Palustrine Emergent Wetland: 22.3% Palustrine Forested Wetland: 3.0% Palustrine Shrub/Scrub Wetland: 4.0% Pasture/Hay: 23.5% Shrub/Scrub: 1.6% Unconsolidated Shore: 2.6%	Levees: 3,532 LF – 10.1% Armoring: 4.5%	Riverine: Bridge: 2 Other:1	Floodplain: 49.8% Floodway: 24.4% Channel migration zone area: 38.5%	12 acres – 6.7% parks • Castle Rock Fairgrounds • Lions Pride Community Park • Mt. St. Helens Motorcycle Club • The Rock Community Park • Al Helenberg Memorial Boat Launch	**Wetlands:** 17 acres – 10.1% Geologic Hazard Areas: <0 acres – 0.1% Priority Habitat Areas: Bald Eagle: 2 acres
City of Kalama	214	6.6	Comprehensive Plan Zoning: Public/Quasi-Public Overlay: 4.9% Industrial & Public/Quasi-Public Overlay: 12.4% Not Classified (e.g., Water, ROW, UGA): 82.0% Current Land Use: Commercial: 5.6% Industrial: 41.6% Ports: 9.7% Recreation: 3.5% Single Family Residential: 9.7% Undeveloped Land: 17.0% Not Classified (e.g., Water, ROW): 11.2%	1.1%	Bare Land: 1.1% Developed Open Space: 1.8% Evergreen Forest: 1.3% Grassland: 3.8% Developed: 25.6% Palustrine Emergent Wetland: 18.8% Palustrine Forested Wetland: 20.6% Palustrine Shrub/Scrub Wetland: 11.5% Pasture/Hay: 1.8% Shrub/Scrub: 1.8% Unconsolidated Shore: 6.7%	Levees: 9,744 LF – 27.9% Armoring: 31%	Riverine: Bridge: 3 Dock\Pier: 16 Fill: 4 Other: 4	Floodplain: 61.7% Floodway: 0.4% Channel migration zone area: 1.9%	20 acres – 6.8% parks • Kress Lake • Lions Club Field • Marine Park • Camp Kalama • Kalama Marina	**Wetlands:** 76 acres – 35.7% Geologic Hazard Areas: 0 acres – 0% Priority Habitat Areas: Canada Goose: <0 acres Cavity-nesting Ducks: 59 acres Oak Woodland: 9 acres Wetland Habitats: 49 acres

Assessment unit	Unit Shoreline Area (Acres – excluding open water)	Unit Length (Miles)	Inventory Elements							
			Land Use Patterns1, 2	Impervious Surfaces	Vegetation1, 3	Levees (County/Cities) Armoring (Cities) (% of shoreline length)	Overwater Structures (#)	Floodplain, Floodway, and Channel Migration Hazard Area	Parks and Public Lands	Critical Areas
City of Kelso	882	21.5	Comprehensive Plan Zoning: Commercial: 9.0% High Dens Res: 2.1% Industrial: 48.1% Low Dens Res: 1.5% Open: 3.5% Not Classified (e.g., Water, ROW): 35.7% Current Land Use: Commercial: 1.5% Diking Right-of-Way: 3.2% Multi-Family Residential: 1.5% Open Space: 2.1% Recreation: 2.8% Single Family Residential: 9.5% Transportation: 11.9% Undeveloped Land: 52.2% Not Classified (e.g., Water, ROW): 13.6%	10.2%	Deciduous Forest: 1.2% Developed Open Space: 6.9% Evergreen Forest: 1.5% Grassland: 5.2% Developed: 18.3% Mixed Forest: 1.4% Palustrine Emergent Wetland: 19.5% Palustrine Forested Wetland: 24.6% Palustrine Shrub/Scrub Wetland: 13.3% Pasture/Hay: 2.5% Shrub/Scrub: 1.9% Unconsolidated Shore: 1.1%	Levees: 43,405 LF – 38.3% of Assessment Unit 65% of City Limits Armoring: 25,866 LF – 22.8%	Riverine: Bridge: 17 Other: 2	Floodplain: 69.3% of Assessment Unit Floodway: 9.1% of Assessment Unit Channel migration zone area: 49.6%	12 acres – 1.2% • Tam O'Shanter Park • Coweeman River Trail • Cowlitz River Trail • Three Rivers Golf Course	**Wetlands:** 463 acres –52.6% Geologic Hazard Areas: 34 acres – 3.4% Priority Habitat Areas: Elk: 41 acres Oak Woodland: 2 acres Waterfowl Concentrations: 444 acres Wetland Habitats: 202 acres
City of Woodland	237	3.8*	Comprehensive Plan Zoning: Commercial: 8.0% Floodway and Open Space: 18.5% High Density Residential: 14.1% Low-density Residential: 34.5% Public/Quasi Public/Institutional: 11.8% Not Classified (e.g., Water, ROW): 13.0% Current Land Use: Airport: 3.8% Church: 2.2% Commercial: 2.8% Multi-Family Residential: 4.6% Recreation: 2.2% Single Family Residential: 28.3% Undeveloped Land: 27.2% Not Classified (e.g., Water, ROW): 27.6%	17.9%	Bare Land: 2.8% Deciduous Forest: 2.2% Developed Open Space: 18.3% Grassland: 2.0% Developed: 35.3% Mixed Forest: 1.2% Palustrine Emergent Wetland: 5.3% Palustrine Forested Wetland: 7.2% Palustrine Shrub/Scrub Wetland: 8.7% Pasture/Hay: 8.1% Shrub/Scrub: 2.2% Unconsolidated Shore: 1.0%	Levees: 3,633 LF – 18.0% Armoring: 8%	Riverine: Dock\Pier: 3 Lakes: Dock\Pier: 12	Floodplain: 52.3% Floodway: 32.5% Channel migration zone area: 42.9%	6 acres – 2.2% • Horseshoe Lake Park	**Wetlands:** 56 acres – 23.8% Geologic Hazard Areas*: 0 acres – 0% Priority Habitat Areas: Cavity-nesting Ducks: 2 acres

1 Only uses and coverages that occupy greater than 1% of the shoreline area are listed.

2 Land use pattern source information is described in Section 3.4.1. Categories shown here have been aggregated in some cases.

3 Vegetation data was classified using NOAA's C-CAP classification. Maps of vegetative cover are found in Appendices B and C (Land Cover).

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Table 5-2. Category 2 waterbodies (waters of concern) by assessment unit.

Assessment unit	Waterbody	pH	Temperature	Arsenic	Mercury	Chemical Compounds, including pesticides	Fecal Coliform	Total Dissolved Gas	DDT/DDE
Columbia River	Columbia River		X	X	X	X	X		X
Lewis River	Lewis River							X	
	Merwin lake					X			
	Swift Creek #2 Power Canal							X	
	Yale Lake							X	
Kalama River	Kalama River						X		
Cowlitz Watershed	Alder Creek								
	Arkansas Creek								
	Baird Creek								
	Coweeman River								
	Cowlitz River					X			
	Delameter Creek								
	Goble Creek								
	Green River		X						
	Herrington Creek								
	Hoffstadt Creek								
	Ostrander Creek								
	Schultz Creek								
	Silver Lake					X			
	Toutle River								
	Turner Creek								
Mill, Abernathy, Germany Creeks	Abernathy Creek	X							
	Cameron Creek								
	Coal Creek								
	Germany Creek	X							
	Mill Creek		X						
South Fork Chehalis River	South Fork Chehalis River								

Table 5-3. Category 4 waterbodies (polluted waters that do not require a total maximum daily load) by assessment unit.

Assessment unit	Waterbody	Dioxin	Total Dissolved Gas	Temperature	Fecal Coliform
Columbia River	Columbia River	X	X		
Lewis River	Lewis River				
	Merwin lake				
	Swift Creek #2 Power Canal				
	Yale Lake				
Kalama River	Kalama River				
Cowlitz Watershed	Alder Creek				
	Arkansas Creek				
	Baird Creek				
	Coweeman River				
	Cowlitz River				
	Delameter Creek				
	Goble Creek				
	Green River				
	Herrington Creek				
	Hoffstadt Creek				
	Ostrander Creek				
	Schultz Creek				
	Silver Lake				
	Toutle River				
	Turner Creek				
Mill, Abernathy, Germany Creeks	Abernathy Creek			X	
	Cameron Creek			X	
	Coal Creek				
	Germany Creek			X	X
	Mill Creek			X	
South Fork Chehalis River	South Fork Chehalis River				

Table 5-4. Category 5 waterbodies (polluted waters that require a total maximum daily load) by assessment unit.

Assessment unit	Waterbody	pH	Temperature	Arsenic	Mercury	Chemical Compounds, including pesticide	PCBs
Columbia River	Columbia River		X	X	X	X	X
Lewis River	Lewis River						
	Merwin lake						
	Swift Creek #2 Power Canal						
	Yale Lake						
Kalama River	Kalama River						
Cowlitz Watershed	Alder Creek		X				
	Arkansas Creek		X				
	Baird Creek		X				
	Coweeman River		X				
	Cowlitz River		X		X	X	X
	Delameter Creek		X				
	Goble Creek		X				
	Green River						
	Herrington Creek		X				
	Hoffstadt Creek		X				
	Mulholland Creek		X				
	Ostrander Creek		X				
	Schultz Creek		X				
	Silver Lake						X
	Toutle River						
	Turner Creek		X				
Mill, Abernathy, Germany Creeks	Abernathy Creek	X					
	Cameron Creek						
	Coal Creek		X				
	Germany Creek	X					
	Mill Creek		X				
South Fork Chehalis River	South Fork Chehalis River						

5.1 General Inventory and Analysis of Conditions

5.1.1 Utilities

Utilities are generally discussed in the assessment unit sections that follow. However, the Bonneville Power Administration (BPA) is currently evaluating potential routes for a new 500-kilovolt transmission line to reinforce the power grid in southwest Washington. The line would travel between potential new substations at Castle Rock, Washington and Troutdale, Oregon (a distance of approximately 70 miles). This project has the potential to occur in multiple assessment units, depending upon the alignment alternative selected. A final agency decision regarding the project, including the potential alignment, is scheduled for 2014.

5.1.2 Public Access – Existing and Potential

Shoreline public access, as defined in the Washington Administrative Code (WAC 173-26-221(4)(a)), includes "the ability of the general public to reach, touch, and enjoy the water's edge, to travel on the waters of the state, and to view the water and the shoreline from adjacent locations." Shoreline public access is probably most often thought of in terms of physical access to the shoreline, such as via a trail, dock, boat ramp, or other access way. However, public access can also be visual, such as from a viewing tower or through a view corridor between buildings.

Protecting public access to shorelines is one of the three major policy goals of the Shoreline Management Act.

The 2010 Cowlitz County Comprehensive Park Plan Update (Cowlitz Parks Plan) is the guidance document for park and recreation facilities in Cowlitz County, including shoreline public access facilities. In the Vision/Mission Statement and Goals section, the Cowlitz Parks Plan sets forth the following shoreline-related goals:

- "Create, maintain, and enhance shoreline accessibility"
- "Provide additional public access the banks of local rivers and lakes"

Later in the document's Summary Findings and Conclusions, the following statements are made relating to Cowlitz County shorelines in general:

- "During the summer season there can be extensive public use of shorelines along area rivers. Shoreline access is also important year-round

for fishing. Wherever possible, undeveloped shoreline areas should be kept open for public use."

- "Merwin, Yale and Swift reservoirs and parks operated by Pacific Power & Light Company (PP&L) are providing extensive and valuable recreation facilities to the Southwest Washington region. Cowlitz County should continue to work with PP&L to meet community needs."

Additionally, in the Demands Assessment, the Cowlitz Parks Plan contains other statements that are generally applicable to shorelines in Cowlitz County:

- "Shoreline access: There is an ongoing need for more access to river shorelines. Demand for boating access for the Columbia and Cowlitz Rivers continues to be a priority. Access to bank fishing in the Columbia, Cowlitz, Lewis and Kalama Rivers is an ongoing need as well."

- "Camping: Existing campgrounds throughout the county particularly along the Lewis and Columbia Rivers operate at capacity through the summer months. … There is a need for increased facilities that could be addressed through public/private partnerships."

Regarding potential shoreline public access projects, in its list of Target Projects, the Cowlitz Parks Plan includes the following:

<u>2020</u>

- "Purchase property to develop a park in the south portion of Cowlitz County that would provide river access (including boat launch), walking trails, playground equipment and sports fields and an outdoor venue/amphitheater (possible gazebo)."

This project is mentioned here as the project could occur in any one of several assessment units. Other projects and statements made in the Cowlitz Parks Plan that apply only in a specific area of the shoreline are presented in the assessment-unit-specific sections that follow.

5.1.3 Historic and Archeological Resources

The historical sites identified in Table 5-5 likely represent only a subset of the historic and archeological resources that occur in Cowlitz County shorelines. Due to the wealth of cultural resources, the State of Washington Department of Archaeology and Historic Preservation requires cultural resources assessments

when development or activities are proposed that may affect archaeological or historic resources. Three out of the four historic and archaeological sites listed in Table 5-5 are bridges that are still in use today. These bridges are maintained to ensure structural integrity and to continue to support traffic needs. Once these bridges are no longer structurally viable, they will likely be removed, rebuilt, and/or replaced. Measures that allow maintenance of historic bridges are likely to help prolong the lives of these structures.

Table 5-5. Places on the Washington State Historic Register within shoreline jurisdiction.

Register Name	Address
Longview Bridge	Spans Columbia River
Modrow Bridge	Modrow Road Over the Kalama River
Stella Blacksmith Shop	8530 Ocean Beach Highway1
Yale Bridge	Spans Lewis River on WA 502

1 Map resolution is not sufficient to determine if location is within shoreline jurisdiction.

5.1.4 Levees

Cowlitz County features an extensive system of levees. Levees in the county range in height from just 1 foot to over 20 feet and are publicly and privately owned. There is no known comprehensive inventory of the entire County levee system.

The County features six diking, drainage, or flood control districts that contain levees. These special districts are as follows:

- Cowlitz County Drainage Improvement District No. 1 (North Kelso)
- Cowlitz County Consolidated Diking Improvement District No. 3 (South Kelso)
- Cowlitz County Consolidated Diking Improvement District No. 2 (Woodland)
- Cowlitz County Diking Improvement District No. 15 (Willow Grove)
- Lexington Flood Control Zone District (Lexington)
- Cowlitz County Consolidated Diking Improvement District No. 1 (Longview)

These special districts maintain and repair their own levees. The Corps has inspected and improved the levees in these special districts many times over the years. Private levees are privately maintained and repaired.

Levees along rivers in these special districts require certification to be accredited by FEMA. A certified levee is one that meets and continues to meet minimum design, operation, and maintenance standards as specified in 44 CFR 65.10. The design criteria and structural requirements outlined in paragraphs (b)(1) through (7) must be certified by a registered professional engineer or a federal agency responsible for levee design.

Certification is not sought for public dikes inside of river levees, dikes along creeks, or private levees/dikes. To date, the Cowlitz River levee in Castle Rock is the only levee that has been certified in the county. However, all of the special districts are actively working towards certifying their levees (though Cowlitz County Diking Improvement District No. 15 has yet to sign an agreement with either the Corps or a private consultant). Figure 18 of the County map folio shows public levees that are currently certified or in the process of being certified.

Levees currently certified or undergoing certification are held to the standards in 44 CFR 65.10. Private levees are held to standards applied through the development permit approval process. Additional flood control structures likely exist throughout the County but are not well inventoried. For example, City-specific information provided by the City of Castle Rock (Appendix I) documents the presence of a flood control berm to the northeast of the Green Acres development and north of Castle Rock High School.

The special districts rely on State Environmental Policy Act (SEPA) notification from the County and Cities to consider if development proposed in proximity to a levee, dike, or drainage ditch could have an impact. This notification typically works if a special district owns the parcel the levee, dike, or drainage ditch is on; however, if the levee, dike, or drainage district is located on an easement, notification through SEPA is less reliable.

When a special district is notified of a development application that may affect a levee, the district reviews it against Corps guidelines. The special districts do not have additional guidelines beyond those of the Corps. If a special district becomes aware of construction taking place next to a levee, dike, or ditch without

prior knowledge, the district will work with that property owner and the jurisdiction to bring the project into compliance with district requirements.

5.1.5 Potential Use Conflicts

In general, comprehensive plan designations limit potential conflicts between neighboring uses. Although there is potential for future use conflict, particularly in land use zones that provide a wide variety of land uses, the proposed SMP will provide guidance and a regulatory framework to minimize or avoid future use conflicts in shoreline jurisdiction.

The areas within County jurisdiction where potential use conflicts are the most possible include areas anticipated for water-oriented industrial uses. These areas are largely established contiguous areas of the Columbia River shoreline in the Longview area (generally extending from Barlow Point to the Cowlitz River; Columbia 7, and 9 through 17), the Kalama area (from south of Carrol's Channel to near the Todd Road interchange; Columbia 27 through 30), and the Woodland area (in the Martin's Bar area south of Burke Island and the Austin Point area north of the Lewis River; Columbia 35 through 38).

In the Kalama area, a recreational use along the north shore of the Kalama River has co-existed with port use without apparent conflicts. The residential area south of the Port of Kalama is reasonably well buffered from port uses by distance but experiences some conflicts when access across the rail corridor is blocked by train movement. The port and industrial facilities in the Woodland area are generally bounded by open space, although a recreational vehicle park abuts the Martins Bar area and is located between two areas zoned Heavy Manufacturing. This use is not allowed by existing zoning and may continue if legally non-conforming or be phased out into a conforming water-oriented use in the future.

See Appendix G, Demand for Water-oriented Uses, for further discussion of industrial uses in the region.

5.2 Columbia River Assessment Unit

The Columbia River Assessment Unit includes 2,505 acres along just over 59 miles of estuarine/riverine Columbia River shoreline (Figure 5-1). A summary of shoreline characteristics is provided in Table 5-1.

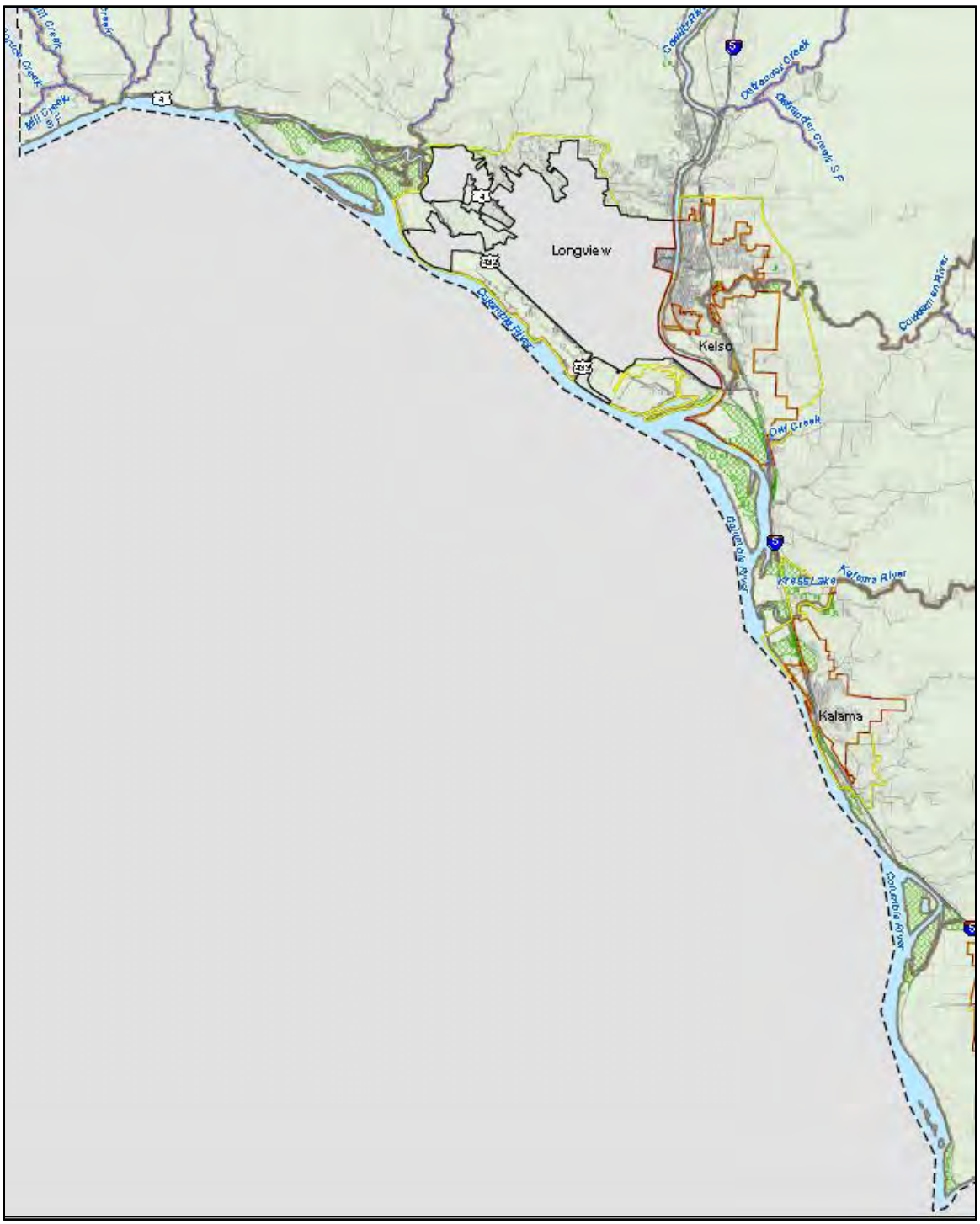


Figure 5-1. Map of Columbia River Assessment Unit (in green).

5.2.1 Ecological Characterization

Critical Areas

The Columbia River shoreline area includes extensive palustrine and riverine tidal channels. Approximately 66 percent of the shoreline is identified as

wetland by the National Wetland Inventory, and approximately 75 percent of the shoreline is within the River's floodplain. Approximately 10 percent of the River's shorelines are leveed within Cowlitz County, and another unknown portion are armored with rip-rap. Largely as a result of this armoring, as well as the regulated water levels in the Columbia River, a mapped floodway is not present in the assessment unit.

Priority bird species documented to use the Columbia River shorelines in Cowlitz County include bald eagles, osprey, peregrine falcons, waterfowl concentrations, cavity nesting ducks, Canada goose, and great blue heron. Roosevelt Elk have been documented to use Columbia River shorelines. The Columbia River is used by all species of salmon for rearing and migration to and from spawning grounds.

Reach Scale Functions

In general, the islands and confluences of major river mouths with the Columbia River provide some of the least altered shoreline habitats in the assessment unit. Ecological vegetative and hydrologic functions remain primarily intact on Fisher and Cottonwood Islands (Reaches 8 and 22, respectively). Both Fisher and Cottonwood Islands are designated as Corps dredge disposal sites with deposition areas inland of the riparian vegetation area.

WDFW has identified important habitat areas as including:

- Cottonwood Island as a habitat area for Columbian white-tailed deer and a heron rookery.
- Martin Island and Burke Island support good habitat despite their agricultural use.
- A large, high-quality wetland complex near Burke Slough
- Between Caples Road and Austin Point, a system of backwater sloughs provides excellent habitat.
- A robust riparian habitat area south of Austin Point (WDFW 2013a).

Other high functioning reaches include undeveloped wetland areas south of the Cowlitz River mouth (Reach 41) and near the mouths of the Kalama (Reach 24) and Lewis Rivers (Reach 39).

WDFW has identified important smelt spawning areas in the Columbia River in the following areas:

- From the western county line, eastward to approximately Bunker Hill Road.
- Near Barlow Point.
- The mouth of the Kalama River contains documented smelt occurrences. WDFW also owns some of this land near the Kalama River mouth.
- The Lewis River, from the confluence with the Columbia River upstream to the Merwin Dam is designated critical habitat for smelt by the National Marine Fisheries Service (WDFW 2013a).

Lower scoring reaches in the Columbia River represent areas of intensive transportation (Port and railroad) infrastructure with levees, overwater structures, limited shoreline vegetation, and extensive impervious surfaces. Industrial reaches (Reaches 9-11) and Port of Kalama (Reaches 28-30) properties have some of the lowest vegetative and habitat scores on the Columbia River.

Table 5-6. Functional scores for reaches in Cowlitz River Assessment Unit.

Waterbody	Label	Hydrologic Overall	Hyporheic Overall	Habitat Overall	Vegetative Overall
Columbia River	Columbia 01	2	2	3	2
Columbia River	Columbia 02	3	2	3	3
	Columbia 03	3	3	3	3
	Columbia 04	2	3	3	3
	Columbia 05	1	2	2	2
	Columbia 06	1	4	3	3
	Columbia 07	1	3	4	4
	Columbia 08	3	3	4	5
	Columbia 09	1	3	2	2
	Columbia 10	1	2	3	2
	Columbia 11	2	3	1	2
	Columbia 12	2	3	2	2
	Columbia 13	3	4	4	3
	Columbia 14	1	4	2	3
	Columbia 15	1	4	2	2
	Columbia 16	1	4	2	2
	Columbia 17	3	4	4	4

Waterbody	Label	Hydrologic Overall	Hyporheic Overall	Habitat Overall	Vegetative Overall
Columbia River	Columbia 19	3	4	4	4
	Columbia 21	3	3	4	4
	Columbia 22	4	4	4	4
	Columbia 23	2	3	3	3
	Columbia 24	3	4	4	4
	Columbia 25	3	4	3	3
	Columbia 26	1	3	3	2
	Columbia 31	3	4	4	4
	Columbia 32	2	3	3	3
	Columbia 33	2	4	4	3
	Columbia 34	1	3	3	2
	Columbia 35	2	4	3	3
	Columbia 36	1	3	3	3
	Columbia 37	1	4	4	3
	Columbia 38	2	4	3	3
	Columbia 39	3	4	5	5
	Columbia 40	4	3	4	4
Owl Creek	Columbia 41	3	4	5	4

Restoration Opportunities

Habitat restoration priorities identified in the 6-year Habitat Work Schedule and Lead Entity Strategy (2010) for the lower Columbia River and Estuary that are applicable to potential actions within Cowlitz County shorelines include:

1. Restoring subbasin valley floodplain function and stream habitat diversity
2. Managing forests to protect and restore watershed processes
3. Addressing immediate risks with short-term habitat fixes

The Lower Columbia River Estuary Partnership has recently updated its Management Plan for the Lower Columbia River (LCREP), which includes several programmatic and project recommendations (LCREP 2011).

Key actions identified by LCREP to address restoration, land use, and water quality improvement include the following:

- Identify and prioritize habitat types and attributes that should be protected or conserved.

- Protect, conserve, and enhance priority habitats, particularly wetlands, on the mainstem of the lower Columbia River and in the estuary.
- Monitor status and trends of ecosystem conditions.
- Establish and maintain Columbia River flows to meet ecological needs of the lower Columbia River and estuary.
- Avoid the introduction of non-native invasive species.
- Manage human-caused changes in the river morphology and sediment distribution within the Columbia River channel to protect native and desired species.
- Develop floodplain management and shoreland protection programs.
- Reduce and improve the water quality of stormwater runoff and other non-point source pollution.
- Ensure that development is ecologically sensitive and reduces carbon emissions.
- Expand and sustain regional monitoring of toxic and conventional pollutants.
- Reduce conventional pollutants.
- Clean up, reduce, or eliminate toxic contaminants, particularly contaminants of regional concern.
- Provide information about the lower Columbia River and estuary that focuses on water quality, endangered species, habitat loss and restoration, biological diversity, and climate change to a range of users.
- Create and implement education and volunteer opportunities for citizens of all ages to engage in activities that promote stewardship of the lower Columbia River and estuary.

Action objectives from the LCFRB (2010) are identified in Table 5-7 below.

Table 5-7. Restoration opportunities in the lower Columbia River and estuary.

Restoration Opportunity	Limiting Factor Addressed	Source Plan
Protect existing rearing habitat to ensure no further degradation.	Availability of preferred habitat	LCFRB 2010

Restoration Opportunity	Limiting Factor Addressed	Source Plan
Increase shallow water peripheral and side channel habitats toward historic levels.	Availability of preferred habitat; Loss of habitat connectivity	LCFRB 2010
Restore connectivity between river and floodplain, tidally influenced reaches of tributaries, as well as in-river habitats.	Loss of habitat connectivity; Microdetritus-based food web; Availability of preferred habitat	LCFRB 2010
Reduce predation mortality on emigrating juveniles.	Predation mortality	LCFRB 2010
Reduce contaminant exposure of emigrating juveniles.	Contaminant exposure	LCFRB 2010
Document the interaction between emigrating juvenile salmonids and introduced species; minimize negative interactions.	Interaction with introduced species	LCFRB 2010
Develop an understanding of emigrating juvenile salmonid life history diversity and habitat use in the lower mainstem, estuary, and plume.	Availability of preferred habitat; Loss of habitat connectivity; Density dependence	LCFRB 2010
Maintain favorable water flow and temperature throughout migration period.	Fitness and timing of juvenile salmonids entering the subbasin	LCFRB 2010
Reduce predation mortality on migrating adults.	Predation losses (Adults)	LCFRB 2010
Protect existing spawning habitat to ensure no further net degradation.	Availability of spawning habitat	LCFRB 2010
Maintain favorable water flow and temperature throughout mainstem spawning and incubation period.	Decreased flows during spawning and incubation; Dewatering of redds	LCFRB 2010

5.2.2 Land Use Characterization

Current Land Use

Figure 5-2 below illustrates land use distribution in the Columbia River Assessment Unit in 2012. As described in Section 3.3.1, this information is aggregated from the 2012 County Assessor's database.

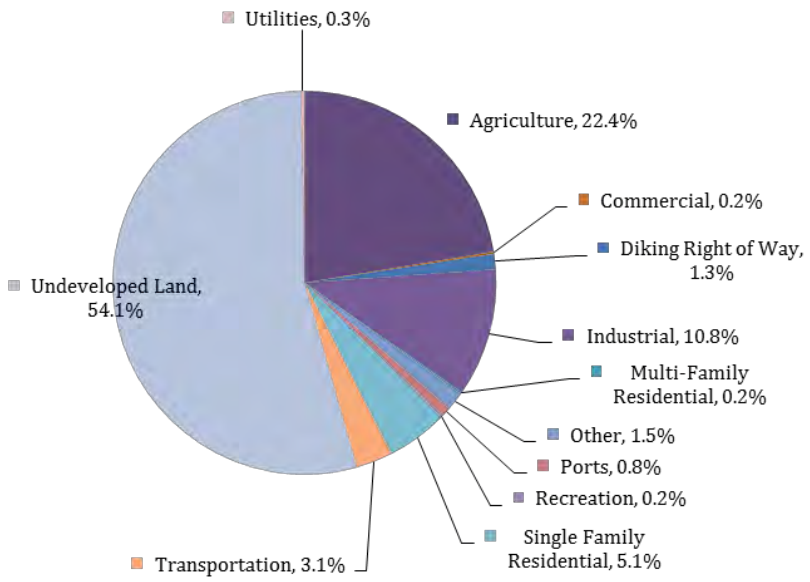


Figure 5-2. Columbia River Assessment Unit 2012 land use distribution (Source: Cowlitz County Assessor's Office).

Water-oriented Uses

The following discussion of water-oriented uses should not be considered comprehensive (please see the subsection on Water-oriented uses in Section 3.3.1 for background discussion). This section only selectively identifies certain water-dependent and water-related uses. Water-enjoyment uses are discussed in the below section titled Existing and Potential Shoreline Public Access.

Cowlitz County shorelines along the Columbia River, specifically in the area around Longview, are home to several major water-oriented uses.

Longview Fibre, situated to the south of the Log Pond in Reach 16, is a major paper and packaging company. An important use of their on-site dock is to receive wood chips that support their operations. Just downstream of Longview Fibre, in the City of Longview, the Port of Longview recently finished construction of a grain export terminal with an expanded pier at the grain export terminal at Berth 9.

The Weyerhauser Longview facilities, just downstream from the Lewis and Clark Bridge in Reaches 11 through 14, include a log export facility, barge unloading facilities for logs and chips to serve the sawmill, as well as paper and fiber export terminals. Upland uses include two paper mills, one sawmill, administrative offices, and a truck maintenance facility.

The PPG Chlor-Alkali plant produces products used by the paper industry throughout the northwest and depends on water access both for raw materials and shipping finished product.

Further downstream, in Reaches 9 and 10, is the Millennium Bulk Terminals Longview (MBTL) property (Figure 5-3), which was formerly the location of an aluminum smelter. MBTL currently operates a bulk product terminal at the site. The bulk product terminal is used for the receipt, storage and transport of alumina from ship to rail or truck; the transportation of coal; and the handing of other products such as green petroleum coke and cementitious materials.

MBTL is currently proposing to construct a coal export terminal on the site. The proposed coal export terminal would cover approximately 100 acres of the 416-acre site. The completed coal export terminal would consist of two docks, two shiploaders, four stockpile pads, one tandem rotary dumper, 8 rail lines, and associated facilities, conveyors, and equipment. The two new docks would require associated dredging. The aforementioned bulk product terminal would remain as a separate use from the coal export terminal (JARPA, MBTL Coal Export Terminal 2012).

Figure 5-3. Millennium Bulk Terminals Longview site (Source: Cowlitz County).

Finally, to the west of Longview is a large undeveloped tract in Reach 6 and the Longview Yacht Club on Fisher Island Slough in Reach 6. The yacht club provides moorage for club members.

Upstream of Longview/Kelso, the Port of Kalama maintains large industrial tracts on both side of the mouth of the Kalama River in Reaches 25 and 26, with dock facilities capable of serving ocean going ships. The Port also maintains facilities within the Kalama city limits and to the south in Reach 28.

The Port of Woodlawn has two undeveloped riverfront industrial parcels at Austin Point just west of the Lewis River in Reach 38 and at Martins Bar to the north in Reach 35. Neither currently has dock facilities.

Transportation and Utilities

At the western side of the County, State Route 4 runs along the north side of the Columbia River, generally within shoreline jurisdiction. To the west of Longview, a stretch of Willow Grove Road (SR 432) lies within shoreline jurisdiction for slightly less than two miles. State Route 433 crosses over the Columbia River (Lewis and Clark Bridge) just west of Log Pond near Longview. North of Kalama, I-5 runs along the Columbia River shoreline. To the west of Woodland, Dike Road generally follows the shoreline. The Burlington Northern Santa Fe (BNSF) Railroad also parallels I-5 and crosses each of the same waterbodies.

BPA has a major utility crossing over the Columbia River on the south side of Longview. However, only a very small portion of this corridor appears to be within Cowlitz County shoreline jurisdiction. A pipeline crosses shoreline jurisdiction near the mouth of Mill Creek.

Existing and Potential Shoreline Public Access

Several existing shoreline public access locations occur within the Columbia River Assessment Unit. These are listed below in Table 5-8.

Table 5-8. Existing shoreline public access locations in the Columbia River Assessment Unit.

Waterbody	Name	Manager	Description
Abernathy Creek	Abernathy Creek (Figure 5-4)	WDFW	Walk-in access only. No boat launch.[1] Open year-round. Although Abernathy Creek itself is located in a different assessment unit, this public access location, per the GIS information currently available, is within the Columbia River Assessment Unit.

Waterbody	Name	Manager	Description
Columbia River	Lower Columbia Water Trail	Multiple agencies: WDFW, State of Oregon	The Lower Columbia River Water Trail web pages provides paddlers and others interested in experiencing the lower Columbia River with information about launch and landing sites, camp sites, lodging, restaurants and grocery stores, and sites of interest along the water trail, as well as information about paddling stewardship, safety and resources.
	County Line Park	Cowlitz County	5.5-acre park on the banks of the Columbia River (approximately 3,000 feet of shoreline is accessible). Offers day use and RV and tent camping. Features restrooms, parking, electrical hookups, picnic sites, fishing platform, trails, and open space.
	Willow Grove Park (Figure 5-5)	Cowlitz County	60-acre regional beach park on the Columbia River for day use, with approximately 4,200 feet of shoreline access. Features a four-lane boat launch, restrooms, playground equipment, beach access, picnic shelters and tables, and a beach volleyball court. A barrier-free, asphalt trail nearly a mile long runs parallel to the water.
	Woodland Bottoms[2]	WDFW	Sand boat launch. Open year-round.
Kalama River	Sportsman Club[2]	WDFW	Sand boat launch. Open year-round.

1 The Draft Public Access map (Appendix B) currently indicates that there is a boat launch at this location; however, this is contrary to the WDFW website which does not show a WDFW Water Access Site (i.e. boat launch) on the WDFW Water Access Site Map.

2 The Draft Public Access map (Appendix B) currently indicates that there is a boat launch at this location (the "Woodland Bottoms" launch is referred to as "Woodland"), but does not show as a WDFW Water Access Site on the WDFW website.

Figure 5-4. Shoreline public access at Abernathy Creek (Source: WDFW).

Figure 5-5. Boat ramp at Willows Grove Park (Source: Cowlitz County).

Regarding potential shoreline public access, in its list of Target Projects, the Cowlitz Parks Plan includes the following project in the Columbia River Assessment Unit:

2020

- Willow Grove Park RV and tent camping, a safe swimming area, overnight boat moorage and marina, venue/amphitheater, windsurfing, and supporting infrastructure.

Future Land Use

Out of the ten assessment units, the Columbia River Assessment Unit saw the largest decrease in vacant lands (14.4 percent) over the ten-year land use analysis period (Table 5-9). Development of vacant land occurred mostly on single family residential lots, which includes development of new single family units and improvements above the $10K market value threshold defining vacant land.

From 2002 to 2012, the assessment unit saw a moderate decrease in agricultural uses (1.3 percent), which were matched by increases in single family and transportation uses (1.4 percent each). This could be indicative of a transition from rural/agriculture to suburban development. Additional evidence of rural to suburban transition, is the decrease in average parcel size, from 7.7 acres to 6.5 acres (an 18.5 percent decrease), despite the increase in parcel count. The assessment unit also saw slight decreases in diking right-of-way, forestland, other, recreation, undeveloped, and utility (<0.8 percent each), accompanied by slight increases in commercial and industrial uses (<0.3 percent each).

Table 5-9. Columbia River Assessment Unit: significant land use change 2002-2012.

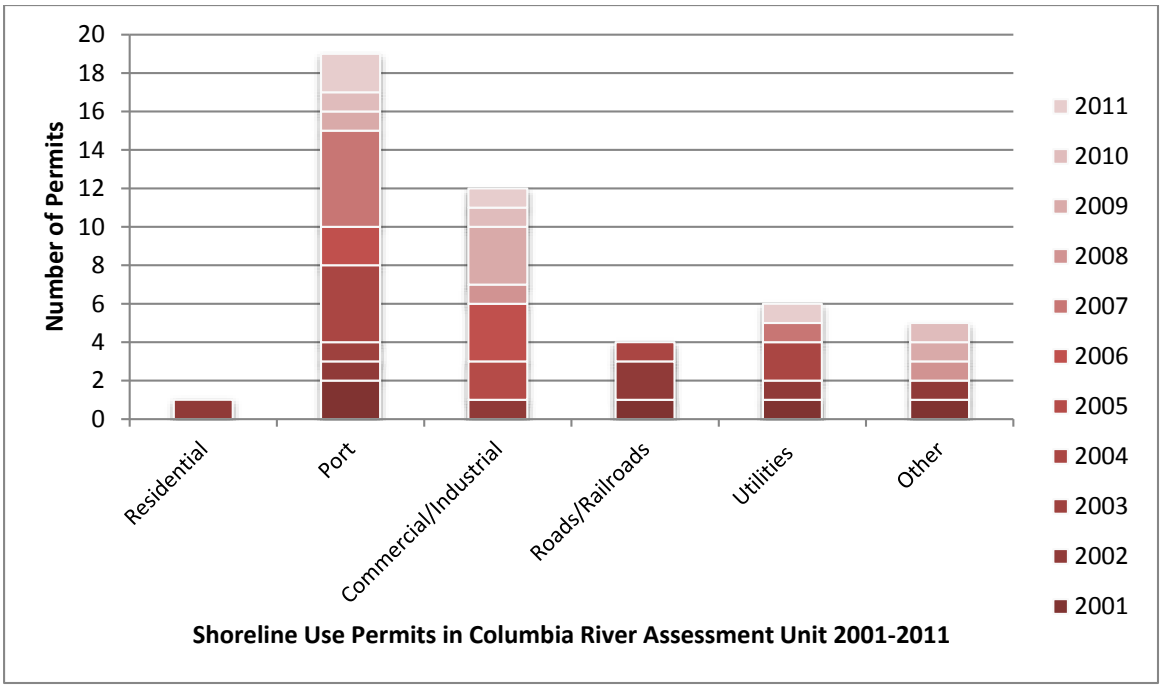
Category	2002		2012		Change in Percent of Total Acres
	Category Acres	Percent of Total Acres	Category Acres	Percent of Total Acres	
Vacant	955 ac.	38.2%	611 ac.	23.9%	-14.4%
Agriculture	593 ac.	23.7%	574 ac.	22.4%	-1.3%
Single family residential	93 ac.	3.7%	131 ac.	5.1%	+1.4%
Transportation	43 ac.	1.7%	79 ac.	3.1%	+1.4%

Over the eleven-year permit evaluation period, the Columbia River Assessment Unit saw the most permit activity compared to the other assessment units. The majority of use permits issued were associated with port and commercial/industrial uses (Figure 5-6). No permits associated with residential uses were issued between 2002 and 2012; however, residential permit applications are likely to increase with the increase in single family residential land uses observed in the comparative analysis.

Throughout the evaluation period, the most common shoreline modification permits issued were for dredging and landfill activities (Figure 5-6). As development in the Columbia River Assessment Unit continues, it is likely that these will remain the most commonly permitted activities.

There are a number of large property holdings in the area along the Columbia River with potential access to the Columbia River Navigation Channel that are likely to be available for water-dependent industrial use in the future. There are about 5 linear miles of industrial-zoned land, along the Columbia River, which is vacant or redevelopable. Some, such as the Millennium site, have active pending development applications. Others, such as the Wasser-Winters site, may have depth and environmental constraints which limit development.

Overall, about 35 percent of the industrial-zoned land with frontage on the Columbia River with reasonable prospects of access to the navigation channel and therefore with the potential for water-dependent use is potentially available. That is substantially more land than has been developed in the past 20 years. The future demand for water-dependent uses, particularly Port use, is dependent on a wide range of factors including world trade and competition within the US among ports, particularly competition for Upper Midwest grain exports from Gulf Coast ports.



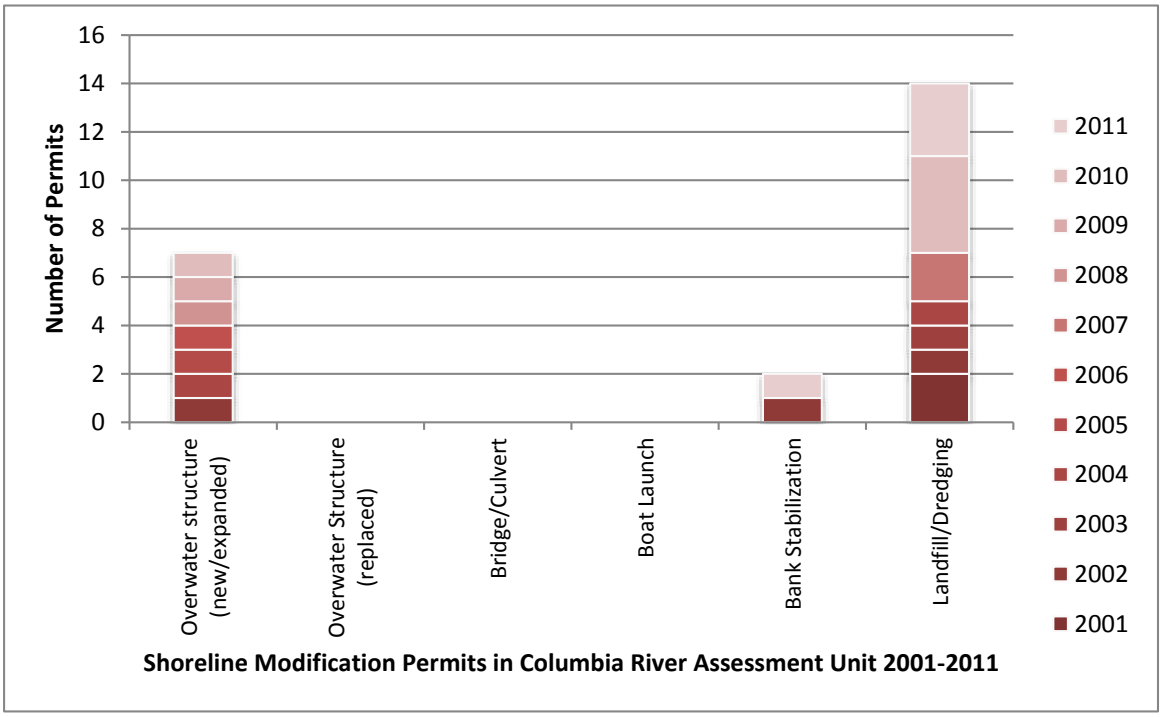


Figure 5-6. Permit issuance data for Columbia River Assessment Unit (Source: Cowlitz County).

5.3 Lewis River Assessment Unit

The Lewis River Basin includes 2,288 acres of shoreline along 44 miles of shoreline (Figure 5-7). A summary of shoreline characteristics is provided in Table 5-1.

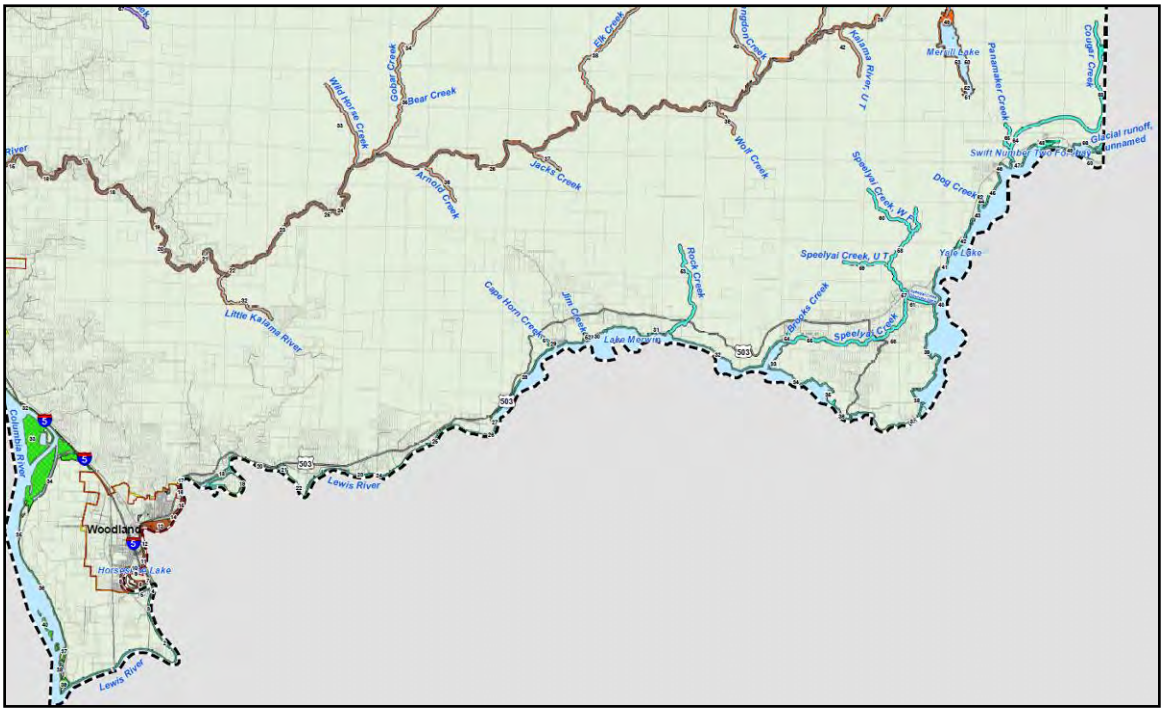


Figure 5-7. Map of Lewis River Basin Assessment Unit (in aqua).

5.3.1 Ecological Characterization

Critical Areas

The Lewis River shoreline area includes palustrine and riverine wetlands. According to the NWI information, as much as 13 percent of the total shoreline area may be wetlands. Shorelines in the lower Lewis River are lined with levees, and levees occupy 10 percent of the total shoreline length of the Lewis River Assessment Unit. Floodplain area is approximately 24 percent of the total shoreline jurisdiction in the assessment unit.

Priority species include bald eagle, osprey, northern spotted owl, Townsend's big-eared bat, waterfowl concentrations, and cavity nesting ducks.

The Salmon and Steelhead Limiting Factors Report (Wade 2000) specifically prioritized the following areas as critical for each priority salmon species within the lower Lewis River.

- Fall Chinook salmon: Off-Channel habitat surrounding Eagle Island; and entire mainstem reach between Cedar Creek and Merwin Dam
- Coho salmon, steelhead, and cutthroat trout: Cedar Creek watershed and the lower reaches of Johnson, Ross, Robinson, and Colvin creeks
- Coho salmon: Wetland complexes in the lower 2 miles of the South Fork Chelatchie Creek
- Chum salmon: All backwater slough areas above the Lewis River Salmon Hatchery

WDFW has identified the following (WDFW 2013a):

- The Lewis River, from the confluence with the Columbia River upstream to Merwin Dam is designated critical habitat for smelt by the National Marine Fisheries Service. This reach is also important spawning and rearing habitat for fall Chinook, coho, and steelhead; it also contains the Lewis River Hatchery.
- WDFW operates a hatchery at the mouth of Speelyai Creek. The creek serves as the water source for the hatchery. The lower reaches of Speelyai Creek support an important Kokanee spawning area.

Reach Scale Functions

Ecological functions in the reaches in the lower Lewis River downstream from the City of Woodland (Reaches 1-5) are significantly degraded. The shorelines in these lower reaches are lined with levees, devoid of native vegetation, and lack habitat complexity. Despite significant degradation of natural shoreline functions of the lower Lewis River, the agricultural fields in the area do likely provide winter foraging habitat for migratory birds. These reaches also experience tidal influence from the Columbia River estuary, and therefore have the potential to provide low energy rearing habitats for juvenile salmon, although the lack of shoreline complexity significantly limits the realization of such potential. As a result of their position in the lower watershed, these reaches score highly for hyporheic functions compared to steeper and naturally confined reaches in the upper watershed.

In contrast to the heavily modified shorelines in the lower Lewis River, the shorelines of Lake Merwin (Reaches 27-37) and Yale Lake (Reaches 38-50)

provide well-vegetated shoreline habitats. The community of Cougar on Yale Lake (Reach 46) does not have direct access on the lakeshore. Although the vegetated and habitat conditions of these reservoirs score highly, the three mainstem dams alter the natural hydroperiod of the lakes and downstream areas, limit longitudinal connectivity in the watershed, create fish passage barriers, and restrict downstream transport of sediment and large woody debris.

Where human disturbance occurs in the upper Lewis River watershed, it is typically limited in extent and associated with small tributaries or sheltered coves. These reaches with human disturbance (for example, Reaches 29, 46, 51, 52, 54, 61 and 62) tend to have lower hydrologic scores as a result of shoreline modifications, including overwater structures and reduced shoreline vegetation). Lower hyporheic scores in the upper watershed tributaries (Reaches 51 through 55 and 58 through 66) are related to the steeper terrain with more confined channels.

Table 5-10. Functional scores for reaches in Lewis River Assessment Unit.

Waterbody	Label	Hydrologic Overall	Hyporheic Overall	Habitat Overall	Vegetative Overall
Lewis River	Lewis 01	1	3	3	3
Lewis River	Lewis 02	1	4	3	3
	Lewis 03	1	3	3	2
	Lewis 04	3	4	3	3
Horseshoe Lake	Lewis 05	1		3	3
Lewis River	Lewis 17	2	4	2	2
	Lewis 18	3	4	3	4
	Lewis 19	3	2	3	4
	Lewis 20	3	4	3	4
	Lewis 21	3	4	4	4
	Lewis 22	3	4	4	4
	Lewis 23	3	4	4	4
	Lewis 24	3	3	3	3
	Lewis 25	3	3	4	4
	Lewis 26	3	4	4	4
Lake Merwin	Lewis 27	3		3	3
	Lewis 28	3		4	4
	Lewis 29	2		4	4
	Lewis 30	4		4	5
	Lewis 31	4		4	5
	Lewis 32	3		4	4
	Lewis 33	3		4	4

Waterbody	Label	Hydrologic Overall	Hyporheic Overall	Habitat Overall	Vegetative Overall
	Lewis 34	3		4	4
	Lewis 35	4		3	4
	Lewis 36	4		4	4
	Lewis 37	5		4	4
Yale Lake	Lewis 38	4		4	4
	Lewis 39	5		4	5
	Lewis 40	5		4	5
	Lewis 41	3		4	4
	Lewis 42	3		3	3
	Lewis 43	4		4	5
	Lewis 44	4		4	5
	Lewis 45	4		4	5
	Lewis 46	3		4	3
	Lewis 47	4		4	4
	Lewis 48	4		4	5
	Lewis 49	4		4	4
	Lewis 50	5		4	5
Cape Horn Creek	Lewis 51	3	2	4	4
Jim Creek	Lewis 52	3	2	4	4
Rock Creek	Lewis 53	3	2	4	4
Brooks Creek	Lewis 54	2	2	4	4
Speelyai Creek	Lewis 55	3	3	4	5
	Lewis 56	3	4	4	5
	Lewis 57	3	4	4	5
	Lewis 58	3	2	4	4
Speelyai Creek, U T	Lewis 59	3	2	4	4
Speelyai Creek, W F	Lewis 60	3	2	4	4
Speelyai Creek Diversion Ditch	Lewis 61	2	3	4	4
Dog Creek	Lewis 62	2	2	4	5
Cougar Creek	Lewis 63	3	2	4	4
	Lewis 64	3	2	4	4
Panamaker Creek	Lewis 65	3	2	4	4
Glacial runoff, unnamed	Lewis 66	2	2	3	3

Restoration Opportunities

The Salmon and Steelhead Limiting Factors report for WRIA 27 (Wade 2000) identifies the Lewis River dam network as the primary limiting factor for salmonid habitat in this area. Planned and ongoing actions by PacifiCorp to

mitigate for impacts to fish passage and habitat alterations will be significant to maintain and improve shoreline functions in the Lewis River.

In addition to addressing dam management, other key strategies for restoring the Lewis River subbasin include restoring floodplain connections and instream habitat complexity and improving riparian habitat. In the upper basin, restoration should address agricultural and forestry impacts to stream corridors (LCFRB, 2010). A summary of priority restoration opportunities is provided in Table 5-11.

Table 5-11. Restoration opportunities in the North Fork Lewis River.

Action	Status	Entity	Source Plan/ ID
Manage regulated stream flows to provide for critical components of the natural flow regime	Expansion of existing program or activity	PacifiCorp, Cowlitz County PUD, FERC, WDFW, NMFS, USFWS	LCFRB 2010, L-Lew 1
Conduct floodplain restoration where feasible along the mainstem and in major tributaries that have experienced channel confinement. Build partnerships with landowners and agencies and provide financial incentives	New	NRCS, C/WCD, CCD, NGOs, WDFW, LCFRB, Corps, LCFEG	LCFRB 2010, L-Lew 4
Address water quality issues through the development and implementation of water quality clean-up plans (TMDLs)	Expansion of existing program or activity	Ecology	LCFRB 2010, L-Lew 17
Limit intensive recreational use of the mainstem Lewis during critical periods	Expansion of existing program or activity	Cowlitz County, WDFW	LCFRB 2010, L-Lew 18

5.3.2 Land Use Characterization

Current Land Use

The chart below illustrates land use distribution in the Lewis River Assessment Unit in 2012.

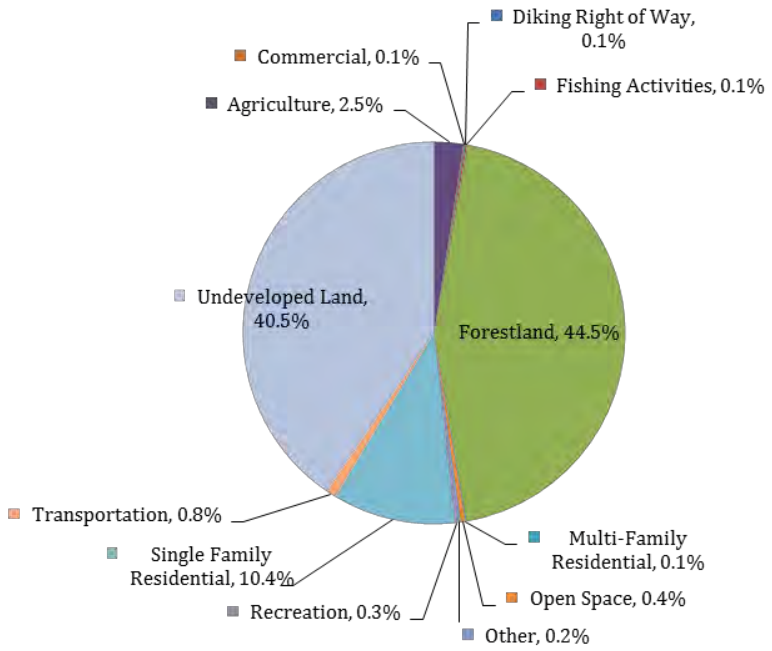


Figure 5-8. Lewis River Assessment Unit 2012 land use distribution (Source: Cowlitz County Assessor's Office).

Water-oriented Uses

The following discussion of water-oriented uses should not be considered comprehensive (please see the subsection on Water-oriented uses in Section 3.3.1 for background discussion). This section only selectively identifies certain water-dependent and water-related uses. Water-enjoyment uses are discussed in the below section titled Existing and Potential Shoreline Public Access.

Dams, a water-dependent use, are defining features of the Lewis River Assessment Unit. This assessment unit includes three major dams: Merwin, Yale, and Swift No. 2. Additionally, a fourth major dam, Swift No. 1, is located just outside the assessment unit in Skamania County. Merwin, Yale, and Swift No. 1 are owned and operated by PacifiCorp. Swift No. 2 is owned by Cowlitz County PUD No. 1 and is operated in coordination with the other projects by PacifiCorp.

Built in 1958, the 512-foot Swift No. 1 (FERC No. 2111) has a capacity of 240 megawatts. The Swift Reservoir it creates is 4,600 acres. The discharge from Swift No. 1 enters a canal that transports the water through the 70-megawatt Swift No. 2 (FERC NO. 2213). Completed in 1953, the 323-feet Yale dam (FERC No. 2071) has a capacity of 134 megawatts. Yale dam creates a 3,780-acre reservoir known as Yale Lake. In service since 1931, the 313-feet-high Merwin dam (FERC No.

935) has a generating capacity of 136 megawatts. It creates Merwin Lake, a 4,040-acre impoundment.

Several fish hatcheries, also water-dependent uses, are located along the Lewis River. Speelyai Hatchery, in Speelyai Bay on Merwin Lake, is owned and funded by Pacificorp and Cowlitz PUD as mitigation for the loss of fish habitat on the North Fork Lewis River due to the construction of the four hydroelectric dams. Just below Merwin dam is the Merwin Fish Hatchery. Started in 1993, it is one of the newest fish hatcheries in Washington State. It was constructed by PacifiCorp to mitigate for fish losses resulting from construction and operation of the Merwin Hydroelectric project. Downstream of the Merwin Fish Hatchery is the Lewis River Hatchery. The Lewis River Hatchery serves to replace fish lost due to land development and the construction of the four hydroelectric projects. The Lewis River Hatchery is currently fully funded by PacifiCorp as mitigation for lost fish habitat.

Other water-related uses include boat storage facilities (e.g. Lewis River Storage).

Transportation and Utilities

State Route 503 generally runs along the north side of Lewis River in this assessment unit (Figure 5-9). However, SR 503 is typically located outside of shoreline jurisdiction. A limited number of local or private roads provide access to properties in shoreline jurisdiction. I-5 crosses over the Lewis River just south of Woodland.

A BPA utility corridor transects shoreline jurisdiction at NE Happa Road, just east of the Lewis River Golf Course. A pipeline transects shoreline jurisdiction near to the east of Kuhnis Road, to the south of Woodland.

Figure 5-9. Lower Lewis River along SR 530 east of Woodland (Source: TWC).

Existing and Potential Public Access

A variety of existing shoreline public access locations occur within the Lewis River Basin Assessment Unit. These are listed below in Table 5-12.

Table 5-12. Existing shoreline public access locations in the Lewis River Basin Assessment Unit.

Waterbody	Name	Manager	Description
Lake Merwin	Cresap Bay[1]	PacifiCorp	Day-use and overnight camping park. Features two-lane boat ramp, marina, and swimming beach. Also includes picnic tables, restrooms, and an RV dump station. Open Friday before Memorial Day through end of September.
	Merwin Park	PacifiCorp	Day-use park with picnic facilities. Opportunities for swimming and bank fishing. No boat launch. Restrooms. Open year-round.
	Speelyai Park	PacifiCorp	Day-use park with two-lane boat ramp and swimming beach. Also features picnic tables and restrooms. Open year-round.
Lewis River	Island River[2] (Figure 5-10)	PacifiCorp	Concrete boat launch, bank fishing. Open year-round.
	Johnson Creek[3]	WDFW	Fishing. Restrooms.
	Lewis River Fish Hatchery[4]	PacifiCorp	Fishing. Restrooms.
	Lewis River Golf Course	Unknown	Boat ramp.

Waterbody	Name	Manager	Description
	Martin[5]	WDFW	Concrete boat launch, bank fishing. Restrooms. Open year-round.
	Merwin Hatchery[2]	PacifiCorp	Boat ramp. Fishing opportunities. Also features picnic facilities and restrooms.
Yale Lake	Beaver Bay Camp	PacifiCorp	Day-use and overnight camping park. Features single-lane boat ramp, swimming beach. Restrooms. Open Friday, before the last Saturday in April (when fishing starts), through the end of September.
	Cougar Camp[1]	PacifiCorp	Day-use and overnight camping park. Features boat ramp, swimming beaches, and picnic area. Restrooms. Open Memorial Day weekend until Labor Day.
	Saddle Dam	PacifiCorp	Day use park with two-lane boat ramp and shoreline picnic area. Restrooms. Open Friday before Memorial Day through end of September.
	Yale Park (Figure 5-11)	PacifiCorp	Day-use park with four-lane boat ramp, picnic tables, and swimming beaches. Restrooms. Open year-round.

1 The Draft Public Access map currently does not show the park, just the boat ramp. The park is depicted on the WDFW website.

2 The Draft Public Access map currently indicates that there is a boat launch at this location (the "Island River" launch is referred to as "Lewis River - Island," the "Merwin Hatchery" launch is referred to as "Merwin"), but does not show as a PacifiCorp River Access Site.

3 The Draft Public Access map currently does not show this WDFW Water Access Site.

4 The Draft Public Access map currently indicates that there is a boat launch at this location; however, this is contrary to the PacifiCorp website for this PacifiCorp River Access Site. Map does not show as a PacifiCorp River Access Site.

5 The Draft Public Access map currently indicates that there is a boat launch at this location (the "Martin" launch is referred to as "End of South Pekin Road"), but does not show as a WDFW Water Access Site.

Figure 5-10. Shoreline public access at Island River (Source: WDFW).

Figure 5-11. Public boat launch and parking lot at Yale Park (Source: TWC).

Potential shoreline public access for this assessment is primarily addressed in the Draft Recreation Resource Management Plan for the Lewis River Hydroelectric Projects (EDAW, Inc. & PacifiCorp 2004). This document includes many public access projects, including new trails, boat launch improvements, ADA accessibility projects, campground upgrades, and more.

Future Land Use

This unit saw a significant decrease in forestland (6.0 percent), the largest decrease across all assessment units (Table 5-13). This decrease contributed to increases in vacant lands (0.7 percent) and recreational uses (3.0 percent), which resulted from reclassification of large tracts of forestland (>50 acres to undeveloped and >65 acres to recreation) between 2002 and 2012. Moderate increases were observed in single family residential (1.8 percent) and undeveloped land (1.8 percent), with lesser increases in commercial, diking right-of-way, and other (<0.4 percent each). Agriculture, open space, public/education/assembly, and utilities decreased slightly by <0.3 percent each.

Some subdivision of parcels was evidenced by the increase in parcel count and decrease in average parcel size from 4.3 acres to 3.8 acres (a 13.2 percent decrease). This may be partially attributed to subdivision of forestland that occurred before reclassification to other uses.

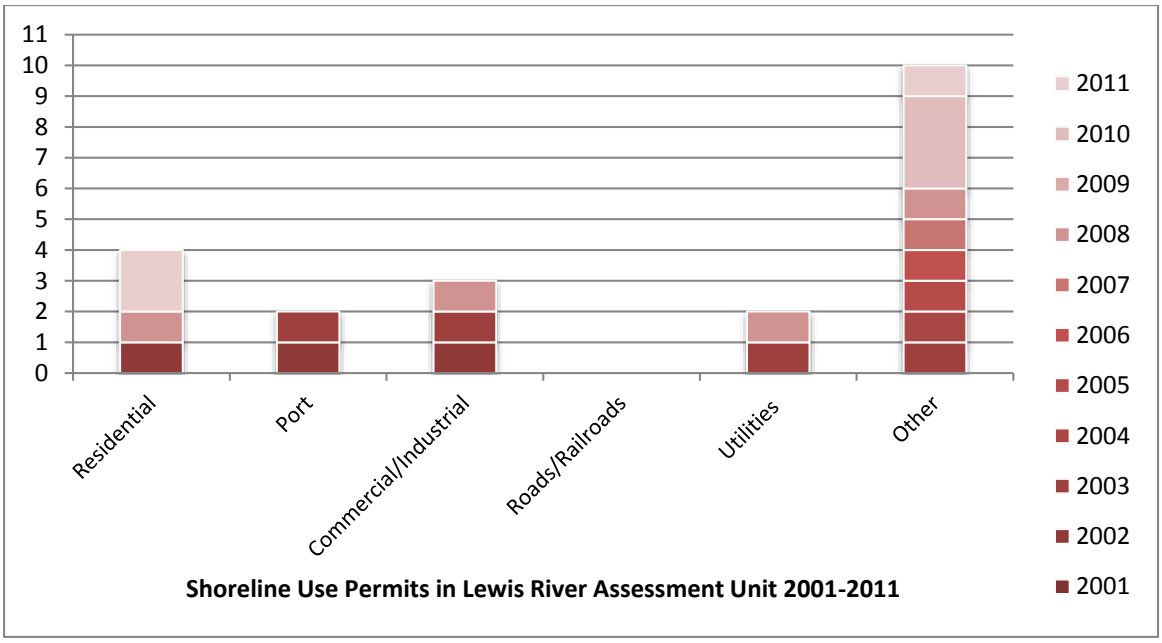
Table 5-13. Lewis River Assessment Unit: significant land use change 2002-2012.

Category	2002		2012		Change in Percent of Total Acres
	Category Acres	Percent of Total Acres	Category Acres	Percent of Total Acres	
Vacant	212 ac.	9.9%	187 ac.	8.4%	-1.5%
Forestland	574 ac.	26.9%	462 ac.	20.8%	-6.0%
Recreation	99 ac.	4.6%	169 ac.	7.6%	+3.0%

Throughout the permit evaluation period, issuance of use permits in this assessment unit was infrequent in all land use categories, aside from "other," which averaged nearly one permit per year (Figure 5-12). Permits falling in the "other" category include dam improvement projects, parks improvements, fish hatchery improvements, and other general permits. Slightly more permits were issued in 2010 and 2011, the last two years of the evaluation period. These represent the only years where more than one permit was issued in a single land use category in a given year (two residential permits in 2012 and three "other" permits in 2011).

In addition to the to-be-developed shoreline master program update, much of the upper Lewis watershed is also owned, managed, and/or regulated by PacifiCorp. The PacifiCorp Shoreline Management Plan parallels a municipal Shoreline Management Program. The plan identifies three shoreline classifications: Integrated Use, Project Works, and Resource Management. The majority of shoreline area is designated as Resource Management classification, in which docks, hard shoreline stabilization, and dredging are all prohibited.

Based on past land use changes, permit history, and the existing regulatory framework in the Lewis River Assessment Unit, future land use changes that may be anticipated include a gradual shift from forestland to residential development in the lower watershed, and continued recreational development and conservation activities in the upper watershed.



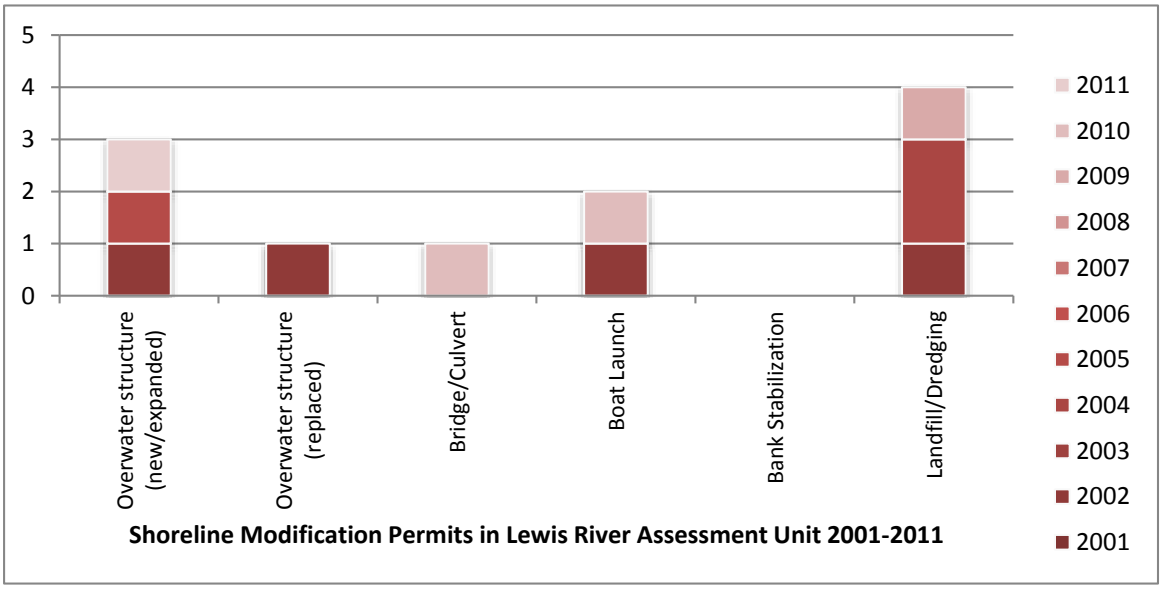


Figure 5-12. Permit issuance data for Lewis River Assessment Unit (Source: Cowlitz County).

5.4 Kalama River Assessment Unit

The Kalama River Assessment Unit includes 4,054 acres along 115.8 miles of shoreline (Figure 5-13). A summary of shoreline characteristics is provided in Table 5-1.

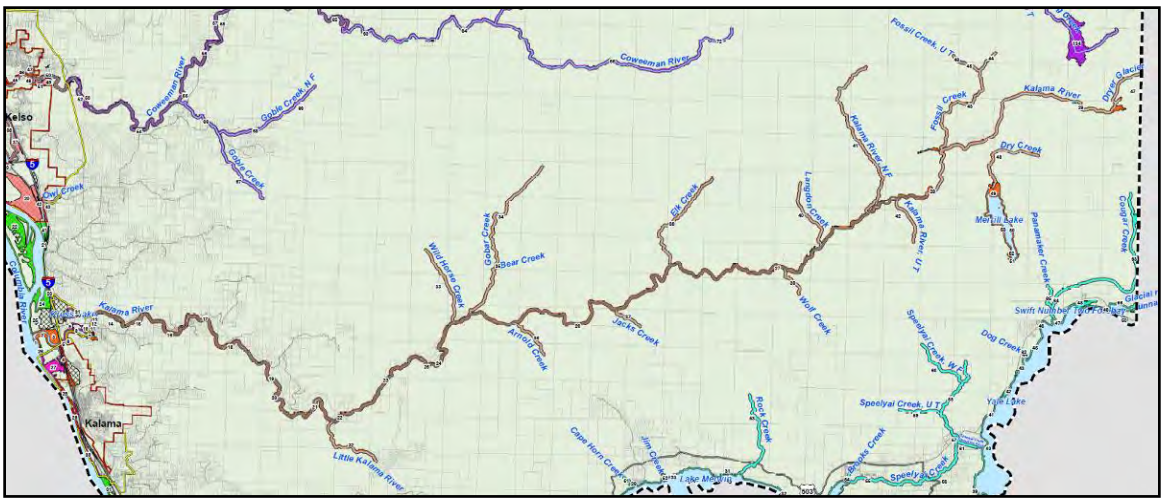


Figure 5-13. Map of Kalama River Basin Assessment Unit (in brown).

5.4.1 Ecological Characterization

Critical Areas

The Kalama River shoreline area includes extensive palustrine and riverine tidal channels. According to the NWI information, as much as 11 percent of the total shoreline area may be wetlands. Many of these wetlands likely fall within the River's floodplain, which occupies 19 percent of shoreline jurisdiction in the assessment unit.

In addition to listed and priority salmonids, priority species in the Kalama River Assessment Unit include bald eagles, northern spotted owls, cavity nesting ducks, waterfowl concentrations, and elk.

The Salmon and Steelhead Limiting Factors Report (Wade 2000) specifically prioritized the following areas as critical for each threatened salmonid species within the Kalama River subbasin.

- Fall Chinook salmon and chum salmon: Mainstem Kalama between Lower Kalama Falls (RM 10) to around Modrow Bridge (RM 2.4)
- Winter steelhead: Upper mainstem Kalama River (RM 10 to RM 35)
- Coho salmon: Tributaries below Lower Kalama Falls and any remaining off-channel habitat

- Summer steelhead: Five tributaries, Gobar Creek, Wildhorse Creek, North Fork Kalama, Langdon Creek, and Lakeview Peak Creek, and the upper mainstem Kalama River

Reach Scale Functions

Scores for hydrologic, habitat, vegetative, and hyporheic functions are consistently higher functioning throughout the Kalama River basin compared to other assessment units in the County. These scores are related to the forested condition of the assessment unit, owing to the fact that approximately 96 percent of the Kalama River Watershed is managed for forest production.

The lower Kalama River has the most impaired functions in the assessment unit. A study of the lower 10 miles of the Kalama River, encompassing Shoreline Reaches 01 to 19, conducted in Phase II of the LCFRB Watershed Assessment Project (R2 and MBI 2004) found that natural geomorphic processes are severely limited in the lower Kalama River. These processes are impaired by armoring and levees that cover the majority of the shoreline length; much of the armoring is designed to protect Kalama River Road, which parallels the lower Kalama River. As a result of development and channelization of the river the density of large woody debris is poor in the lower River. Incomplete armoring data for the functional analysis means that armored shorelines were not incorporated into the functional scoring for the lower Kalama River. Therefore, the reported scores are likely skewed slightly higher than expected.

In the upper watershed, logged areas score lower for vegetative functions, although where clear-cut boundaries extend to the edge of shoreline jurisdiction, these areas are not reflected in the reach score (an example is Reach 27, which shows high reach scores despite a large clear-cut adjacent to shoreline jurisdiction).

In smaller tributaries, hyporheic functions score poorly compared to the mainstem river functions because of the steeper terrain and sediment composition. In several of the smaller tributaries, including Elk Creek (Reach 37) and Wolf Creek (Reach 38), areas of forest harvest occur on both sides of a stream, and vegetated buffers are smaller compared to the mainstem Kalama, resulting in a more direct impact (i.e. lower scores) to shoreline scores and functions.

The area surrounding Merrill Lake (Reaches 48-52) is primarily undeveloped; however, the steep slopes and unstable soils surrounding the Lake limit its hydrologic scores. Logging in upslope areas likely has the most significant impact on water quality and habitat functions in Merrill Lake.

Table 5-14. Functional scores for reaches in Kalama River Assessment Unit.

Waterbody	Reach Number	Hydrologic Overall	Hyporheic Overall	Habitat Overall	Vegetative Overall
Kalama River	Kalama 01	3	4	3	4
	Kalama 02	1	4	4	3
	Kalama 03	3	5	4	5
	Kalama 07	3	4	4	5
	Kalama 10	3	4	4	5
	Kalama 12	3	3	4	4
	Kalama 13	3	2	3	4
	Kalama 14	3	4	3	4
	Kalama 15	3	4	4	4
	Kalama 16	3	3	4	4
	Kalama 17	4	3	4	4
	Kalama 18	3	3	4	4
	Kalama 19	3	3	4	4
	Kalama 20	3	4	4	4
	Kalama 21	4	3	4	4
	Kalama 22	4	3	4	4
	Kalama 23	3	3	4	4
	Kalama 24	3	2	4	4
	Kalama 25	4	2	4	4
	Kalama 26	4	3	4	4
	Kalama 27	4	3	4	5
	Kalama 28	4	2	4	4
Kress Lake	Kalama 30	3		4	4
Little Kalama River	Kalama 31	4	4	4	4
Wild Horse Creek	Kalama 32	3	2	4	4
Gobar Creek	Kalama 33	3	2	4	4
Bear Creek (3)	Kalama 34	2	2	4	3
Arnold Creek	Kalama 35	3	2	4	4
Jacks Creek	Kalama 36	3	2	4	4
Elk Creek	Kalama 37	3	2	4	4
Wolf Creek	Kalama 38	3	2	4	4
Langdon Creek	Kalama 39	4	2	4	4

Waterbody	Reach Number	Hydrologic Overall	Hyporheic Overall	Habitat Overall	Vegetative Overall
Kalama River, N F	Kalama 40	4	2	4	4
Kalama River, U T	Kalama 41	3	2	4	3
Fossil Creek	Kalama 42	4	2	4	4
	Kalama 43	3	2	4	3
Fossil Creek, U T	Kalama 44	3	2	4	4
	Kalama 45	4	2	4	4
Dryer Glacier	Kalama 46	3	2	4	5
Dry Creek	Kalama 47	3	2	4	4
Merrill Lake	Kalama 48	3		4	4
	Kalama 49	3		4	4
	Kalama 50	4		4	4
	Kalama 51	3		4	4
	Kalama 52	4		4	4

Restoration Opportunities

Priority actions to improve the Kalama River basin for salmonid recovery include managing forest lands and land development to conserve and restore watershed processes. Fish passage barriers are also important consideration in watershed management.

The following actions were proposed to restore and enhance shoreline functions in the Kalama River (Table 5-15). This table includes specific actions prioritized for salmon recovery in a 2009 study of the lower 2.5 miles of the Kalama River (Powers and Tyler 2009).

Table 5-15. Restoration opportunities in the Kalama River.

Action	Status	Entity	Source Plan/ ID
Fully implement and enforce the Forest Practices Rules (FPRs) on private timber lands in order to afford protections to riparian areas, sediment processes, runoff processes, water quality, and access to habitats	Currently in place	WDNR	LCFRB 2010, KAL 1
Conduct floodplain restoration where feasible along the lower mainstem that has experienced channel confinement. Build partnerships with the Port of Kalama and other landowners and provide financial incentives	New	NRCS, C/W CD, NGOs, WDFW, LCFRB, Corps, Port of Kalama	LCFRB 2010, Kal 5

Action	Status	Entity	Source Plan/ ID
Assess, upgrade, and replace on-site sewage systems that may be contributing to water quality impairment	Expansion of existing program	Cowlitz County, C/W CD	LCFRB 2010, Kal 15
Address potential low-flow and thermal passage problems on the bar at the mouth of the Kalama	New	Port of Kalama	Wade 2000
Assess and look for solutions to gravel and debris buildup near the mouths of tributaries in the upper river	New	Cowlitz County	Wade 2000
Look for opportunities to increase and enhance off-channel and rearing habitat within the lower Kalama River	New	Cowlitz County	Wade 2000
Ledgett Groundwater Channel, Left bank at RM 2.5. Create 10,400 square meters of year round rearing habitat with a potential for some spawning habitat.	New	TBD	Powers and Tyler,2009
Port of Kalama Groundwater Channel, Right bank at RM 2.2. Create off-channel rearing habitat.	New	Port of Kalama	Powers and Tyler,2009
GW Channel System (private), Right bank at RM 2.1	New	TBD	Powers and Tyler,2009
Riprap Removal/Floodplain Reconnection, Right bank at RM 2.4	New	TBD	Powers and Tyler,2009
Pipeline Removal and LWD, Left bank at RM 2.2	New	TBD	Powers and Tyler,2009
WDFW Tidal and Groundwater Channels, Right bank at RM 0.7. Create off-channel rearing habitat.	New	WDFW	Powers and Tyler,2009
Low Water Fish Passage, Left bank at RM 0	New	TBD	Powers and Tyler,2009
Groundwater Channel, Left bank at RM 1.4	New	TBD	Powers and Tyler,2009
Active Side Channel, Right bank at RM 1.8	New	TBD	Powers and Tyler,2009
Port Tidal and Backwater Channels, Left bank at RM 0.1	New	Port of Kalama	Powers and Tyler,2009
Spencer Creek Riparian and LWD at RM 0.5. Restore riparian, spawning, and rearing habitat. The mouth of Spencer Creek is at Kalama RM 1.8	New	TBD	Powers and Tyler,2009
Fish Passage Culvert, Spencer Creek at RM 1.8	New	TBD	Powers and Tyler,2009

5.4.2 Land Use Characterization

Current Land Use

The chart below illustrates land use distribution in the Kalama River Assessment Unit in 2012.

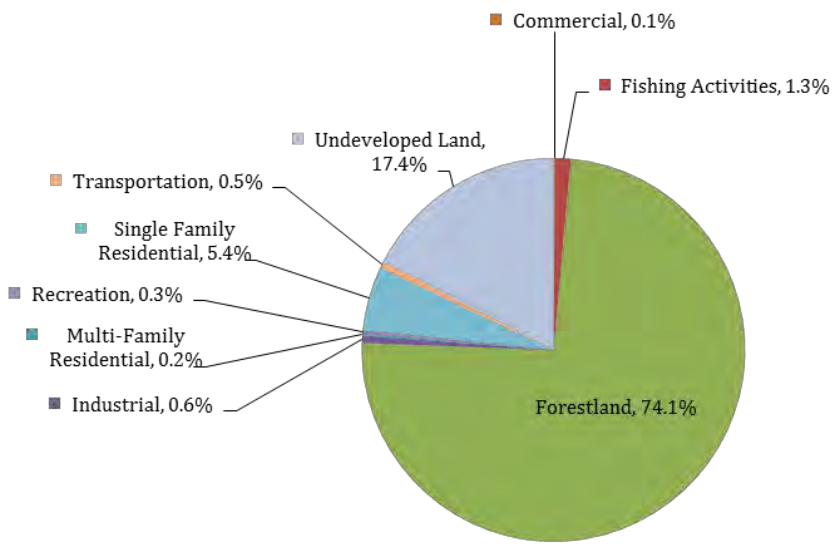


Figure 5-14. Kalama River Assessment Unit 2012 land use distribution (Source: Cowlitz County Assessor's Office).

Water-oriented Uses

The following discussion of water-oriented uses should not be considered comprehensive (please see the subsection on Water-oriented uses in Section 3.3.1 for background discussion). This section only selectively identifies certain water-dependent and water-related uses. Water-enjoyment uses are discussed in the below section titled Existing and Potential Shoreline Public Access.

The Kalama River Assessment Unit includes two fish hatcheries. Constructed in 1958, Kalama Falls Hatchery is a Columbia River Fish Development program hatchery, authorized under the Mitchell Act and funded through National Marine Fisheries Service. Downstream of the Kalama Falls Hatchery is the Fallert Creek Hatchery, a state-funded hatchery that began operation in 1895.

Transportation and Utilities

On the north side of the Kalama River, the aptly named Kalama River Road closely follows the watercourse, often in shoreline jurisdiction, until the road's terminus near Gobar Creek. On the south side of the river, Bates Road runs along the shoreline for less than one mile. Besides these two roads, other roads in this assessment unit tend to transect shoreline jurisdiction. To the east of Gobar Creek, few roads exist.

Approximately 0.6 miles east of Wooden Bridge Road, a BPA utility corridor transects shoreline jurisdiction. A pair of pipelines transect shoreline jurisdiction to the east of I-5.

Existing and Potential Shoreline Public Access

Existing shoreline public access locations within the Kalama River Assessment Unit are listed below in Table 5-16.

Table 5-16. Existing shoreline public access locations in the Kalama River Assessment Unit.

Waterbody	Name	Manager	Description
Kalama River	Beginners Hole[1] (Figure 5-15)	WDFW	Platform. No boat launch. Restrooms. Open year-round. Site is located just over a mile east of the City of Kalama.
	Lower Kalama River[2]	WDFW	Gravel boat launch, bank fishing. Open year-round.
	Mahaffey's Campground	Private	Boat ramp available.
	Modrow Bridge[2]	WDFW	Concrete boat launch, bank fishing. Restrooms. Open year-round.
	Pritchard's[2] (Figure 5-16)	WDFW	Gravel boat ramp (hand-launch only). Limited parking. Open year-round.
	Upper Kalama[2]	WDFW	Concrete boat ramp (recommended for drift boats only because the ramp silts up). Open year-round.
Lake Merrill	Lake Merrill[3]	WDNR	This 114-acre Natural Resource Conservation Area consists of a forested area along the Lake Merrill shoreline. Includes a boat launch and a newly renovated small campground area (mostly walk-in, with a few sites accessible by vehicle).

1 The Draft Public Access map (Appendix B) currently does not show this WDFW Water Access Site.

2 The Draft Public Access map currently indicates that there is a boat launch at this location, but does not show as a WDFW Water Access Site.

3 The Draft Public Access map currently does not show NRCA, just the boat ramp.

Figure 5-15. Shoreline public access at Beginners Hole (Source: WDFW).

Figure 5-16. Shoreline public access at Pritchard's (Source: WDFW).

No long range plans were found regarding future changes or modifications to shoreline public access in this assessment unit other than increased public access needs are noted in the County Parks Plan (2010). WDFW is in the process of upgrading the boat ramp and associated facilities at the Modrow Bridge access location.

Future Land Use

Aside from South Fork Chehalis River, this assessment unit experienced the least change in land use over the last decade (Table 5-17). The largest change was a modest decrease in forestland (1.5 percent, about 35 acres). Slight increases in single family residential and undeveloped land (0.5 percent and 0.6 percent, respectively) were observed, along with an overall decrease in vacant land (0.6 percent). Commercial and fishing activity uses also increased by 0.1 percent each.

Table 5-17. Kalama River Assessment Unit: significant land use change 2002-2012.

Category	2002		2012		Change in Percent of Total Acres
	Category Acres	Percent of Total Acres	Category Acres	Percent of Total Acres	
Vacant	216 ac.	5.5%	194 ac.	4.9%	-0.6%
Forestland	2,950 ac.	75.4%	2,917 ac.	74.1%	-1.5%
Single family residential	193 ac.	4.9%	213 ac.	5.4%	+0.5%
Undeveloped	657 ac.	16.8%	684 ac.	17.4%	+0.6%

Issuance of use permits in the Kalama River Assessment Unit was fairly consistent over the period studied (Figure 5-17). Use permits were issued equally across land uses, with the most recent permits issued to port and "other" uses (both in 2010). Modification permits issued averaged one permit every two years.

If the rate of land use change and permit activity observed in this analysis continues, significant shifts in level or intensity of development is not anticipated within this assessment unit.

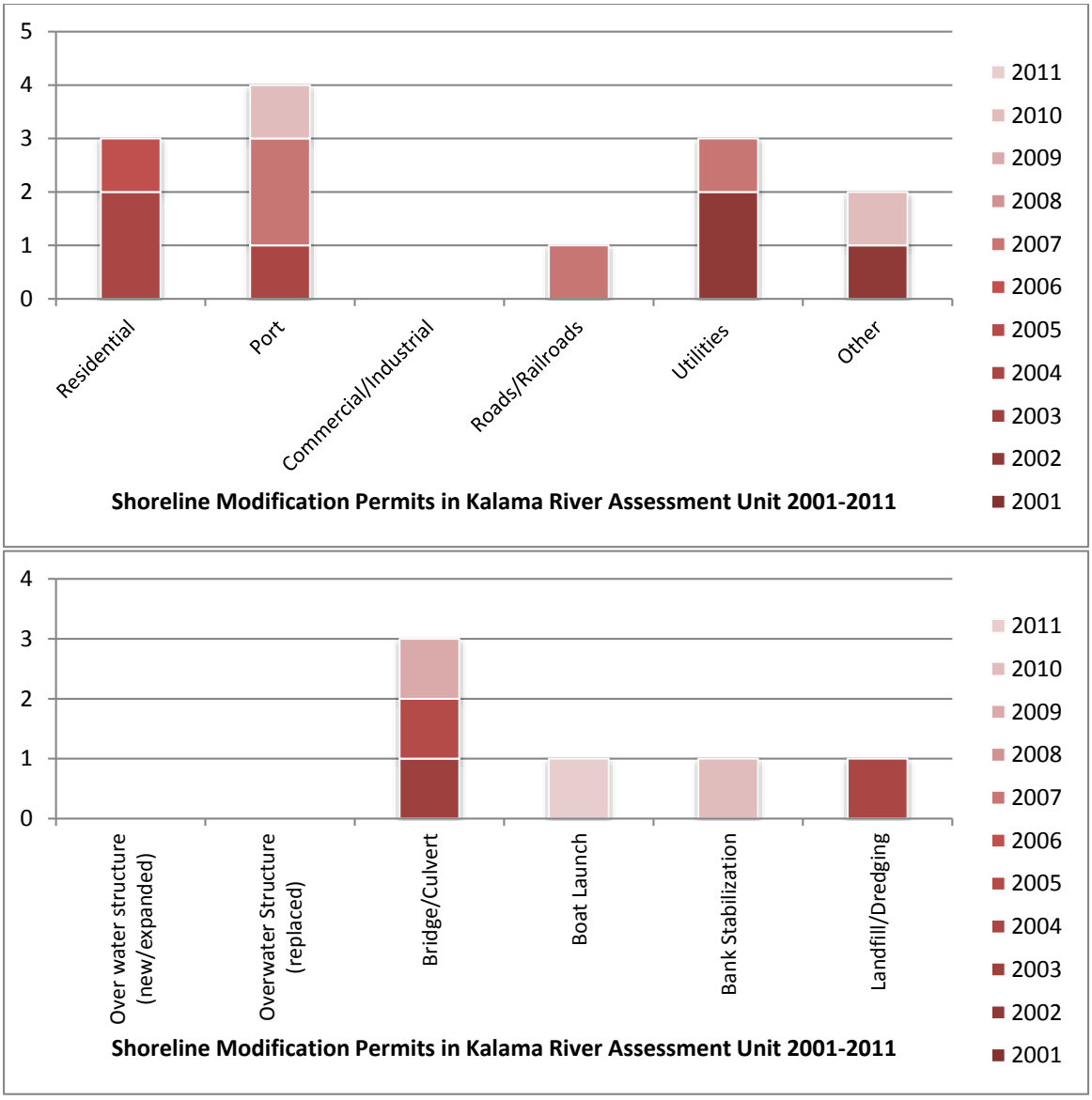


Figure 5-17. Permit issuance data for Kalama River Assessment Unit (Source: Cowlitz County).

5.5 Cowlitz River Assessment Unit

The Cowlitz River watershed includes 379.5 miles of shoreline, divided among the Cowlitz River, Toutle River, and Coweeman River and their tributaries, as well as Silver Lake, Castle Lake, Coldwater Lake, and Fawn Lake (Figure 5-18). The total shoreline area is 16,230 acres, the largest assessment unit in the County. A summary of shoreline characteristics in the assessment unit is provided in Table 5-1.

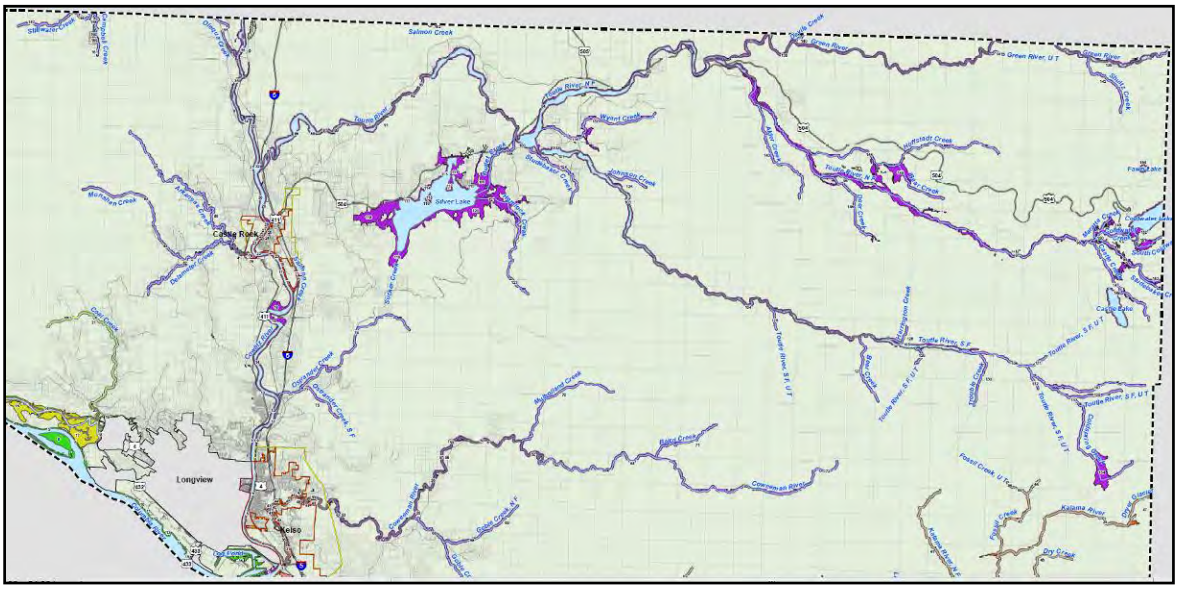


Figure 5-18. Map of Cowlitz River Assessment Unit (in purple).

5.5.1 Ecological Characterization

Critical Areas

According to the NWI information, as much as 30 percent of the total shoreline area on the Cowlitz River may be wetlands. Approximately 33 percent of shoreline jurisdiction falls within the floodplain. The Cowlitz Assessment Unit has the highest proportion of shoreline area in landslide hazard areas (10 percent) compared to other assessment units in the County.

Priority bird species in the Cowlitz Assessment Unit include bald eagles, osprey, cavity nesting ducks, and waterfowl concentrations.

Reach Scale Functions

Cowlitz River Shoreline Reaches 9-13, north of the City of Kelso, score lower for hydrologic, hyporheic, habitat, and vegetative scores compared to other reaches in the Cowlitz Assessment Unit. The Cowlitz River is artificially constrained by levees in these reaches and shoreline vegetation is limited, except in Reach 11,

where patchy scrub shrub and forested vegetation occurs paralleling the interstate. WDFW has identified the tidal flat between the mainland and the peninsula south of Highway 432, south of the Log Pondas excellent off-channel habitat. It is a protected backwater that is less prone to sedimentation from the volcanic ash that affects many other areas of the system.

In contrast to the artificially confined reaches in the lower Cowlitz River, Reaches 29-31 on the Cowlitz River, near the northern County border, occur on a broad floodplain with significant riparian wetland areas. Functional scores in these reaches are amongst the highest for Cowlitz River reaches.

Undeveloped reaches of Silver Lake (Cowlitz Reaches 104, 106-110, 113-116) have high hydrologic, vegetated, and habitat functions resulting from the large areas of relatively undisturbed forested and shrub wetlands. This is in contrast to the more highly developed reaches along Silver Lake (Cowlitz Reaches 105, 111, and 112), which have a high density of overwater structures and other shoreline modifications. The community of Silver Lake (Reach 110) has 83 single family lots fronting on the lake and sloughs with minimal setbacks and vegetated buffers and with docks on most lots where lake depth is sufficient for vessels.

Reaches in the North Fork Toutle River and upper South Fork Toutle River scored poorly for hydrologic functions (Reaches 89-102). Both rivers still maintain an extremely high sediment load resulting from the 1980 eruption of Mount St. Helens, particularly on the North Fork Toutle River upstream of the Corps' Sediment Retention Structure. The high sediment load has resulted in a broadly braided and frequently migrating channel that responds to episodic, flow-mediated sediment fluxes. This area is referred to as the sediment plain. Because these braided channels each convey a relatively small portion of the total flow and because each channel is wide relative to its depth, the sediment plain can act as a fish barrier, preventing upstream migrations during low flow conditions (AMEC 2010). As a result of the recent channel migrations, the mapped channel is a small portion of the total channel area, and despite few human impacts, riparian vegetation is limited within the mapped area of shoreline jurisdiction. Downstream from the confluence of the Green River (Cowlitz Reaches 89-90), the North Fork Toutle River maintains high sediment loads, but the channel path is more defined, and the sediment has formed sandbars with early floodplain forests; which will likely support a source of future large woody debris recruitment when the channel shifts course.

WDFW has noted that the South Fork Toutle was less impacted by the eruption of Mt. St. Helens, has largely intact habitat, and remains an important system particularly for wild steelhead, coho, and fall Chinook.

Reaches on the Green River (Cowlitz Reaches 133-134) and its tributary, Devils Creek (Cowlitz Reach 135), scored highly for vegetative functions. The area is in private ownership and used primarily for timber harvest.

With the exception of the Town of Ryderwood, where residential development has resulted in limited vegetation along Campbell Creek (Cowlitz Reach 155), functional scores for vegetation and habitat are relatively high on Campbell Creek (Cowlitz Reaches 153, 154, and 156) and Stillwater Creek (Cowlitz Reaches 151-152) near the northern border of the County.

Table 5-18. Functional scores for reaches in Cowlitz River Assessment Unit.

Waterbody	Label	Hydrologic Overall	Hyporheic Overall	Habitat Overall	Vegetative Overall
Cowlitz River	Cowlitz 001	3	4	4	4
	Cowlitz 009	1	3	4	3
	Cowlitz 010	1	2	2	2
	Cowlitz 011	2	3	3	3
	Cowlitz 012	1	2	2	2
	Cowlitz 013	1	3	3	2
	Cowlitz 014	1	3	4	3
	Cowlitz 015	3	4	4	4
	Cowlitz 016	3	4	4	4
	Cowlitz 017	2	3	4	3
	Cowlitz 024	2	3	4	3
	Cowlitz 025	3	3	3	4
	Cowlitz 026	3	3	3	4
	Cowlitz 027	3	2	3	3
	Cowlitz 028	3	3	4	4
	Cowlitz 029	3	4	4	4
	Cowlitz 030	3	4	4	4
	Cowlitz 031	3	4	4	4
Coweeman River	Cowlitz 047	3	4	4	4
	Cowlitz 048	3	4	4	4
	Cowlitz 049	4	3	4	4
	Cowlitz 050	4	3	4	4
	Cowlitz 051	3	3	4	5
	Cowlitz 052	3	2	4	4
	Cowlitz 053	4	3	4	5

Waterbody	Label	Hydrologic Overall	Hyporheic Overall	Habitat Overall	Vegetative Overall
	Cowlitz 054	4	3	4	5
	Cowlitz 055	3	3	4	4
	Cowlitz 056	3	3	4	4
	Cowlitz 057	4	3	4	4
	Cowlitz 058	3	4	4	5
	Cowlitz 059	3	5	4	5
	Cowlitz 060	3	3	4	5
Goble Creek	Cowlitz 061	3	3	4	4
	Cowlitz 062	3	2	4	4
Goble Creek, N F	Cowlitz 063	3	3	4	4
	Cowlitz 064	3	2	4	4
Mulholland Creek	Cowlitz 065	3	2	4	4
Baird Creek	Cowlitz 066	3	2	4	4
Coweeman River, U T	Cowlitz 067	3	2	4	4
Ostrander Creek	Cowlitz 068	3	3	4	4
	Cowlitz 069	3	3	4	5
Ostrander Creek, S F	Cowlitz 070	3	2	4	4
Salmon Creek	Cowlitz 071	3	3	3	3
Arkansas Creek	Cowlitz 073	4	2	3	4
	Cowlitz 075	3	4	4	4
	Cowlitz 076	3	2	4	4
Delameter Creek	Cowlitz 077	3	3	4	4
Monahan Creek	Cowlitz 078	3	2	4	4
	Cowlitz 079	3	2	4	4
Toutle River	Cowlitz 080	3	3	3	4
	Cowlitz 081	2	3	3	3
	Cowlitz 082	3	2	4	4
	Cowlitz 083	4	2	4	4
	Cowlitz 084	3	1	4	4
	Cowlitz 085	3	2	3	3
	Cowlitz 086	3	3	4	4
	Cowlitz 087	3	2	4	4
	Cowlitz 088	3	2	4	4
Toutle River, N F	Cowlitz 089	3	3	4	4
	Cowlitz 090	3	3	4	4
	Cowlitz 091	2	2	4	3
	Cowlitz 092	2	2	3	2
	Cowlitz 093	2	2	4	3
	Cowlitz 094	2	2	3	3

Waterbody	Label	Hydrologic Overall	Hyporheic Overall	Habitat Overall	Vegetative Overall
Toutle River, S F	Cowlitz 095	3	2	4	4
	Cowlitz 096	3	3	4	5
	Cowlitz 097	3	3	4	4
	Cowlitz 098	3	3	4	4
	Cowlitz 099	4	3	4	4
	Cowlitz 100	3	3	4	5
	Cowlitz 101	2	3	3	3
	Cowlitz 102	2	1	4	3
Outlet Creek	Cowlitz 103	3	3	4	5
	Cowlitz 104	3	2	4	4
Silver Lake	Cowlitz 105	3		2	2
	Cowlitz 106	5		4	5
	Cowlitz 107	4		4	4
	Cowlitz 108	4		4	5
	Cowlitz 109	4		4	4
	Cowlitz 110	4		4	4
	Cowlitz 111	4		3	4
	Cowlitz 112	3		3	3
	Cowlitz 113	5		4	5
Sucker Creek	Cowlitz 114	5	4	5	5
Silver Lake	Cowlitz 115	5		4	5
Hemlock Creek	Cowlitz 116	3	3	4	4
	Cowlitz 117	2	3	4	4
	Cowlitz 118	3	2	4	4
Studebaker Creek (2)	Cowlitz 119	3	2	4	4
Johnson Creek	Cowlitz 120	4	3	4	4
Toutle River, S F, U T (5)	Cowlitz 121	3	2	4	3
Bear Creek (2)	Cowlitz 122	4	2	4	4
Harrington Creek	Cowlitz 123	3	2	4	5
Toutle River, S F, U T (4)	Cowlitz 124	4	2	4	4
Trouble Creek	Cowlitz 125	4	2	4	4
Toutle River, S F, U T	Cowlitz 126	3	2	4	4
Toutle River, S F, U T (3)	Cowlitz 127	3	1	4	4
Coldspring Creek	Cowlitz 128	3	1	4	4
	Cowlitz 129	4	2	4	4
Toutle River, S F, U T (2)	Cowlitz 130	2	2	4	4
Wyant Creek	Cowlitz 131	3	4	4	4
Wyant Creek, U T	Cowlitz 132	3	3	4	4
Green River	Cowlitz 133	4	3	4	5
	Cowlitz 134	3	3	4	5

Waterbody	Label	Hydrologic Overall	Hyporheic Overall	Habitat Overall	Vegetative Overall
Devils Creek	Cowlitz 135	3	4	4	5
Green River, U T	Cowlitz 136	3	2	4	4
Shultz Creek	Cowlitz 137	4	2	4	4
Alder Creek	Cowlitz 138	2	2	4	4
Hoffstadt Creek	Cowlitz 139	3	2	4	4
Bear Creek	Cowlitz 140	2	2	4	4
Deer Creek	Cowlitz 141	3	2	4	4
Castle Creek	Cowlitz 142	2	2	4	3
Castle Lake	Cowlitz 143	3		4	3
Maratta Creek	Cowlitz 144	2	2	4	4
Coldwater Creek	Cowlitz 145	2	2	4	3
South Coldwater Creek	Cowlitz 146	3	2	4	4
Coldwater Lake	Cowlitz 147	3		4	4
Studebaker Creek	Cowlitz 148	2	2	3	3
Fawn Lake	Cowlitz 149	2		4	3
Olequa Creek	Cowlitz 150	3	4	4	4
Stillwater Creek	Cowlitz 151	3	4	4	5
	Cowlitz 152	3	3	4	5
Campbell Creek	Cowlitz 153	3	4	4	5
	Cowlitz 154	3	4	4	4
	Cowlitz 155	2	4	3	3
	Cowlitz 156	3	4	4	5
Salmon Creek (2)	Cowlitz 157	3	2	4	4

Restoration Opportunities

Prioritized restoration measures for the Lower Cowlitz basin are identified below as excerpted from the Lower Columbia Salmon Recovery and Fish and Wildlife Subbasin Plan (LCFRB 2010):

1. Protect stream corridor structure and function in high priority reaches at risk of degradation;
2. Protect hillslope processes in functional subbasins contributing to Tier 1 reaches;
3. Restore degraded hillslope processes in the Lower Cowlitz subbasin;
4. Create/Restore off-channel and side channel habitat in the mainstem Cowlitz and lower reaches of major tributaries;
5. Restore floodplain function and channel migration processes;
6. Restore access to habitat blocked by artificial barriers (priority locations at Mill Creek, Leckler Creek, Salmon Creek, Foster Creek, Skook Creek, and Blue Creek);

7. Provide for adequate instream flows during critical periods in tributaries;
8. Restore degraded hillslope processes on forest, agricultural and developed lands;
9. Restore riparian conditions throughout the basin (Priority locations in Tier 1 reaches);
10. Restore degraded water quality with an emphasis on temperature; and
11. Restore channel structure and stability.

The same set of general priorities apply to the Coweeman and Toutle Rivers, except that in the Coweeman River, restoring channel structure and stability is a higher priority than in the lower Coweeman. In the Toutle River, an additional high priority action is to address fish passage and sediment issues at the Sediment Retention Structure on the NF Toutle (LCFRB 2010).

As noted in the Lower Cowlitz River and Floodplain Habitat Restoration Siting and Design Report (Tetra Tech 2007), primary limitations on restoration in the Lower Cowlitz are the high sediment load from the Toutle River; the regulation of flows; and existing and proposed development within the floodplain and along the riparian zone. A summary of restoration opportunities throughout the assessment unit is presented in Table 5-19 below.

Table 5-19. Restoration opportunities in the Cowlitz River Assessment Unit.

Action	Status	Entity	Source Plan
Manage regulated stream flows to provide for critical components of the natural flow regime	Expansion of existing program or activity	Tacoma Power, Lewis County PUD, FERC, WDFW	LCFRB 2010, L Cow 1, Wade 2000
Monitor and notify FERC of significant license violations, enforce terms and conditions of section 7 consultations on FERC relicensing agreements, and encourage implementation of section 7 conservation recommendations	Expansion of existing program or activity	NMFS, USFWS	LCFRB 2010, L Cow 4
Conduct floodplain restoration where feasible along the mainstem and in major tributaries that have experienced channel confinement, and especially in areas affected by dredging and floodplain filling following the 1980 Mt. St. Helens eruption. Survey landowners, build partnerships, and provide financial incentives	New	NRCS, Cowlitz CD, NGOs, WDFW, LCFRB, Corps, LCFEG	LCFRB 2010, L Cow 6; Toutle 2; Coweeman 6, Wade 2000
Expand local government Comprehensive Planning to ensure consistent protections are in place to initiate review of development and real estate transactions that may affect natural resources	Expansion of existing program or activity	Cowlitz County	LCFRB 2010, L Cow 15

Action	Status	Entity	Source Plan
Assess, upgrade, and replace on-site sewage systems that may be contributing to water quality impairment.	Expansion of existing program or activity	Cowlitz County, Cowlitz CD	LCFRB 2010, L Cow 19; Toutle 18
Address fish passage and sediment issues at the Sediment Retention Structure on the NF Toutle.	Expansion of existing program or activity	WDFW, Corps	LCFRB 2010, Toutle 1, Wade 2000
Assess and, if possible, alter the Silver Lake Dam to increase flows in Outlet Creek to assure fish passage into the Silver Lake watershed.	New	TBD	Wade 2000
Continue to manage federal forest lands according to the Northwest Forest Plan.	Activity is in place	USFS	LCFRB 2010, Toutle 4
Address temperature impairments through development of water quality clean-up plans (TMDLs)	Expansion of existing program or activity	Ecology	LCFRB 2010, Coweeman 15
Assess, repair, and where possible, decommission roads that are contributing chronic sediment to stream systems or that may fail and lead to landslides, especially within areas with road densities above 3.0 miles/square mile.	Expansion of existing program or activity	USFS, Cowlitz County	Wade 2000
Look for opportunities, both short- and long-term, to increase Large Woody Debris (LWD) supplies within stream systems.	New	Cowlitz County and partners	Wade 2000
Replant degraded riparian areas with native conifers. To begin with, focus riparian restoration efforts along the more productive tributaries including Baird, Mulholland, and Goble creeks.	Expansion of existing program or activity	Cowlitz County and partners	Wade 2000
Address fish passage barriers in the Toutle River and tributaries to the lower Cowlitz River and prioritize for repair and replacement.	Expansion of existing program or activity	USFS, Cowlitz County, and partners	Wade 2000
Connect gravel ponds and other off-channel areas near RM 7 on the Coweeman River to provide rearing and overwintering habitat for juvenile salmonids.	New	TBD	Wade 2000
Cowlitz RM 0.5 right bank remove some dredged materials and create riparian and wetland bench.	Conceptual plan	TBD	Tetra Tech 2007
Cowlitz RM 7.3 right bank remove some dredged materials and create riparian/floodplain bench; construct setback levee if necessary.	Conceptual plan	TBD	Tetra Tech 2007
Cowlitz RM 8.5 right bank set back levee and plant riparian/floodplain vegetation on bench	Conceptual plan	TBD	Tetra Tech 2007

Action	Status	Entity	Source Plan
Cowlitz RM 9.0 left bank dredged materials removal to create riparian/floodplain bench.	Conceptual plan	TBD	Tetra Tech 2007
Place LWD and vegetate with willows (mouth of Ostrander Creek).	Conceptual plan	TBD	Tetra Tech 2007
Remove noxious weeds and restore riparian zone along length of Ostrander Creek.	Conceptual plan	TBD	Tetra Tech 2007
Cowlitz RM 9.7 right bank bar and island enhancement.	Conceptual plan	TBD	Tetra Tech 2007
Culvert replacement on Leckler Creek at Hazel Dell Road.	Conceptual plan	TBD	Tetra Tech 2007
Cowlitz RM 9.8 left bank riparian restoration: Remove revetment and some dredged material and create riparian and floodplain bench.	Conceptual plan	TBD	Tetra Tech 2007
Cowlitz RM 10.5 left bank riparian restoration: Remove some dredged materials and create riparian/floodplain bench.	Conceptual plan	TBD	Tetra Tech 2007
Cowlitz RM 11.2 left bank bar and island enhancement: Place wood to promote side channel scour and provide cover.	Conceptual plan	TBD	Tetra Tech 2007
Cowlitz RM 12.5 left bank side channel restoration and enhancement: Enhance low bar with remnant side channel by placing wood and minor excavation.	Conceptual plan	TBD	Tetra Tech 2007
Cowlitz RM 12.5 right bank riparian restoration: Remove riprap and bioengineer as feasible, remove dredged materials to create riparian/floodplain bench	Conceptual plan	TBD	Tetra Tech 2007
Cowlitz RM 13.5 left bank riparian restoration: Remove some dredged materials and bioengineer recent riprap placement to create riparian/floodplain bench.	Conceptual plan	TBD	Tetra Tech 2007
Cowlitz RM 14.0 left bank side channel restoration and enhancement: Excavate remnant side channel, place LWD.	Conceptual plan	TBD	Tetra Tech 2007
Cowlitz RM 14.5 right bank side channel restoration and enhancement: Excavate remnant side channel, place LWD, plant riparian vegetation.	Conceptual plan	TBD	Tetra Tech 2007
Cowlitz RM 16.0 right bank side channel restoration and enhancement: Create defined boat launch area and restore historic side channel and improve floodplain with plantings and wood.	Conceptual plan	TBD	Tetra Tech 2007
Delameter Creek Culvert replacement at Delameter Road.	Conceptual plan	TBD	Tetra Tech 2007
Fence off Delameter Creek from livestock and restore riparian at RM 4.	Conceptual plan	TBD	Tetra Tech 2007

Action	Status	Entity	Source Plan
Monahan Creek Culvert replacement at Delameter Road.	Conceptual plan	TBD	Tetra Tech 2007
Monahan Creek Riparian restoration: Remove Japanese knotweed along lower 4 miles and revegetate.	Conceptual plan	TBD	Tetra Tech 2007
Cowlitz RM 18.5 left bank dredged materials removal to create riparian/floodplain bench.	Conceptual plan	TBD	Tetra Tech 2007
Cowlitz RM 18.8 right bank bar and island enhancement: segregate boat launching from riparian zone and bars; cut chute overflow channels and restore floodplain/riparian habitat.	Conceptual plan	TBD	Tetra Tech 2007
Cowlitz RM 19.8 left bank dredged materials removal to create riparian/floodplain bench.	Conceptual plan	TBD	Tetra Tech 2007
Toutle River RM 0.2 right bank dredged materials removal to create riparian/floodplain bench.	Conceptual plan	TBD	Tetra Tech 2007
Toutle River RM 3.2 right bank Off-channel restoration and enhancement: Reconnect off-channel ponds behind dredged material, enhance with LWD and riparian restoration.	Conceptual plan	TBD	Tetra Tech 2007
Cowlitz RM 20.2 left bank dredged materials removal to create riparian/floodplain bench.	Conceptual plan	TBD	Tetra Tech 2007
Cowlitz RM 22.2 left bank dredged materials removal to create riparian/floodplain bench.	Conceptual plan	TBD	Tetra Tech 2007
Cowlitz RM 23.0 left bank off-channel and floodplain restoration.	Conceptual plan	TBD	Tetra Tech 2007
Cowlitz RM 23.2 right bank bar and island enhancement: Place LWD alongside channel and revegetate where appropriate on Hog Island.	Conceptual plan	TBD	Tetra Tech 2007
Rock Creek Culvert replacement at West Side Highway.	Conceptual plan	TBD	Tetra Tech 2007
Remove water control structure and reconnect Hill Creek; riparian revegetation along lower 1000-2000 feet of creek.	Conceptual plan	TBD	Tetra Tech 2007
Cowlitz RM 24.5 left bank riparian restoration: Slope back banks and create riparian/floodplain bench.	Conceptual plan	TBD	Tetra Tech 2007
Lower Olequa Creek enhancement: Restore side channel and riparian zone, remove invasive species, place LWD.	Conceptual plan	TBD	Tetra Tech 2007
Cowlitz RM 25.0 Acquire easements in active channel migration area.	Conceptual plan	TBD	Tetra Tech 2007
Cowlitz RM 25.0 side channel restoration and enhancement: Remove car bodies, place LWD and riparian restoration.	Conceptual plan	TBD	Tetra Tech 2007

Action	Status	Entity	Source Plan
Cowlitz RM 26.0 left bank riparian restoration: Slope back banks to create riparian bench; remove riprap; may need to move road in one area.	Conceptual plan	TBD	Tetra Tech 2007
Cowlitz River habitat enhancements upstream of Cowlitz County (RM 27-43)	Conceptual plan	TBD	Tetra Tech 2007

5.5.2 Land Use Characterization

Current Land Use

The chart below (Figure 5-19) illustrates land use distribution in the Cowlitz River Assessment Unit in 2012.

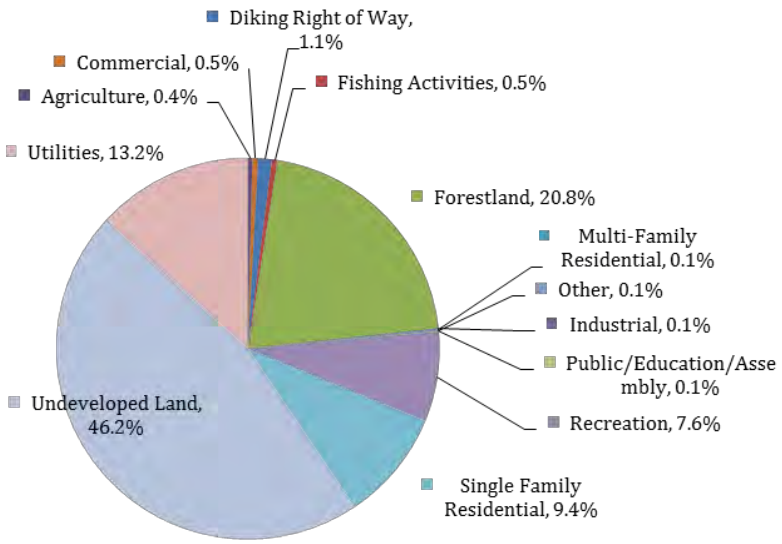


Figure 5-19. Cowlitz River Assessment Unit 2012 land use distribution (Source: Cowlitz County Assessor's Office).

Water-oriented Uses

The following discussion of water-oriented uses should not be considered comprehensive (please see the subsection on Water-oriented uses in Section 3.3.1 for background discussion). This section only selectively identifies certain water-dependent and water-related uses. Water-enjoyment uses are discussed in the below section titled Existing and Potential Shoreline Public Access.

The Cowlitz River Assessment Unit includes the North Toutle Fish Hatchery as a key water-oriented use. Constructed in 1952, the hatchery is federally-funded and operated by the state of Washington. The hatchery was temporarily

abandoned after the 1980 eruption of Mount St. Helens, with hatchery operations reestablished in 1985.

Transportation and Utilities

This expansive assessment unit features numerous roads, highways, Interstate 5, and railroads (Figure 5-18) in shoreline jurisdiction; however, most tend to pass through shoreline jurisdiction briefly (rather than run parallel the shoreline). An exception to this is the Rose Valley Road, which follows closely along the Coweeman River for extended stretches.

BPA utility corridors pass through the shoreline jurisdiction of Arkansas, Monahan, and Delameter Creeks before crossing the shoreline jurisdiction of the Cowlitz and Coweeman Rivers. Pipelines cross the shoreline jurisdiction of the Cowlitz, Coweeman, and Toutle Rivers, as well as Ostrander Creek.

Figure 5-20. The BNSF Railroad along Cowlitz River north of Castle Rock (Source: TWC).

Existing and Potential Shoreline Public Access

Existing shoreline public access locations within the Cowlitz River Assessment Unit are listed below in Table 5-20.

Table 5-20. Existing shoreline public access locations in the Cowlitz River Assessment Unit.

Waterbody	Name	Manager	Description
Coldwater Lake	Coldwater Lake Recreation Area[1]	USFS	Boat ramp (petroleum-powered motors prohibited). Also has picnic areas, shoreline trails, and restrooms.
Cowlitz River	Harry Gardner Park[2]	Cowlitz County	Originally wiped out by the 1980 eruption, this 17-acre, day-use park on the south fork of the Toutle River was recently reopened. There is approximately 500 feet of Toutle River access. Includes walking trails, picnic tables, benches, fire pits, barbecues, play area, horseshoe pits and beach volleyball.
	Hog Island[3]	Cowlitz County	10-acre day use park with primitive boat launch. Fishing access. Features parking and undeveloped areas.
	Olequa Creek[4] (Figure 5-21)	WDFW	Concrete boat launch, bank fishing. Restrooms. Open year-round.
	Riverside Park	Cowlitz County	58-acre regional park on the Cowlitz River includes ball fields, sport courts, restrooms, trails, playground equipment, open space, picnic shelters and tables. There is no river access for fishing or boat launching.
	North County Recreation Sports Complex	City of Castle Rock	Access to the Castle Rock boat launch is through the North County Recreation Sports Complex, directly south of the Castle Rock High School entrance.
Silver Lake	Seaquest State Park	Washington State Parks	475-acre, year-round camping park near Mount St. Helens. The forested park claims over a mile of Silver Lake shoreline. Amenities include trails for hiking and bicycling, play areas, and playing fields. Open year-round.
	Silver Lake[4] (Figure 5-22)	WDFW	Concrete boat ramp, fishing dock. Restrooms. Open year-round.
	Silver Lake Resort	Private	Boat ramp available.
	Streeter's Resort	Private	Boat ramp available.
Toutle River	Toutle[5]	WDFW	Located near the mouth of the Toutle River, just west of I-5. Walk-in only. No boat launch. Open year-round.
	Tower Bridge[5]	WDFW	Located off Riverview Drive, just downstream of the north and south fork confluence. No boat launch. Open year-round.

1 The Draft Public Access map (Appendix B) currently indicates that there is a boat launch at this location, but does not show Recreation Area.
2 The Draft Public Access map currently does not show this park. However, this park is documented on the Cowlitz County website as recently re-opened.
3 The Draft Public Access map currently indicates that there is a boat launch at this location, but does not showpark.
4 The Draft Public Access map currently indicates that there is a boat launch at this location, but does not show as a WDFW Water Access Site.
5 The Draft Public Access map currently does not show this WDFW Water Access Site.

Figure 5-21. Shoreline public access at Olequa Creek (Source: WDFW).

Figure 5-22. Shoreline public access at Silver Lake (Source: WDFW).

Regarding potential shoreline public access, the Cowlitz Parks Plan, in its Summary Findings and Conclusions, makes the following statement applicable to the Cowlitz River Assessment Unit:

- "Efforts to improve the water quality of Silver Lake will increase public use of the lake. Additional public shoreline access combined with needed

recreational facilities serving local communities and tourist traffic along SR 504 is anticipated."

Moreover, in its list of Target Projects, the Cowlitz Parks Plan includes the following projects in the Cowlitz River Assessment Unit:

2012-2013

- "Complete restoration of Harry Gardner Park to the condition prior to the 1980 eruption of Mount St. Helens to include RV/tent camping, supporting outdoor venues, hiking, and river access."

2013

- "Create kayak/canoeing/sculling opportunities at Silver Lake to include improved launch facilities, restrooms, parking and other required facilities."

Finally, Cowlitz County has recently approved a shoreline permit application for a commercial zip line recreation course on Goat Island (within Silver Lake). When completed, this facility will provide patrons with access to a portion of privately owned shoreline that was not previously accessible to the public.

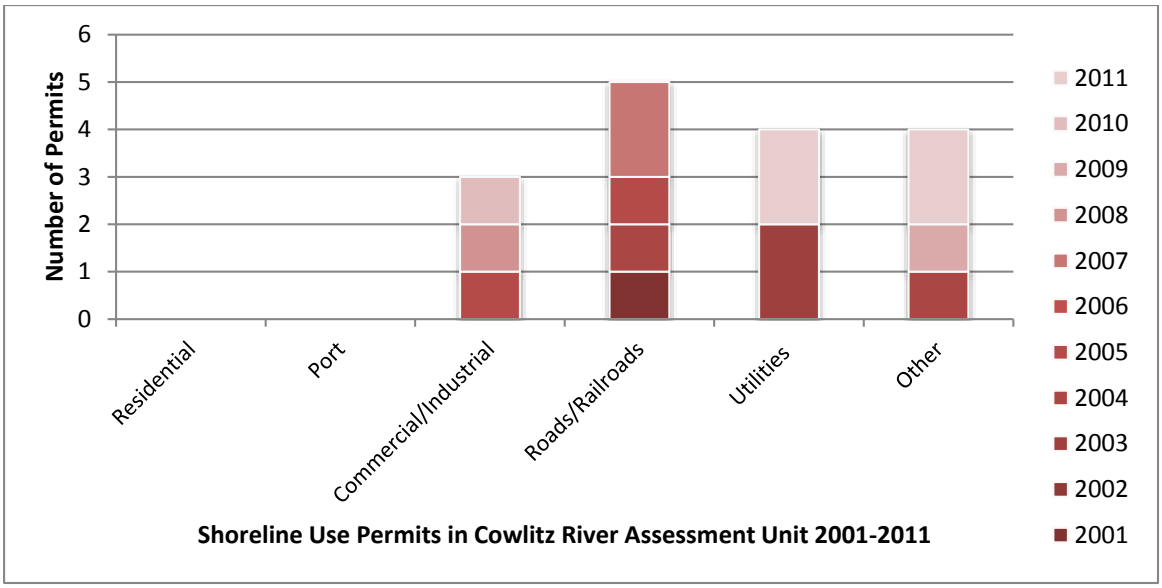
Future Land Use

At around 16,000 acres, Cowlitz River is the largest assessment unit studied. Over the ten-year study period (Table 5-21), the assessment unit saw a significant increase in land classified as "undeveloped" (6.2 percent), despite an overall decrease (by 2.1 percent) in lands meeting the definition criteria for vacant land, as described in Section 3.4.2. This change indicates the potential for development on lands in 2012 where development was not anticipated in 2002, indicating an increase in development potential within the assessment unit. A notable decrease in forestland (5.5 percent) was also observed. The analysis yielded several areas that were reclassified from forestland in 2002 to other land uses in 2012, including single-family residential (>70 acres), agriculture (>30 acres), and undeveloped (>140 acres). Additional land use changes included increases in transportation (3.8 percent), agriculture (1.4 percent), and single family residential (1.8 percent), as well as lesser increases in fishing activities, open space, and recreation (0.1 percent each). Slight decreases were observed in industrial and public/educational/assembly (<0.3 percent each).

Table 5-21. Cowlitz River Assessment Unit: significant land use change 2002-2012.

Category	2002		2012		Change in Percent of Total Acres
	Category Acres	Percent of Total Acres	Category Acres	Percent of Total Acres	
Vacant	1,789 ac.	11.2%	1,523 ac.	9.2%	-2.1%
Undeveloped	5,460 ac.	34.3%	6,737 ac.	40.5%	+6.2%
Forestland	7,950 ac.	49.9%	7,401 ac.	44.5%	-5.5%
Transportation	747 ac.	4.7%	141 ac.	0.8%	-3.8%

Permit activity in this unit was modest relative to the development change observed over the evaluation years. Over the evaluation period, approximately three-times as many permits were issued for transportation and infrastructure related uses than all other use categories (Figure 5-23). Accompanying this, is the observation that half of all shoreline modification permits issued were for bridges and culverts, which may have been associated with roads and infrastructure. Given the push to remove and renovate roads in the upper watershed, one can anticipate that development of this type will continue within the Cowlitz River Assessment Unit.



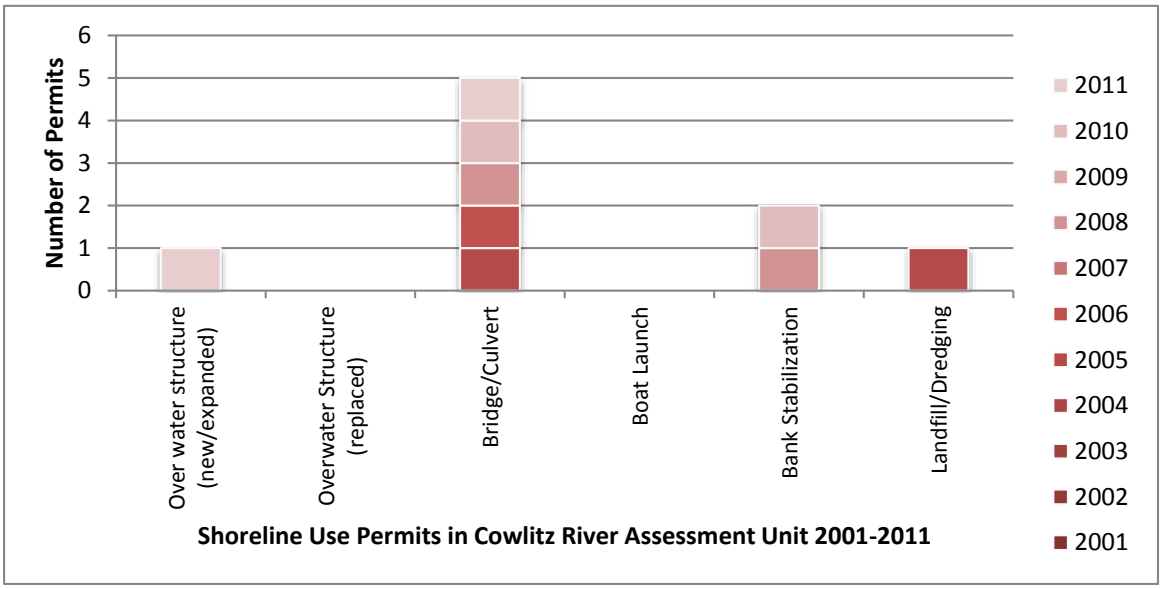


Figure 5-23. Permit issuance data for Cowlitz River Assessment Unit (Source: Cowlitz County).

5.6 Mill, Abernathy, Germany Creek Assessment Unit

Shoreline jurisdiction in the Mill, Abernathy, and Germany Creek Assessment Unit covers 2,745 acres and 57.6 miles of river (Figure 5-24). A summary of shoreline characteristics is provided in Table 5-1.

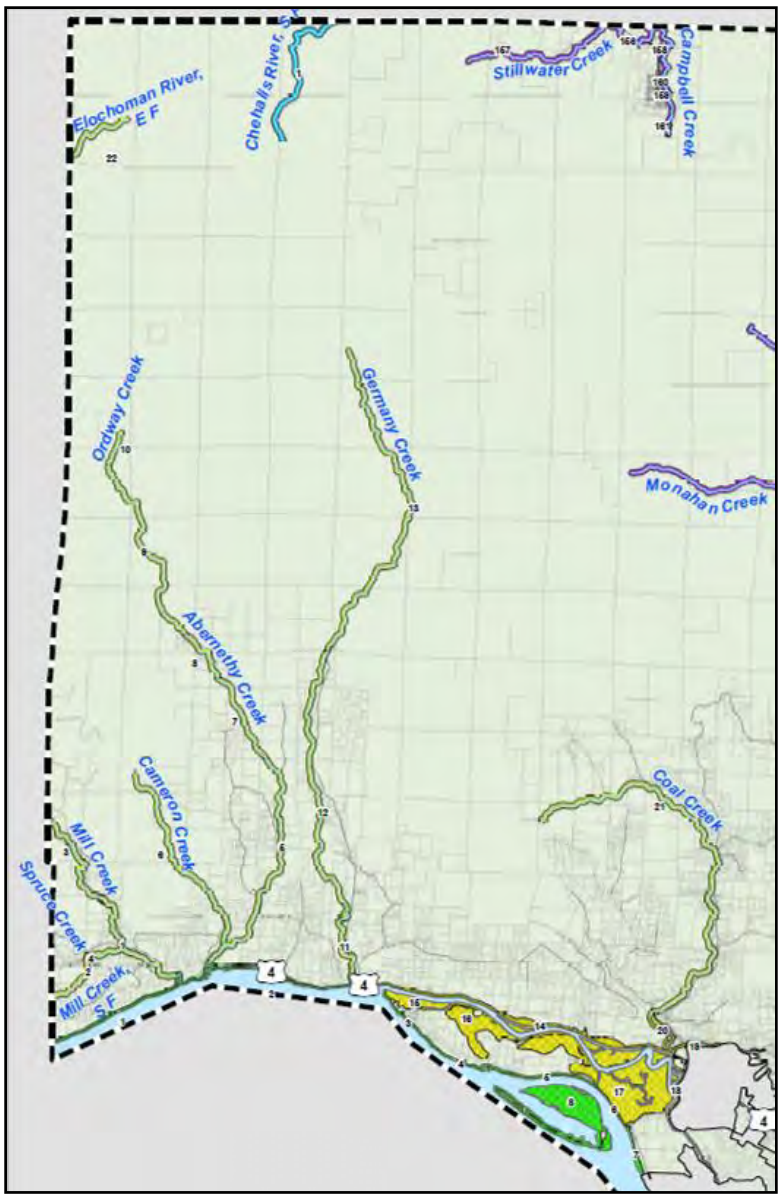


Figure 5-24. Map of Mill, Abernathy, and Germany Creek Assessment Unit (in yellow).

5.6.1 Ecological Characterization

Critical Areas

According to the National Wetland Inventory, wetlands occupy approximately 33 percent of shoreline jurisdiction in the Mill, Abernathy, Germany Assessment Unit. Similarly, floodplain areas occupy approximately 31 percent of shoreline jurisdiction. The majority of the floodplain and wetland area occurs in the Coal Creek delta.

The assessment unit provides habitat for priority species including northern spotted owl, Columbian white tailed deer, osprey, purple martin, Dunn's salamander, and the tailed frog.

Reach Scale Functions

Ecological functions in Mill, Abernathy, and Germany Creeks are primarily influenced by forest harvest activities, agriculture, and rural residential development. Scores of the functional analysis are relatively consistent throughout the assessment unit, but larger valleys tend to score higher for hydrologic, hyporheic, and vegetative functions because of the potential for floodplain connectivity even though these floodplain valleys tend to be either cleared or developed compared to steeper, more highly confined, but less developed forested areas in other reaches.

The Coal Creek delta offers potentially important tidal freshwater rearing habitats for juvenile salmonids, as well as vegetated marshes that provide habitat for birds and other wildlife; however, the pumping station on Coal Creek Slough limits fish passage. Although not identified as particularly high functioning using the scoring approach, Reach 17, in particular, supports a large emergent and scrub-shrub wetland complex with first and second order tidal channels that are particularly significant habitats for small fish throughout the year. This wetland complex also provides significant flood storage capacity for the Columbia River and Coal Creek. In contrast, Reach 16 is entirely enclosed within dikes, and shoreline vegetation is limited to agricultural fields.

Table 5-22. Functional scores for reaches in Mill, Abernathy, Germany Creeks Assessment Unit.

Waterbody	Reach number	Hydrologic Overall	Hyporheic Overall	Habitat Overall	Vegetative Overall
Mill Creek	01	3	3	4	4
Mill Creek, S F	02	3	2	4	4
Mill Creek	03	3	3	4	5
Spruce Creek	04	3	2	4	3
Abernethy Creek	05	3	3	4	4
Cameron Creek	06	3	2	4	4
Abernethy Creek	07	3	3	4	4
	08	3	3	4	5
	09	3	2	4	4
Ordway Creek	10	2	2	4	4

Waterbody	Reach number	Hydrologic Overall	Hyporheic Overall	Habitat Overall	Vegetative Overall
Germany Creek	11	3	3	4	4
	12	3	3	4	5
	13	3	2	4	4
Coal Creek	14	2	3	3	3
	15	2	5	4	4
	16	1	3	4	2
	17	1	4	4	4
	18	1	3	3	2
	19	3	4	4	3
	20	3	4	4	5
	21	3	3	4	4
Elochoman River, E F	22	2	2	4	4

Restoration Opportunities

Prioritized restoration measures for the Lower Cowlitz basin are identified below as excerpted from the Lower Columbia Salmon Recovery and Fish and Wildlife Subbasin Plan (LCFRB 2010):

1. Protect stream corridor structure and function;
2. Protect hillslope processes;
3. Restore degraded hillslope processes on forest, agricultural, and developed lands;
4. Restore floodplain function and channel migration processes along the lower mainstems and major tributaries;
5. Restore riparian conditions throughout the basin;
6. Restore degraded water quality with an emphasis on temperature;
7. Create/restore off-channel and side-channel habitat;
8. Restore channel structure and stability;
9. Provide for adequate instream flows during critical periods;
10. Restore access to habitat blocked by artificial barriers (priority locations in Tributaries to Mill Creek and Coal Creek).

A summary of restoration opportunities throughout the assessment unit is presented in Table 5-23 below.

Table 5-23. Restoration opportunities in Mill, Abernathy, and Germany Creeks.

Action	Status	Entity	Source Plan, ID
Seize opportunities to conduct voluntary floodplain restoration on lands being phased out of agricultural production. Survey landowners, build partnerships, and provide financial incentives	New	NRCS/WCD, NGOs, WDFW, LCFRB, Corps, LCFEG	LCFRB 2010 M-A-G 4
Assess, upgrade, and replace on-site sewage systems that may be contributing to water quality impairment	Expansion of existing program or activity	Cowlitz County, Cowlitz CD	LCFRB 2010 M-A-G 15
Address fish passage barriers, particularly in Germany and Coal Creeks where 30-34% of the habitat is blocked	Expansion of existing program or activity	LCFRB, Cowlitz County	Wade 2002
Look for opportunities to reconnect off-channel and side channel habitat in incised stream reaches	New	LCFRB, Cowlitz County	Wade 2002
Identify areas where channel modifications (LWD or large rocks) could help slow flows, capture scarce spawning gravels, reconnect floodplain habitat, and enhance instream channel diversity	New	LCFRB, Cowlitz County	Wade 2002
Target riparian restoration efforts along the most productive and/or degraded streams including the agricultural areas (generally lower and middle reaches) of Germany and Abernathy Creeks, and the residential areas of Mill Creek.	New	LCFRB, Cowlitz County, Cowlitz CD	Wade 2002

5.6.2 Land Use Characterization

Current Land Use

The chart below (Figure 5-25) illustrates land use distribution in the Mill, Abernathy, Germany Creeks River Assessment Unit in 2012.

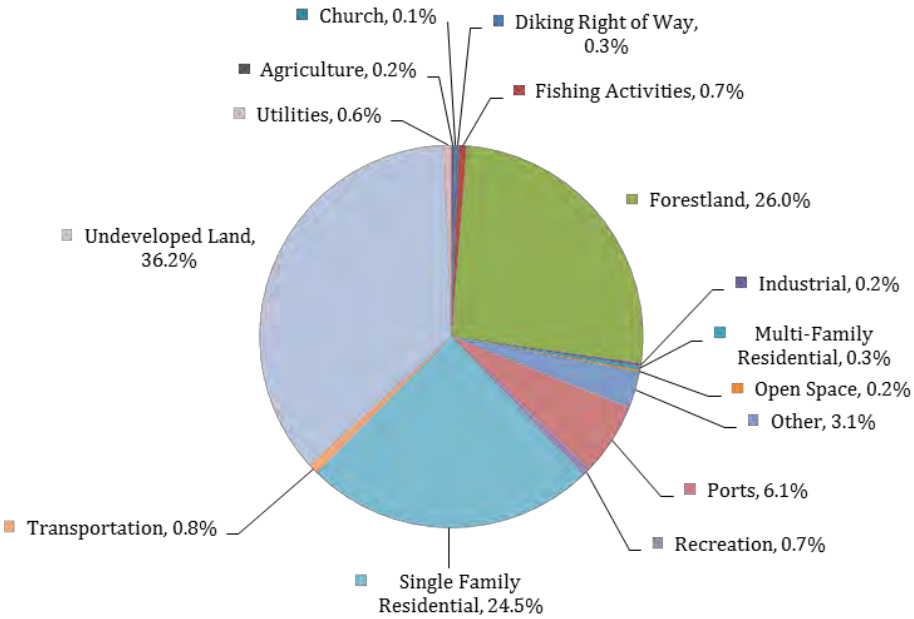


Figure 5-25. Mill, Abernathy, Germany Creeks Assessment Unit 2012 land use distribution (Source: Cowlitz County Assessor's Office).

Water-oriented Uses

The following discussion of water-oriented uses should not be considered comprehensive (please see the subsection on Water-oriented uses in Section 3.3.1 for background discussion). This section only selectively identifies certain water-dependent and water-related uses. Water-enjoyment uses are discussed in the below section titled Existing and Potential Shoreline Public Access.

Coal Creek Moorage on Coal Creek Slough provides commercial vessel moorage.

Transportation and Utilities

State Route 4 runs along the north side of Coal Creek Slough. On the south side of the slough, Willow Grove Road closely follows the shoreline. The creeks in this assessment unit typically feature a road running alongside that bears the same name of the creek (e.g. Mill Creek Road runs alongside Mill Creek). These roads are frequently found within shoreline jurisdiction.

There is a pipeline in this assessment unit that begins near the mouth of Mill Creek and heads north for approximately 1.5 miles before heading east. This pipeline transects shoreline jurisdiction at multiple locations in this assessment unit.

Existing and Potential Shoreline Public Access

Existing shoreline public access locations within the Mill, Abernathy, and Germany Creek Assessment Unit are listed below in Table 5-24.

Table 5-24. Existing shoreline public access locations in the Mill, Abernathy, and Germany Creek Assessment Unit.

Waterbody	Name	Manager	Description
Coal Creek Slough	Coal Creek Boat Launch[1]	Cowlitz County	Includes two-acre boat launch with concrete, single-lane ramp on Coal Creek Slough leading to the Columbia River, as well as parking and undeveloped areas.

1 The Draft Public Access map currently refers to the boat launch at this location as "Coal Creek Slough."

Regarding potential shoreline public access, in its list of Target Projects, the Cowlitz Parks Plan includes the following projects in the Mill, Abernathy, and Germany Creek Assessment Unit:

<u>2013</u>

- "Create kayak/canoeing/sculling opportunities at Coal Creek Slough to include improved launch facilities, restrooms, parking and other required facilities."

Future Land Use

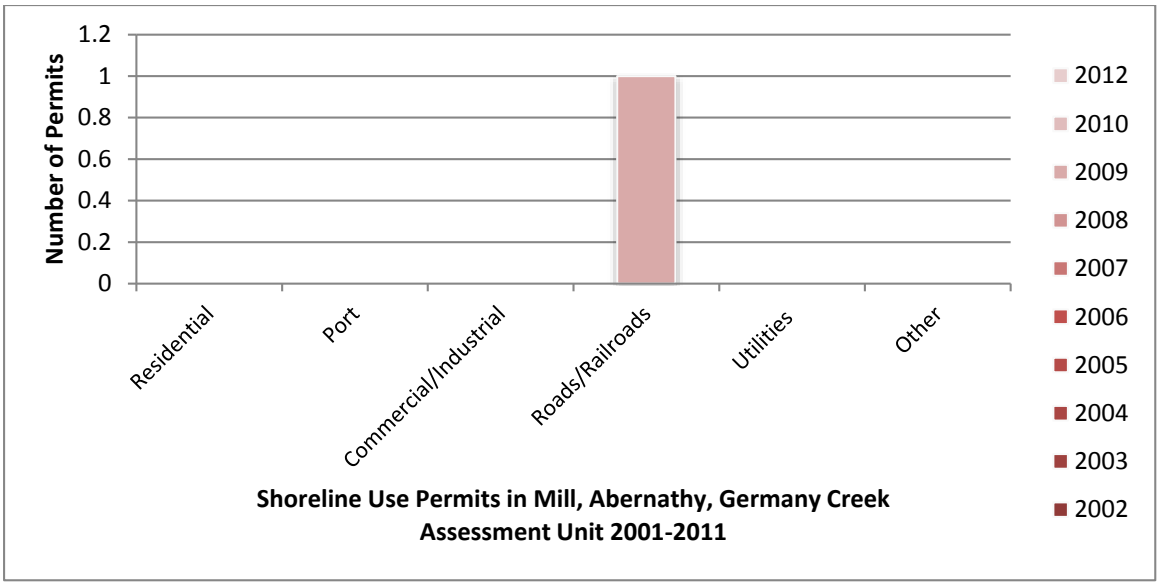
The Mill, Abernathy, Germany Creeks Assessment Unit saw the greatest increase in vacant land (6.8 percent) (Table 5-25). This is due in part to two factors. Several parcels (>32 total acres) that were classified as forestland in 2002 were reclassified as undeveloped in 2012. In addition, a large area (>251 total acres) associated with the Port of Longview that was excluded as vacant in 2002 (due to its "public exempt" tax status), changed ownership and subsequently met the criteria for vacant land in 2012, as described in Section 3.4.2. This change indicates the potential for development on lands where development was not anticipated in 2002, indicating an increase in development potential within the assessment unit. These changes also contributed to the increase in undeveloped land (2.7 percent) and decrease in forestland (0.2 percent). Single family residential (1.4 percent), transportation (0.8 percent), and open space increased over the ten-year period. Decreases were observed in agriculture (1.0 percent), ports (0.8 percent), and utilities (0.5 percent); with lesser decreases in fishing activities, multi-family residential, and recreation (<0.3 percent each).

Table 5-25. Mill, Abernathy, Germany Creeks Assessment Unit: significant land use change 2002-2012.

Category	2002		2012		Change in Percent of Total Acres
	Category Acres	Percent of Total Acres	Category Acres	Percent of Total Acres	
Vacant	552 ac.	21.7%	764 ac.	28.6%	+6.8%
Undeveloped	849 ac.	33.4%	969 ac.	36.2%	+2.7%
Single family residential	588 ac.	23.2%	656 ac.	24.5%	+1.4%

This assessment unit saw the fewest number of shoreline use and modification permits issued over the evaluation period compared to all other units except the South Fork Chehalis River (Figure 5-26). A total of three use permits were issued, all for road/railroad uses. Five modification permits were issued, all but one of which were for bridge/culvert modifications.

Analysis of land use changes within the Mill, Abernathy, Germany Creek Assessment Unit indicates potential for increased development activity. Single family residential development and development associated with the port is likely to continue, while forestland may decrease as development occurs. However, considering the limited number of permits issued over the evaluation period, significant changes are not anticipated.



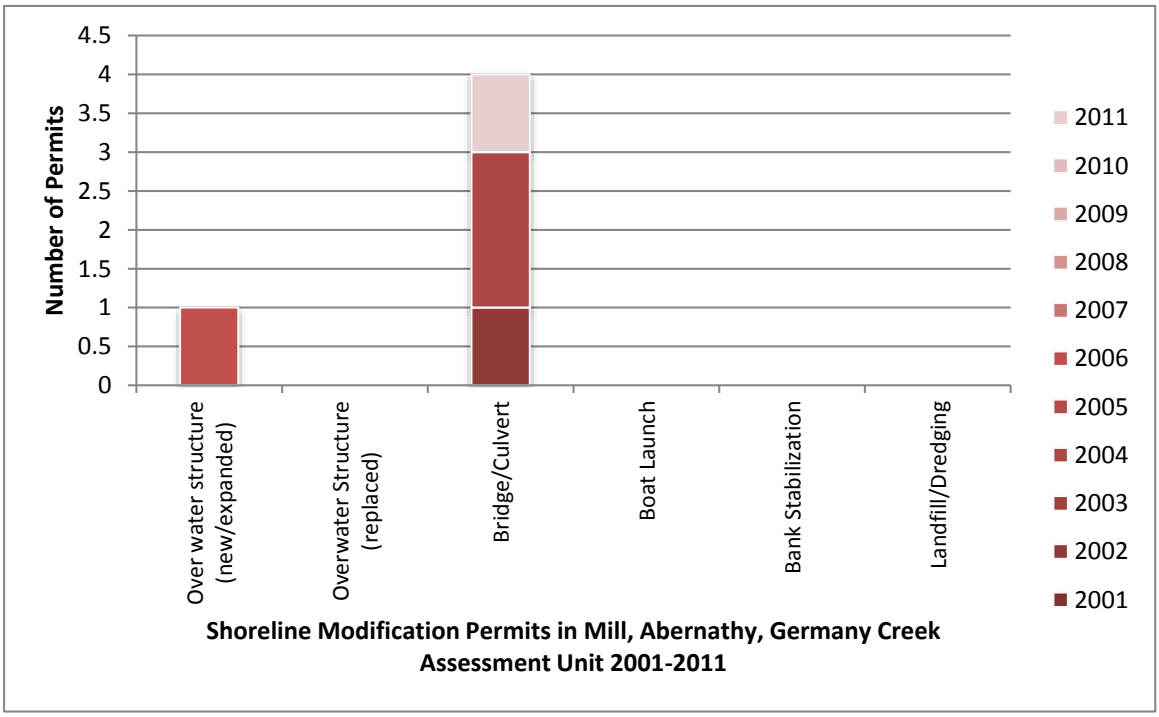


Figure 5-26. Permit issuance data for Mill, Abernathy, Germany Creeks Assessment Unit (Source: Cowlitz County).

5.7 South Fork Chehalis River

Shoreline jurisdiction in the South Fork Chehalis River Assessment Unit is very small, covering only 121 acres and 2.5 miles of river in the northwest corner of the County (Figure 5-27). A summary of shoreline characteristics is provided in Table 5-1.

Figure 5-27. Map of South Fork Chehalis Assessment Unit.

5.7.1 Ecological Characterization

Critical Areas

No wetlands are identified by the National Wetlands Inventory within shoreline jurisdiction in the South Fork Chehalis River Assessment Unit; however, the NOAA CCAP coverage identifies areas of emergent, scrub shrub, and forested wetland vegetation. Where projects may potentially impact wetland sites, a site-specific survey will be required to identify and delineate if and where wetlands occur.

This assessment unit provides habitat for Roosevelt elk, Dunn's salamander, as well as coho salmon, steelhead trout, and pacific lamprey.

Reach Scale Functions

The South Fork Chehalis River Assessment Unit consists of a single reach. The reach is steep and well vegetated along the river corridor and primarily in use as forest lands. The primary impact to the immediate shoreline comes from a logging road that parallels the reach and associated active logging activities. Otherwise, the reach rates moderately high for ecological functions.

Table 5-26. Functional scores for reaches in South Fork Chehalis River Assessment Unit.

Waterbody	Reach number	Hydrologic Overall	Hyporheic Overall	Habitat Overall	Vegetative Overall
Chehalis River, S F	01	3	2	4	4

Restoration Opportunities

Dominant land use in the upper South Fork is commercial forestry, and agricultural uses predominate in the lower river. Both agricultural and forestry

uses have resulted in significant alterations to the shorelines of the South Fork Chehalis River. The Chehalis Basin Salmon Habitat Restoration and Preservation Work Plan for WRIA 22 and 23 (Chehalis Basin Partnership Habitat Work Group 2008) identified several restoration recommendations for the Chehalis watershed, including several recommendations applicable to the upper South Fork Chehalis River. Given the degraded state of riparian vegetation, high sediment loads originating from the upper watershed, and the density of fish passage barriers, the Chehalis Basin Partnership Habitat Work Group (2008) identified the following priorities for restoration in the upper South Fork Chehalis River:

- Riparian restoration
    - Conifer underplanting
    - Control of invasive species
- Control excess sedimentation
    - Implement alternative methods of bank stabilization (bioengineering) in locations with excessive erosion (sediment input)
    - Abandon roads on steep geologically sensitive areas
    - Upgrade existing roads to comply with Forest Practices Act rules and regulations
    - Revegetate streaming and riverbanks for added protection from erosion
- Correct fish passage barriers

5.7.2 Land Use Characterization

Current Land Use

The chart below illustrates the 100 percent forestland land use within the South Fork Chehalis River Assessment Unit in 2012 (Figure 5-28).

Figure 5-28. South Fork Chehalis River Assessment Unit 2012 land use distribution (Source: Cowlitz County Assessor's Office).

Water-oriented Uses

No water-oriented uses are known for this assessment unit. The entire assessment unit consists of forestland.

Transportation and Utilities

Minor forest service roads provide access to this area. No utilities are known to exist in this area.

Existing and Potential Shoreline Public Access

No existing public access locations are known for this assessment unit. The entire assessment unit consists of privately held forestland.

Future Land Use

The South Fork Chehalis River Assessment Unit consists of a single land use (forestland). No changes in land use were observed between 2002 and 2012. In addition, no use or modification permits were issued between 2001 and 2011.

Due to the lack of change observed within this unit, significant development changes are not expected or cannot be anticipated.

5.8 City of Castle Rock and UGA

The City of Castle Rock is located on the Cowlitz River floodplain in northern Cowlitz County, just downstream from the confluence with the Toutle River. The Castle Rock Assessment Unit has 170 acres of shoreline jurisdiction covering 6.6 miles of river and streams.

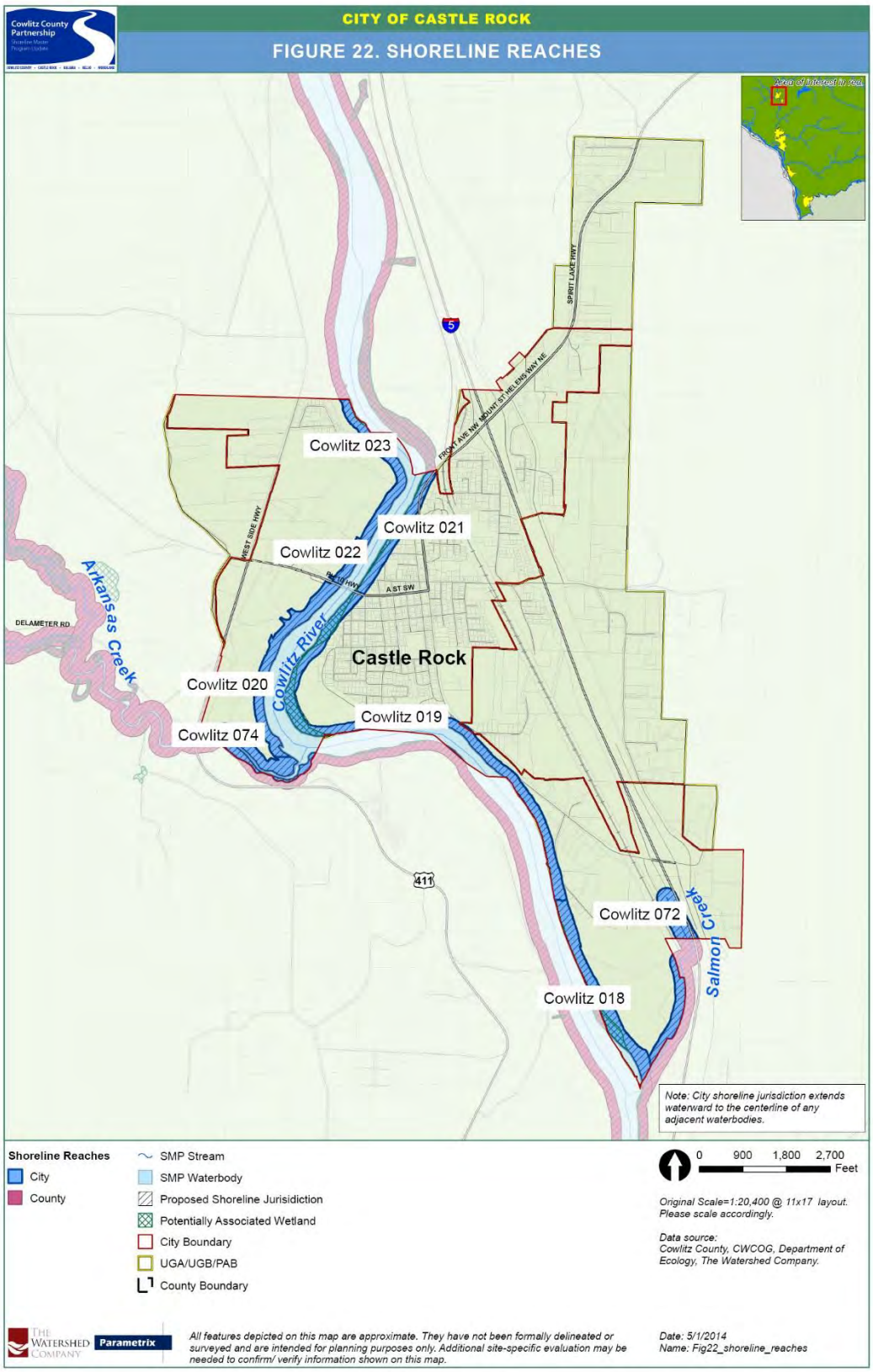


Figure 5-29. Map of City of Castle Rock shoreline jurisdiction.

5.8.1 Ecological Characterization

Critical Areas

Approximately 10 percent of the area in the assessment unit is mapped as wetlands by the National Wetlands Inventory. Approximately 50 percent of the assessment unit is in the mapped floodplain, and another 24 percent of the shoreline area is within the floodway. A certified levee within the City limits occupies approximately 45 percent of the shoreline length along the east bank of the Cowlitz River within the City's jurisdiction.

Priority species and habitats are limited to the shoreline waterbodies, which provide migratory, rearing, and potential spawning areas for six species of priority and listed salmonids.

Reach Scale Functions

As a result of sediment deposition from the Toutle River, the Cowlitz River within the City of Castle Rock includes alluvial gravel bars on the inner bends of the river. The downtown core of the City of Castle Rock is protected from flood waters by a levee on its west side. The levee occurs within shoreline jurisdiction in Reaches 19 and 21, limiting function scores in those reaches (Table 5-27). Although this levee is currently the only certified levee, significant deposition of dredge material on the banks of the river in the city has altered the natural shoreline of the Cowlitz River (Sherwood et al. 1990). This deposition has created berms along the Cowlitz River that limit floodplain functions and connectivity within the city. As noted in Appendix I, these dredge deposits are located throughout all of the City's reaches and have modified the shoreline conditions from its natural state. In addition to the berms and levees, shoreline armoring has been installed throughout many shoreline reaches. These include rip-rap adjacent to the public boat launch (Reach 23) and north and south of the SR 411 bridge (Reach 22), and a revetment and emergency armament southeast of "The Rock" community park (Reach 19).

In some locations along the city's shorelines, wooded vegetation (primarily alders and cottonwoods) on the berms along the river provides a vegetated corridor for wildlife and helps buffer some of the effects of adjacent development on the river. Several areas along the certified levee are maintained to preserve view windows. These are generally located within Reach 19 and Reach 21, north and south of the SR 411 bridge. Where tree vegetation is present along the shoreline, it is generally limited to a relatively narrow riparian corridor. Three notable areas of more substantial vegetation exist; Reach 18 (near the mouth of

Salmon Creek adjacent to dredge spoil deposits), Reach 19 ("The Rock" community park), and Reach 74 (along Arkansas Creek). In contrast, a dredge disposal site, also in Reach 19 is sparsely vegetated. There is little terrestrial habitat value outside of the narrow riparian corridor.

Salmon Creek (Reach 072) and Arkansas Creek (Reach 074) within the City's shoreline jurisdiction have narrow bands of forested riparian vegetation. Although not confined by armoring or a levee, Salmon Creek borders the railway, and is artificially confined to its present course.

Table 5-27. Functional scores for reaches in City of Castle Rock Assessment Unit.

Waterbody	City/ UGA	Label	Hydrologic Overall	Hyporheic Overall	Habitat Overall	Vegetative Overall
Cowlitz River	City	Cowlitz 018 [a]	3	4	4	5
		Cowlitz 019	1	3	2 [b]	3
		Cowlitz 020	2[b]	4	2 [b]	3 [b]
		Cowlitz 021	1	3	2 [b]	3
		Cowlitz 022	2 [b]	4	2 [b]	3 [b]
		Cowlitz 023	1 [b]	3	2 [b]	3 [b]
Salmon Creek		Cowlitz 072	3	3	3	4
Arkansas Creek		Cowlitz 074	3	4	4	4

[a] Functional scores for Cowlitz 18 reflect that the majority of this reach has a wide area of multi-structured vegetation within the shoreline jurisdiction. The vegetation is established on dredge spoil deposits placed there after the Mt. Saint Helen's volcanic eruption. By their physical nature, the dredge spoils are highly susceptible to displacement from high water events. The dredge spoils site may receive additional spoils in the future. The functional scores of this reach would be considered lower if either natural river processes or the addition of dredge spoils reduced the width of the vegetation along the shoreline.

[b] Functional scores were adjusted to account for documented shoreline armoring along portions of the Cowlitz River (see Appendix I).

Table 5-28. Summary of reach characteristics in the Castle Rock Assessment Unit (see Section 3.4.2 for methodology)

			Average Conditions by Parcel					Total by Reach		
Waterbody	City/ UGA	Reach Label	Parcel Size (acre)	Parcel Width (ft)	Parcel Depth (ft)	Shoreline Setback (ft)	Vegetated Condition	Overwater Structures	Shoreline Armoring %	Impervious %
Cowlitz River	City	Cowlitz 018	3.3	323.3	182.6	267.0	3.8	0	0	3
		Cowlitz 019	2.1	316.6	105.3	188.8	2.7	0	0	14
		Cowlitz 020	20.0	1357.0	108.6	192.1	3	0	10	9
		Cowlitz 021	0.3	158.8	68.7	188.6	1.3	0	0	16
		Cowlitz 022	1.8	160.1	114.0	249.0	2.5	0	0	22
		Cowlitz 023	12.3	665.6	191.9	456.3	2.8	1	0	12
Salmon Creek		Cowlitz 072	8.2	279.7	467.8	NA	4	0	0	14
Arkansas Creek		Cowlitz 074	39.8	1,496.5	1,022.6	154.7	3.8	0	0	3

Restoration Opportunities

The most significant opportunities for restoration in the City of Castle Rock include riparian restoration and floodplain restoration. The City has completed significant restoration projects in the last 10 years, including recent enhancements along Janisch and Whittle Creeks, and continues to identify new restoration opportunities.

5.8.2 Land Use Characterization

Future Land Use (Assessment Unit Analysis)

Over the past 10 years, vacant lands and undeveloped lands decreased in the Castle Rock Assessment Unit (Table 5-29). However, this was due to a large annexation in 2010 on the western shore of the Cowlitz River and not the result of increased development activity. Some growth of single-family residential uses can be anticipated in vacant lands in the assessment unit in the foreseeable future.

Table 5-29. Castle Rock Assessment Unit: significant land use change 2002-2012.

Category	2002		2012		Change in Percent of Total Acres
	Category Acres	Percent of Total Acres	Category Acres	Percent of Total Acres	
Vacant	29 ac.	31.5%	19 ac.	20%	-11.5%
Undeveloped	72 ac.	77.6%	65 ac.	70.4%	-7.3%
Single family residential	12.6 ac.	13.5%	15.3 ac.	16.5%	+3.0%
Recreation	0.3 ac.	0.3%	4.7 ac.	5.1%	+4.8%

A review of shoreline permit history over the past 10 years within the City of Castle Rock revealed only four projects; each of these was a public project. As a result of the City's ownership and stewardship of the majority of the City's shorelines, few private development permits are expected in the future.

Potential Use Conflicts

Castle Rock currently has no water-oriented commercial uses, but does have public recreation areas and access trails along levees. The potentially industrial area in the southerly portion of the city and UGA is not likely to include water-dependent uses given the lack of a commercial navigation channel. There are a few residences in the vicinity of this area, but these are not likely to be incompatible with future industrial uses if appropriate site design provides for buffers or other means to reduce impacts.

Transportation and Utilities

The BNSF Railroad and I-5 only intersect with City of Castle Rock shoreline jurisdiction within reach Cowlitz 072 on Salmon Creek. Huntington Avenue runs through a portion of Cowlitz 019 and PH 10/A Street (SR 411) bisects reach Cowlitz 022 and divides Cowlitz 019 and Cowlitz 021 where it crosses the Cowlitz River. In addition to these larger roads, many local roads are present within Cowlitz 021 and Cowlitz 022.

Utility infrastructure is present within Reach 21 (water treatment plant) and Reach 19 (PUD Substation and the Wastewater Treatment Plant)

Existing and Potential Public Access

Much of the Castle Rock shoreline is owned and managed by the City for a variety of public access and recreation uses. The State DNR and the School District also have shoreline sites with limited public access options. Public access is described for each reach in the City of Castle Rock and its unincorporated UGA in Table 5-30 below.

The City's Riverfront Master Plan, Park and Recreation Plan, and the Riverfront Trails Project provide a comprehensive public access approach for shoreline jurisdiction lands in Castle Rock. These plans identify opportunities to improve existing sites for public enjoyment.

Table 5-30. Public access opportunities in the Castle Rock Assessment Unit.

Reach	Potential Public Access Description
Cowlitz 074	No current facilities, zoned for Parks, Recreation and Open Space
Cowlitz 019	The Rock Community Park, Lions Pride Community Park, Riverfront Trail and future park site. Lions Pride Community Park provides a "gateway" to the City with main trailhead access. Future trails to the southeast are planned.
Cowlitz 020	Castle Rock Fairgrounds, Riverfront Trail with meandering access trails, informal parking and fishing locations, shoreline access at the end of Fair Lane. The City plans to develop the "High Banks" area outside of shoreline jurisdiction, but with likely connectivity and amenities within jurisdiction.
Cowlitz 021	Riverfront Trail, fishing platform north of bridge, Trailhead parking near the intersection of Front Ave and SR 411.
Cowlitz 022	Riverfront Trail, and Mosier Road Recreation Area
Cowlitz 023	Al Helenberg Memorial Boat Launch includes boat launch, floating dock and groin, Riverfront Trail, and an outdoor classroom north of the boat launch. The Riverfront Trail is proposed to be paved as part of a regional trail system.

Reach Scale Analysis of Current Land Use, Water-dependent and Water–related uses, and Future Land Use

Cowlitz 072 – City –Salmon Creek

Current Land Use: A small fraction of a large vacant parcel and I-5/local street right-of-way make up the existing land uses. The BNSF railroad right-of-way is just outside of the Shoreline jurisdictional boundaries. The reach also includes land that is vacant and owned by WDNR and that may provide restoration opportunities. Impervious surface includes 14 percent of the parcel area for this reach. Shoreline vegetated area depths are 100 feet in this area, with an average condition score of the vegetated area, as estimated from aerial photos, of 4. The shoreline is not armored within this reach, and there are no overwater structures. City of Castle Rock zoning includes Highway Business and Industrial designations.

Water-dependent Uses and Water-related Uses: There are no water-dependent or water-related uses within this reach.

Future Land Use: The Comprehensive Plan includes industrial uses within this reach. Given the constrained nature of this reach, located between the freeway and rail line, no new development is expected.

Cowlitz 018 – City –Cowlitz River

Current Land Use: The southern (majority) portion of this reach is owned by the WDNR. This reach is currently used as a dredge spoil deposit site under emergency declaration after the eruption of Mount St. Helens. The remainder is made up of three vacant tax lots and two single family residences. Two of the vacant tax lots extend out into the Cowlitz River. A substantial amount of tree and shrub vegetation exists near the mouth of Salmon Creek (ranging between 161 feet to 281 feet wide), covering most of the shoreline jurisdictional area at the southern tip of this reach. The width of continuous vegetation drops off considerably on the northern parcels (~30 feet in places) which are either vacant or contain single family residences located on dredge spoils. The shoreline is not armored within this reach, and there are no overwater structures. The majority of this reach is zoned Industrial with a small portion zoned as low-density residential at the very north end of the reach.

Water-dependent Uses and Water-related Uses: The existing dredge spoils were excavated and removed from the bottom of a body of water (presumably the

Cowlitz River) and may be used for land reclamation purposes, and as such can be categorized as water-related.

Future Land Use: The Comprehensive Plan includes industrial uses within this reach. Much of this reach is under one ownership and has good access to I-5. During stakeholder interviews, part of the visioning process, the owner's representative described the possibility of a new marina, floating homes, spectator sports facilities and new industrial development. These uses, however, are not permitted under current zoning, are not envisioned in the Comprehensive Plan, and have not been presented to the City by the property owner. Land use projections in this report are based on existing zoning.

Cowlitz 019 – City –Cowlitz River

Current Land Use: Beginning at the southern portion of this reach, there are several single-family residences and mobile homes, along with vacant parcels and street ROW. Three rock barbs are located in the Cowlitz River. They are designed to decrease velocity and reduce erosional forces along the river bank. Further north, the reach is occupied by Lions Pride Park and a City-owned RV waste disposal site. Long strips of vacant land owned by the State, County or City are located on either side of Huntington Avenue, representing both public open space (Lions Pride Park) and public access (Riverfront Trail). A 300-foot-long revetment installed by the Corps is located just downstream of "The Rock" community park. The only remaining vegetated shoreline within the City is located within "The Rock" community park, an identified cultural/historical site west of Huntington Avenue. There is evidence of previous realignment of Front Avenue based on parkland not within any tax lot (possibly former road ROW). West of "The Rock" community park, the reach along Dike Drive includes the Castle Rock Wastewater Treatment Plant and other city-owned vacant parcels, along with one single-family residence. This area also represents the downstream end of the certified levee.

Further upstream, along the waterward side of the levee, is the location of the City's active dredge spoils deposit site, a skate park and bike park. This is an area planned (through the Riverside Master Plan) for future recreational uses. To the north, there are vacant parcels corresponding to the Riverfront Trail and future park site, as well as single-family residences, a mobile home and a lot owned by the Cowlitz Public Utility District No. 1. A portion of land closest to the shoreline is part of the right-of-way.

Shoreline vegetation is fairly narrow along the levee and located primarily at the toe of the river bank (typically around 30 feet). Only along the waterward side of the active dredge spoils disposal site is the vegetated width more substantial.

There are no overwater structures within this reach. Land within this reach is designated with Low-density Residential, Parks, Recreation and Open Space and High Density Residential.

Water-dependent Uses and Water-related Uses: As shoreline parkland with access to the river, Lions Pride Park and the Riverfront Trail represent a water-enjoyment use. The Wastewater Treatment Plant on Michner Street is a water-related use due to the need for sewage facilities to be located near the river where its outfall is located.

The existing dredge spoils were excavated and removed from the bottom of a body of water (presumably the Cowlitz River) and may be used for land reclamation purposes, and as such can be categorized as water-related.

Future Land Use: The Comprehensive Plan includes industrial, low-density residential, high-density residential, commercial, parks/open space and public/institutional uses within this reach. Some portions of the shoreline are not given a planning designation. The parks/open space designation extends out into the Cowlitz River. Given the significant ownership by the City in this reach and the open space and recreational designations, future development is likely to be recreation related. The City's adopted Riverside Master Plan calls for the dredge spoils deposit site to be reclaimed for recreational uses.

Cowlitz 074 – City –Arkansas Creek

Current Land Use: A large City-owned vacant tract that is the current site of City and WDNR dredge spoils is located here. The reach also includes small portion of a repair facility parcel. Most of the reach occupies unparcelized vacant lands, zoned for parks/open space. The southern bank of Arkansas Creek is adjacent to several single-family residential parcels that are not within the reach itself. The area of shoreline jurisdiction within the City is fairly well vegetated along both banks of Arkansas Creek. The average condition score of the vegetated area, as estimated from aerial photos, is 3.8. The shoreline is not armored within this reach, and there are no overwater structures. This reach is designated with Parks, Recreation and Open Space zoning.

Water-dependent Uses and Water-related Uses:

The existing dredge spoils were excavated and removed from the bottom of a body of water (presumably the Cowlitz River) and may be used for land reclamation purposes, and as such can be categorized as water-related.

Future Land Use: The Comprehensive Plan includes parks/open space and mixed-uses within this reach. The parks/open space designation extends across the Cowlitz River. There is not likely to be any new development in this reach except recreation use and restoration opportunities, including a potential new bridge over the creek near the mouth.

Cowlitz 020 – City –Cowlitz River

Current Land Use: A large City-owned vacant tract that is the current site of city and WDNR dredge spoils is within the southern extent of the reach. A small corner of the Mt. St. Helens Motorcycle Club facility is also within this reach, as well as portions of the Castle Rock Fairgrounds. Much of the shoreline between the dredge spoils site to the south and PH 10 (A Street), which includes the Riverfront Trail, is not within any tract. The undeveloped "High Banks" area to the south includes an extensive amount of informal walking trails, parking and fishing locations. As with other areas of the City's shoreline which contains dredge spoils deposits, the shoreline vegetation is somewhat limited through this reach, with the exception of an approximately 800-foot-long section along the Fairgrounds. Tree cover typically consists of alders and cottonwoods located near the toe of the river bank. Rip rap armoring is located just south of the SR 411 bridge, adjacent to the Fairgrounds structures and parking. There are no overwater structures through this reach. This reach is designated with Parks, Recreation and Open Space zoning.

Water-dependent Uses and Water-related Uses: As shoreline parkland with access to the river, the Riverfront Trail represents a water-enjoyment use. There is shoreline access provided at the end of Fair Lane.

The existing dredge spoils were excavated and removed from the bottom of a body of water (presumably the Cowlitz River) and may be used for land reclamation purposes, and as such can be categorized as water-related.

Future Land Use: The Comprehensive Plan includes parks/open space and mixed-uses within this reach. A significant length of this shoreline proximate to the dredge spoils site is not within any comprehensive plan designation. The

Community Fair has discussed expanding and renovating facilities with the City staff, and these buildings are currently within the 200-foot shoreline jurisdiction.

Cowlitz 021 – City –Cowlitz River

Current Land Use: The Castle Rock Public Works Facility is located along A Street, while the Water Treatment Plant is located directly north. There is also a church, single-family residences and multifamily apartments within this reach. The Riverfront Trail runs along an easement within several tax lots, while much of the shoreline is not within any tax lot. Further north, the reach consists entirely of single-family residential parcels, with some parcels that are vacant. Closest to the city boundary, there are two single-family residences east of Huntington Avenue as well as several vacant tax lots. There are also vacant parcels towards the shoreline on the west side of the road, including a state-owned tidelands parcel and a city-owned parcel that encompasses the Riverfront Trail and trailhead. ADA trail access is provided at the western end of Shintaffer Avenue. The certified levee runs along the entire shoreline of this reach, immediately adjacent to the shore. Shoreline vegetation is fairly narrow along the levee and located primarily at the toe of the river bank (typically less than 30 feet). Per view corridor maintenance requirements, several areas along the certified levee are maintained to preserve view windows. The average condition score of the vegetated area, as estimated from aerial photos, is 1.3. There are no overwater structures. This reach is designated with High Density Residential and Retail Business zoning.

Water-dependent Uses and Water-related Uses: Within this reach, there is a fishing platform north of the bridge; these are the reach's sole overwater structures. The operation of a Water Treatment Plant is dependent on being located in proximity to the intake on the river; hence it is classified as a water-related use. As shoreline parkland with access to the river, the Riverfront Trail represents a water-enjoyment use. Other uses are separated from the river by a federally certified levee. This levee separates the uplands from the shoreline, such that shoreline functions do not extend landward of the levee.

Future Land Use: The Comprehensive Plan includes public/institutional, commercial, low-density residential and high-density residential uses within this reach. Some portions of the shoreline are not designated in the comprehensive plan. The City's waterfront and downtown plans call for significant redevelopment and enhancements in this area.

Cowlitz 022 – City –Cowlitz River

Current Land Use: There is a vacant commercial parcel located on past dredge spoils along SR 411 as well as single family residences and a mobile home to the west of Mosier Road. Two of these residential tracts also occupy land to the east of Mosier along the shoreline. A City-owned vacant tract is located along the river, while the remaining shoreline is not within any parcel. The Riverfront Trail runs along the shoreline as well, adjacent to Mosier Road and public access also includes a fishing platform just north of the bridge. Shoreline vegetated consists of a narrow band of alders and cottonwoods, located near the toe of the river bank. Mosier Road runs along the river and interrupts potential habitat connectivity. The shoreline is nearly completely armored within this reach, and there are no overwater structures. This reach is designated with High Density Residential and Low-density Residential zoning.

Water-dependent Uses and Water-related Uses: As shoreline parkland with access to the river, the Riverfront Trail represents a water-enjoyment use.

Future Land Use: The Comprehensive Plan includes low-density residential, high-density residential and mixed-uses within this reach. Given the larger parcel sizes and good transportation access this reach is likely to see new commercial development in the future.

Cowlitz 023 – City –Cowlitz River

Current Land Use: The majority of this reach contains past dredge spoils deposits. Vegetation is typically just a narrow band of alders and willows, with the only extensive vegetation located at the river's bend just east of the recreational ball fields. The City's Boat Launch facility is located within this reach, along with the North County Recreation Association's Sports Complex and two additional vacant parcels, one of which is owned by the Castle Rock School District #401. Of the three school district-owned parcels, one extends across the Cowlitz River while another privately owned parcel extends out into the river. A small portion of the reach is not within any tax lot parcel, including local street right-of-way and land closest to the shoreline. The shoreline is armored just north of the boat launch within this reach. The boat launch also contains a recently constructed floating dock. There is a flood control berm that was built after a 1995 high water event to protect residences within the Green Acres community and the high school from flooding. This reach is designated with a small area of Low-density Residential zoning with the remainder designated as Parks, Recreation and Open Space.

Water-dependent Uses and Water-related Uses: The Boat Launch facility is a water-dependent use. As shoreline parkland with access to the river, the Riverfront Trail represents a water-enjoyment use. Other existing informal dirt trails are likely to be incorporated into the regional trail system in the future.

Future Land Use: The Comprehensive Plan includes parks/open space and low-density residential uses within this reach. There is the potential for a small amount of low-density residential in this reach. The local school district may utilize the area for teaching and interpretive nature trails and displays and may complete wetland and/or habitat enhancement as a part of an open classroom curriculum.

The existing berm may be improved in the future to achieve certification. This may result in a loss of shoreline vegetation along the berm due to Corps vegetation policies, but in most instances the amount of vegetation is limited to a narrow band of cottonwoods and alders. As an alternative to improving the berm, some land in or adjacent to this reach may be elevated to accommodate new development in the floodplain (WEST Consultants 2008). Both land elevation and berm improvement would eliminate already limited floodplain connectivity in this reach.

5.9 City of Kalama

The City of Kalama is located on the Columbia River, just upstream (southeast) of the confluence with the Kalama River. The assessment unit has 214 acres of shoreline jurisdiction covering 6.6 miles of river.

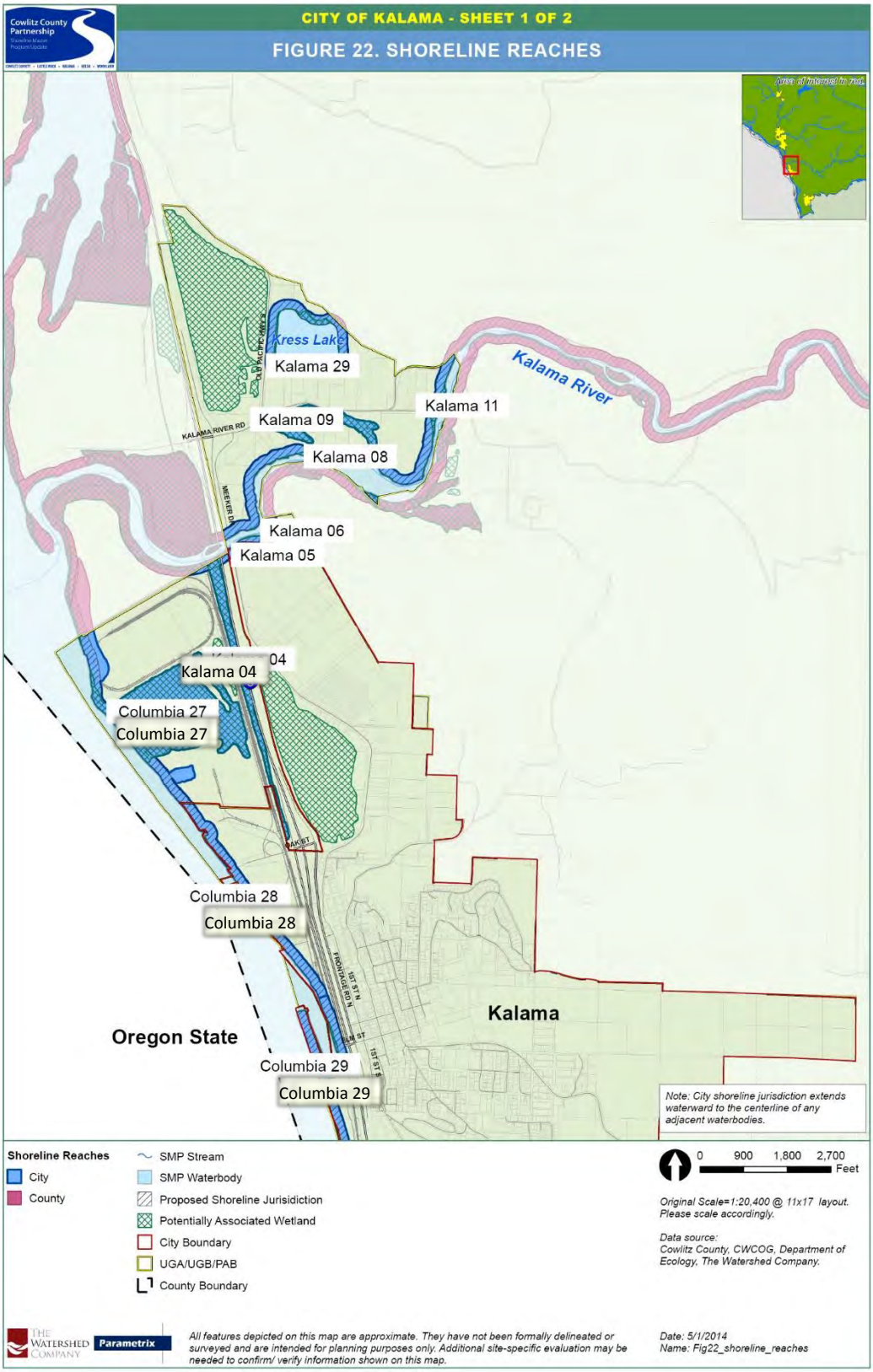


Figure 5-30. Maps of City of Kalama shoreline jurisdiction (continued).

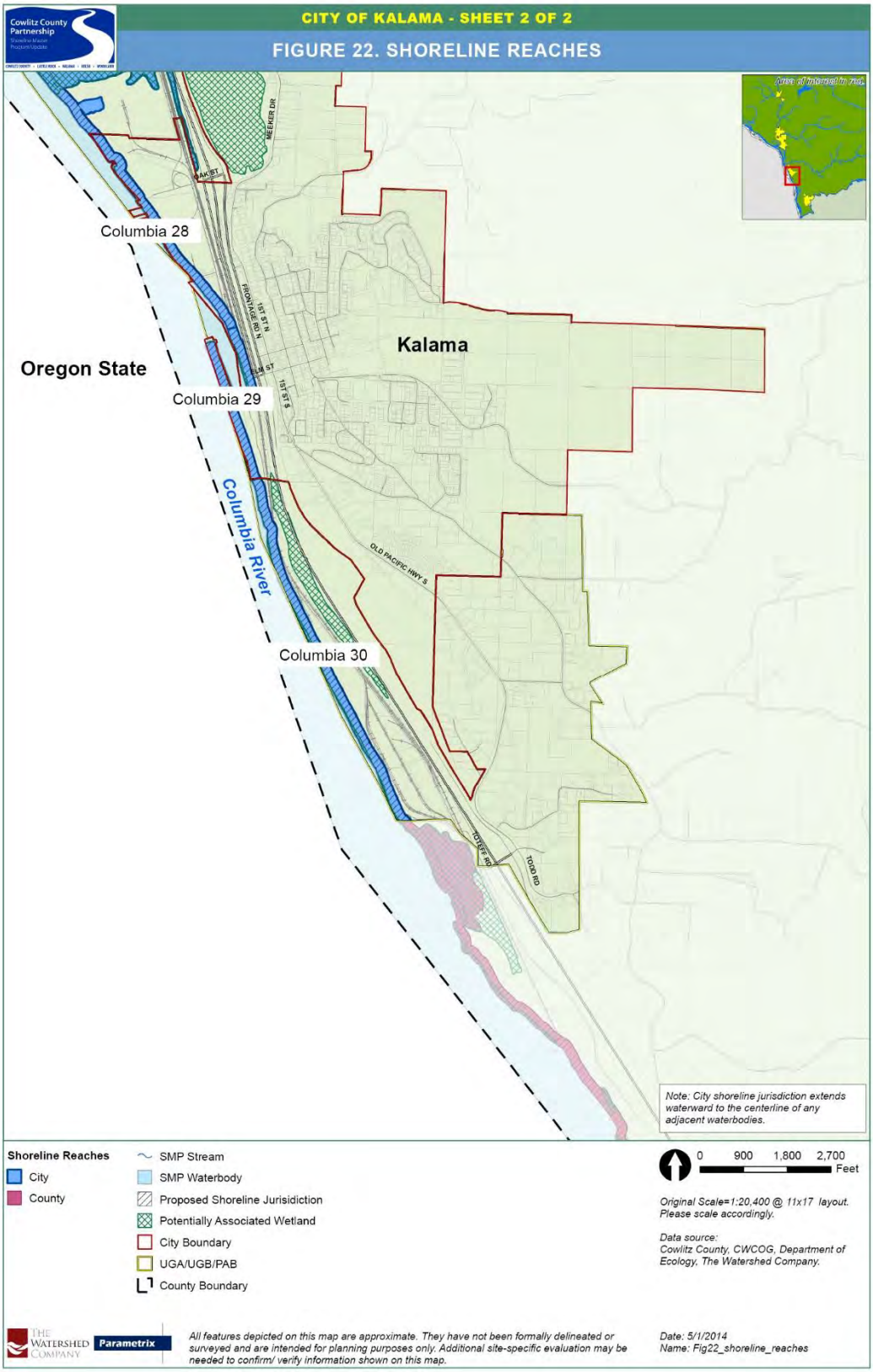


Figure 5-30. Maps of City of Kalama shoreline jurisdiction (continued).

5.9.1 Ecological Characterization

Critical Areas

Approximately 36 percent of the shoreline jurisdiction in the City of Kalama Assessment Unit is mapped as wetland area by the National Wetlands Inventory. Levees along the Columbia and the lower Kalama River in the City and its UGA occur on nearly 28 percent of the shoreline length in the assessment unit. Outside of these leveed sections, approximately 62 percent of the shoreline area is within the mapped floodplain.

The shoreline provides habitat for osprey, Canada geese, and cavity-nesting ducks, as well as aquatic shoreline habitat for the entire suite of salmonids and priority fish species using the Columbia River and lower Kalama River shorelines.

Reach Scale Functions

The shoreline along the Columbia River in the City of Kalama and its UGA is lined with levees or other shoreline armoring largely supporting port and industrial uses. A large wetland is located adjacent to Port properties in Reach 27, and although separated from the River by a levee, the property is within the mapped floodplain of the Columbia River, providing some hydrologic functions. This wetland area provides some of the only shoreline vegetation and functioning habitat within the City's UGA on the Columbia River (Table 5-31). Other vegetation on the Columbia River is limited to a few mowed grass areas and patchy trees and shrubs in Reaches 29 and 30. Over- and in-water structures occur throughout the Columbia River reaches, associated with Port properties. The marina basin provides refuge from high flows, but instream habitat is lacking in complexity and shallow water habitat, and overwater structures provide potential habitat for predators on juvenile salmonids and other small fish.

Kalama River

Kalama Reach 04 is largely perpendicular to the river and consists of a narrow wetland situated between I-5 and the railway. Because of its location, the wetland provides water quality functions. Kalama Reaches 05 and 06 are well vegetated and include a sandbar. Kalama Reach 08 on the right bank includes a variety of land uses including a resort, single-family homes, and some agriculture. Kalama Reach 09 is a well-vegetated wetland area with a pond near its west end. Similarly, the majority of the shoreline area on Kress Lake (Reach 29) is well vegetated, with little human disturbance of functions except the

parking lot and boat launch on the west side. A soft-surface trail encircles the lake.

Table 5-31. Functional scores for reaches in City of Kalama Assessment Unit.

Waterbody	City/ UGA	Label	Hydrologic Overall	Hyporheic Overall	Habitat Overall	Vegetative Overall
Columbia River	UGA	Columbia 27	1	4	1	1
	City	Columbia 28	1	3	2	2
		Columbia 29	1	3	2	2
	UGA	Columbia 30	2	3	2	2
Kalama River	UGA	Kalama 04	3	4	4	3
	City	Kalama 05	3	3	3	3
	UGA	Kalama 06	3	4	4	5
		Kalama 08	3	4	3	4
		Kalama 09	3	4	5	4
	City	Kalama 11	2	4	3	3
Kress Lake	UGA	Kalama 29	4		4	5

Table 5-32. Summary of reach characteristics in the City of Kalama Assessment Unit.

			Average Conditions by Parcel						Total by Parcel		
Waterbody	City/ UGA	Reach Label	Parcel Size (acre)	Parcel Width (ft)	Parcel Depth (ft)	Shoreline Setback (ft)	Average Depth of Vegetated Shoreline (ft)	Vegetated Condition	Overwater Structures	Shoreline Armoring %	Impervious %
Columbia River	City	Columbia 28	13.6	1054.1	125.6	284.6	0	1	3	77	41
		Columbia 29	3.5	475.0	105.4	244.0	20.6	1	0	58	55
	UGB	Columbia 27	57.2	947.9	883.7	779.7	0	1	3	92	30
		Columbia 30	11.4	957.9	152.5	288.6	113.4	1.1	2	50	41
Kalama River	City	Kalama 05	25.2	237.9	134.3	NA	1740.0	5	0	0	5
		Kalama 11	2.0	232.9	261.3	305.2	281.3	2	1	0	6
	UGB	Kalama 04	9.7	122.3	90.9	NA	326.9	5	0	0	16
		Kalama 06	10.1	338.6	120.3	318.3	384.8	3.7	0	0	8
		Kalama 08	7.8	385.7	154.7	250.6	387.4	2.8	1	0	3
		Kalama 09	7.2	329.1	221.4	294.2	600.9	3.1	0	0	3
Kress Lake	UGB	Kalama 29	13.3	792.4	152.0	789.2	675.2	3.3	0	0	1

Restoration Opportunities

Two areas present potential restoration opportunities with the City of Kalama. Some portion of the land around Kress Lake, which is primarily forested, is under a mitigation agreement with the State of Washington. The land along the north and south banks of the Kalama River, west of I-5 and the BNSF Railroad also presents a potential mitigation opportunity. Both projects are proposed as mitigation, meaning that they would be restored to compensate for an action that negatively affects ecological functions. As such, mitigation projects are not truly restoration projects, and the projects may or may not result in a net gain in ecological functions.

5.9.2 Land Use Characterization

Future Land Use (Assessment Unit Analysis)

Over the past ten years, the area of vacant lands in the City of Kalama UGA has only decreased slightly, by 1.4 percent (Table 5-33). The area of single family residential use has remained largely unchanged. Agricultural uses, once present in the assessment unit have been lost or reclassified as undeveloped properties. The data shows a shift of approximately 15 acres from industrial to commercial uses; since commercial and industrial uses are often related and may sometimes overlap, this apparent difference in use may be a reflection of differences in categorization methods over the course of time.

Table 5-33. City of Kalama Assessment Unit: Significant land use change 2002-2012.

Category	2002		2012		Change in Percent of Total Acres
	Category Acres	Percent of Total Acres	Category Acres	Percent of Total Acres	
Vacant	23 ac.	7.7%	19 ac.	6.3%	-1.4%
Undeveloped	38 ac.	13.1%	49 ac.	16.3%	+3.2%
Single Family Residential	27 ac.	9.3%	29 ac.	9.4%	+0.1%
Recreation	0.3 ac.	0.3%	10 ac.	5.1%	+3.3%
Agriculture	10.6 ac.	3.6%	0	0%	-3.6%

Permits within City of Kalama shoreline jurisdiction back to 2002 were obtained from the City of Kalama and reviewed for applicability (Table 5-34). Permits with a use change, new development or significant expansion of an existing use are included here.

Table 5-34. Ten year permit history in the City of Kalama.

Reach	Permit Application	Activity	Location
Columbia 29	N/A	Phase 1 - Develop Port of Kalama Interpretative Center and Office Building Phase 2 – Develop hotel and restaurant	110 W. Marine Drive, at Kalama Marina

Potential Use Conflicts

The existing park and recreation facilities and marina, with the prospect for a hotel, restaurant, and small conference center called for in the Port of Kalama Comprehensive Plan, would not be a conflicting use with anticipated existing and future industrial uses given the configuration of surrounding Port uses.

The residential area south of the Port of Kalama is reasonably well buffered from port uses by distance but experiences some conflicts when access across the rail corridor is blocked by train movement.

Transportation and Utilities

The BNSF Railroad runs parallel to the Columbia River and the shoreline reaches along the Columbia within the City of Kalama. Shoreline jurisdiction includes portions of the railroad within Columbia 29 and is very near the railroad in Kalama 04. I-5 is near to reach Columbia 2 and Kalama 04 as well, and crossing the Kalama River at the edges of reaches Kalama 05 and Kalama 08

Existing and Potential Public Access

Public access is described for each reach in the City of Kalama and its unincorporated UGA in Table 5-35 below. Potential public access opportunities include the Port of Kalama's plans to develop an interpretive center as well as a restaurant and hotel on the marina. Kalama Reach 09 is in an area designated for a future park, and Kress Lake recreation in Kalama Reach 29 has potential for amenity and access improvements.

Table 5-35. Public access opportunities in the Kalama Assessment Unit.

Reach	Potential Public Access Description
Columbia 30	Part of Marine Park with beach access
Columbia 29	Part of Marine Park with beach access, Kalama Marina and boat launch
Kalama 08	Camp Kalama: Boat launch, beach access, camping
Kalama 29	Kress Lake: Small boat launch, fishing access, and trail around shore

Reach Scale Analysis of Current Land Use, Water-dependent and Water–related uses, and Future Land Use

The City of Kalama has shoreline jurisdiction along the Columbia River, the Kalama River, and Kress Lake. The reaches include low-density residential, industrial, and recreational areas. The following descriptions for each reach will summarize existing and planned land uses and details regarding shoreline treatments and features.

Columbia River

Columbia 30 – City

Current Land Use: The south half of this reach is occupied by industrial land uses with a dock associated with large grain silos near the shore and the Port of Kalama wastewater treatment plant. The north half of the reach includes the southern portion of a park with a beach area and beach access below an armored slope supporting the upper portion of the park. Shoreline vegetated area depths range from 35.8 feet to 278.9 feet, including the park, with an average depth of 113.4 feet. The average condition score of the vegetated area, as estimated from aerial photos, is 1.1. The shoreline is armored within portions of this reach. The docks constitute overwater structures. The City of Kalama future land use designation within this reach is industrial.

Water-dependent Uses and Water-related Uses: This reach contains water-dependent uses associated with the Port of Kalama including the marine shipping terminals for Cenex/United Harvest. The Port of Kalama also owns the property to the north occupied by Marine Park with access to the water, and thus includes a water-enjoyment use. The outfall to the river for the City of Kalama wastewater treatment plant is another a water-related use due to the need for proximity to river for discharge of treated wastewater.

Future Land Use: It is anticipated that this area will remain in industrial use as part of the Port of Kalama.

Columbia 29 - City

Current Land Use: Land use consists of a recreational marina, Kalama Marina, with partially covered boat docks. Adjacent upland uses include local roads, a railroad and I-5. The shore is armored near the marina. The southern end of Columbia 29 includes a portion of a park owned and operated by the Port of Kalama. Shoreline vegetated area depths range from 0 feet to 63.3 feet within the park, with an average depth of 20.6 feet. The average condition score of the vegetated area, as estimated from aerial photos, is 1. The marina and associated

docks are overwater structures in this reach. This area is all designated with Industrial Zoning in the City of Kalama.

Water-dependent Uses and Water-related Uses: The marina is a water-dependent use owned by the Port of Kalama and includes nine floating docks with covered and uncovered moorage slips for recreational boats. The beach access portion of Marine Park is a water-enjoyment use.

Future Land Use: The City of Kalama Comprehensive Plan shows this area as an industrial zone, which is consistent with the current zoning. The Port of Kalama has plans to develop an interpretive center with offices as well as a restaurant and hotel on the marina (see the Permit Table). The Port of Kalama may expand or redevelop additional industrial uses in this reach in the future.

Columbia 28 – City

Current Land Use: Land use in Columbia 28 is all industrial with two log float areas adjacent to a large log storage and processing yard (RSG Forest Products). The property is also part of the Port of Kalama. The shoreline is armored within the entire reach. The shoreline vegetated area generally consists of small bushes and grasses that are temporarily established on riprap slopes between periods of periodic clearing to ensure stability of the armoring. The average condition score of the vegetated area, as estimated from aerial photos, is 1. There are large docks and overwater storage structures in this reach. This area is all designated with Industrial Zoning in the City of Kalama.

Water-dependent Uses and Water-related Uses: Two water-dependent log float areas and at least three docks exist within the Columbia River in Columbia 28. The upland log storage area could be considered water-oriented based on the use of the Columbia River shipping facility.

Future Land Use: The City of Kalama Comprehensive Plan shows this area as an industrial zone, which is consistent with current zoning. Although fully occupied with industrial uses at present, the Port of Kalama may expand or redevelop additional industrial uses in this reach in the future.

Columbia 27 – UGA

Current Land Use: Columbia 27 includes a large area of forested floodplain between industrial uses that is isolated from the river by a levee constructed in the 1960s. East of the forested shore area, the Kalama Export Company industrial use has rail lines, large silos for farm products, and docks along its shoreline.

The shoreline is armored within the entire reach. Shoreline vegetated areas are not present waterward of the riprap slopes that border industrial lands, except for small areas of accretion deposits which support vegetation waterward of the toe of the artificial slope. The Port of Kalama docks are overwater structures in this reach. The City of Kalama future land use designation within this reach is industrial.

Water-dependent Uses and Water-related Uses: The docks associated with the Port of Kalama industrial land are a water-dependent use for the export of goods.

Future Land Use: It is anticipated that the developable portion of this reach will remain in industrial use as part of the Port of Kalama, although the comprehensive plan does not include this area. The Port of Kalama may expand or redevelop additional industrial uses in this reach in the future.

Kalama River

Kalama 04 – UGA

Current Land Use: This reach is a long, narrow reach of inland floodplain between I-5 and the railroad. It is vegetated but otherwise is vacant. There are no buildings in this reach; however, 16 percent of the parcel area for this reach is impervious surface due to transportation infrastructure. The average shoreline vegetated area depth is 171.7 feet. The average condition score of the vegetated area, as estimated from aerial photos, is 5. The shoreline is not armored in this reach. There are no overwater structures in this reach. There is no City of Kalama future land use designation within this reach.

Water-dependent Uses and Water-related Uses: There are no water-oriented uses in this reach.

Future Land Use: No future changes in this reach are anticipated as it appears to be undevelopable land due to its configuration. This area is not included in the Kalama Comprehensive Plan.

Kalama 05 – City

Current Land Use: This small reach is densely forested up to the shore and is otherwise vacant. It is adjacent to a local road and bridge crossing the Kalama River. The parcel configuration is unusual with a 2-acre parcel about 250 feet deep abutting the river, extending about 660 feet along the river abutted by a very steep rock escarpment. This parcel is outside of the city limits. Behind it is

a parcel 24.13 acres in size, with a width of about 660 feet and a depth of about 1,300 feet. A steep escarpment rises from the river over both parcels. There are no buildings in this reach; however, 5 percent of the parcel area for this reach is impervious surface due to transportation infrastructure. The average shoreline vegetated area depth is 1,740 feet. The average condition score of the vegetated area, as estimated from aerial photos, is 5. The shoreline is not armored within this reach. There are no overwater structures in this reach. This reach is designated with Single-Family Residential Zoning in the City of Kalama.

Water-dependent Uses and Water-related Uses: There are no water-oriented uses in this reach.

Future Land Use: A small part of the westerly portion of this reach is included in the Kalama Comprehensive Plan, and no significant growth or development is expected.

Kalama 06 – UGA

Current Land Use: This small reach is mostly vegetated with shrubs and trees but may have some manicured lawn and private shore access for the upland residence. Shoreline vegetated area depths range from 97.3 feet to 1,089 feet, with an average depth of 384.8 feet. The average condition score of the vegetated area, as estimated from aerial photos, is 3.7. The shoreline is not armored within this reach. There no overwater structures within this reach. The City of Kalama future land use designation within this reach is residential.

Water-dependent Uses and Water-related Uses: There are no water-oriented uses in this reach.

Future Land Use: If additional development were to occur in this area, it would be anticipated to be low-density residential with a small number of units.

Kalama 08 – UGA

Current Land Use: Kalama 08 is a long reach, extending from the east side of I-5 on the north shore of the Kalama River to approximately Kalama River Road. At the southern end near I-5 there is recreation access to the Kalama River at Camp Kalama Resort with camping and a boat launch area. The remainder of the reach is occupied by large, low-density residences and agricultural uses. Shoreline vegetated area depths range from 0 feet to 1,514.8 feet, with an average depth of 387.4 feet. The average condition score of the vegetated area, as estimated from aerial photos, is 2.8. The shoreline is not armored within this reach. There is one

dock in this reach. There is no City of Kalama future land use designation within this reach.

Water-dependent Uses and Water-related Uses: The boat launch for recreation access to the river is a water-dependent use.

Future Land Use: This area is designated for mixed use in the Kalama Comprehensive Plan and can accommodate a variety of residential, commercial and industrial uses. There are several large vacant properties within this reach that could be used for potential development in the future. Redevelopment of the existing resort is also a possibility. Over the long term, substantial new mixed use development is anticipated in this area.

Kalama 09 – UGA

Current Land Use: This reach is a potential associated wetland to the Kalama River and is surrounded by riparian forested areas and agricultural fields with homes. Vegetated area depths range from 129.7 feet to 1,012.1 feet, with an average depth of 600.9 feet. The average condition score of the vegetated area, as estimated from aerial photos, is 3.1. There are no overwater structures in this reach. This is part of the area designated for mixed use in the Kalama Comprehensive Plan and can accommodate a variety of residential, commercial, and industrial uses. Over the long term, substantial new mixed use development is anticipated in this area. The easterly portion of this area is within a future designated park.

Water-dependent Uses and Water-related Uses: There are no water-oriented uses in this reach.

Future Land Use: Due to the Kalama Comprehensive Plan designation for mixed use, substantial new mixed use development with a variety of residential, commercial, and industrial uses is anticipated in this area. The easterly portion of this area will be developed as active and passive park facilities.

Kalama 11 – City

Current Land Use: Kalama 11 is a small reach consisting only of the City of Kalama drinking water treatment facility, one building near the road, and a pump station building on the shore. Surrounding land use is very low-density residential. The one parcel is 2 acres with a width of 232.9 feet and a depth of 261.3 feet. The building setback is 305.2 feet, and 6 percent of the parcel area for this reach is impervious surface. Shoreline vegetated area depth is 281.3 feet.

The condition score of the vegetated area, as estimated from aerial photos, is 2. The shoreline is not armored within this reach. An ancillary structure for the water treatment facility appears to be partially an overwater structure. This reach is designated with Single-Family Residential Zoning in the City of Kalama.

Water-dependent Uses and Water-related Uses: The drinking water treatment facility is a water-oriented use because of the need for access to water from the Kalama River.

Future Land Use: This area in not included in the Kalama Comprehensive Plan. As this small reach only consists of the drinking water treatment facility, no use changes are anticipated; however, the City of Kalama may expand or redevelop the utility use currently present.

Kalama 29 – UGA

Current Land Use: Kalama 29 contains the shoreline around Kress Lake. There is a small corner of agricultural land at the southwest corner of the lake along with a parking lot for a recreation trail. A wheelchair-accessible platform for fishing or viewing the lake and small boat launch are also in this area. The remainder of the shoreline is forested with a recreation trail around the perimeter of the lake. Kress Lake is surrounded by agriculture and forest lands. Shoreline vegetated area depths range from 491.5 feet to 925.3 feet, with an average depth of 675.2 feet. The average condition score of the vegetated area, as estimated from aerial photos, is 3.3. The shoreline is not armored within this reach. There are no overwater structures in this reach. There is no City of Kalama future land use designation within this reach.

Water-dependent Uses and Water-related Uses: Kress Lake has both water-dependent and water-related uses. The boat launch and fishing access are water-dependent, while wildlife viewing and the recreation trail are water-enjoyment uses.

Future Land Use: The area around the lake owned by the Washington Department of Fish and Wildlife is designated Recreation in the Kalama Comprehensive Plan. The parcel to the south and generally 50 to 100 feet from OHWM is designated for mixed use in the Kalama Comprehensive Plan. Substantial new mixed use development with a variety of residential, commercial, and industrial uses is anticipated in this area.

5.10 City of Kelso

The City of Kelso is located at the confluence of the Cowlitz, Coweeman, and Columbia Rivers. The assessment unit, which includes the UGB planning area identified by the Cowlitz-Wahkiakum Council of Governments, has 882 acres of shoreline jurisdiction covering 21.5 miles of River.

Figure 5-31. Map of City of Kelso shoreline jurisdiction (1 of 2).

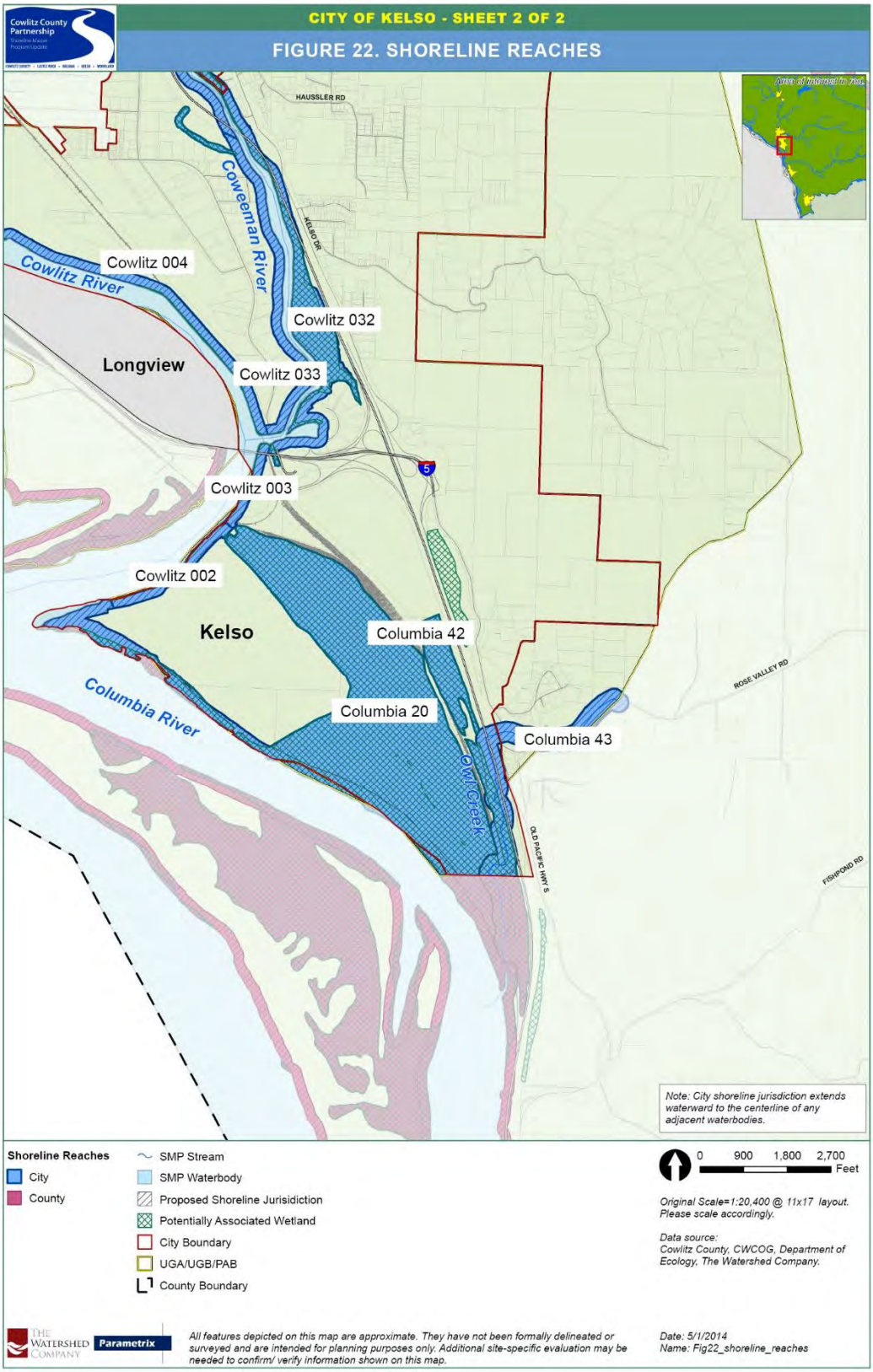


Figure 5-31. Map of City of Kelso shoreline jurisdiction (2 of 2).

5.10.1 Ecological Characterization

Critical Areas

The NWI identifies wetlands on approximately 53 percent of shoreline jurisdiction. Levees on the Coweeman and Cowlitz Rivers in the City and a portion of its UGA occupy 38 percent of the total assessment unit shoreline length. Within the City of Kelso city limits, levees occupy 65 percent of the total shoreline length, including 100 percent of the Cowlitz River shoreline upstream of the Coweeman River and the entire west bank of the Coweeman River downstream from Allen Street Road. These levees preclude functioning floodplains in much of the City; however, a portion of the Coweeman River within the City has an active floodway, and floodplain areas occur along the Coweeman River within the unincorporated UGA, as well as in Columbia Reach 20. In total, 69 percent of the shoreline area within the assessment unit is in the mapped floodplain, of which, an additional 9 percent is within the floodway.

Reach Scale Functions

Ecological function scores are reported in Table 5-36 below along with parcel and reach level data in Table 5-37.

Columbia River

Reach Columbia 20 is the only reach in the City of Kelso with Columbia River frontage. This reach, located at the confluence with the Cowlitz River, includes substantial area of potential wetland habitat in the eastern portion of the site. A levee is present on the northwestern edge of the wetland, approximately 0.75 mile from the Columbia River shoreline; given its distance from the Columbia River, its presence was not factored into the hydrologic scores. The entire reach area is within the floodplain of the Columbia River. The dredge spoil deposit area in the western portion of the site has a vegetated riparian area that varies between 150 and 300 feet, and the reach performs significant hydrologic, habitat, and water quality functions.

Owl Creek

Reach Columbia 43 in the City's UGA on Owl Creek scores highly for hydrologic functions because of a lack of shoreline armoring, and forested vegetation is intact throughout much of the reach. Reach Columbia 42 in the City on Owl Creek is also not armored, and it runs through a narrow depression between I-5 and a railway. This depression includes substantial areas of wetland emergent and forested vegetation; given its location relative to roads and railways, this reach has an especially significant role in water quality functions.

Cowlitz River

With the exception of Reaches Cowlitz 002 and 003, the entire Cowlitz River shoreline in the City and its UGA are impaired by shoreline armoring and levees. The series of levees has channelized the lower Cowlitz has channelized the lower Cowlitz River, and ongoing levee maintenance results in limited shoreline vegetation. A railway parallels the Cowlitz River, and further limits any shoreline vegetation functions along most of the Cities reaches (Cowlitz 004, 006-008). The most intact shoreline vegetation occurs in a portion of Reach Cowlitz 004, along the golf course, and in Cowlitz 007 where the railway curves away from the shoreline.

Coweeman River

A levee isolates the Coweeman River from its northern shoreline for its entire length within the City. Hydrologic connectivity is significantly better on the southern (left) bank of the River (Reaches Cowlitz 32, 35-37, 43, and 46) and within the eastern UGA (Reaches Cowlitz 44 and 45). Shoreline vegetation and habitat are more diverse and provide greater habitat functions on the southern bank of the Coweeman River, despite existing development and infrastructure. In the eastern UGA, Reach Cowlitz 44 includes a large wetland area.

Table 5-36. Functional scores for reaches in City of Kelso Assessment Unit.

Waterbody	City/ UGA	Label	Hydrologic Overall	Hyporheic Overall	Habitat Overall	Vegetative Overall
Columbia River	City	Columbia 20	4	4	5	4
Owl Creek	City	Columbia 42	3	4	4	4
	UGA	Columbia 43	3	3	4	5
Cowlitz River	City	Cowlitz 002	3	4	4	4
		Cowlitz 003	2	4	3	4
		Cowlitz 004	1	3	3	3
		Cowlitz 005	1	3	3	3
		Cowlitz 006	1	3	2	3
		Cowlitz 007	1	4	4	4
	UGA	Cowlitz 008	1	2	2	2
Coweeman River	City	Cowlitz 032	3	4	4	5
		Cowlitz 033	1	3	3	2
		Cowlitz 034	1	3	3	2
	UGA	Cowlitz 035	3	4	4	5
	City	Cowlitz 036	3	4	4	4
		Cowlitz 037	3	4	4	4
		Cowlitz 038	1	3	2	2
		Cowlitz 039	1	3	3	2

Waterbody	City/ UGA	Label	Hydrologic Overall	Hyporheic Overall	Habitat Overall	Vegetative Overall
	UGA	Cowlitz 040	1	4	4	3
		Cowlitz 041	1	3	4	2
	City	Cowlitz 042	1	3	3	3
	UGA	Cowlitz 043	3	4	4	4
		Cowlitz 044	3	5	4	4
		Cowlitz 045	3	3	4	4
	City	Cowlitz 046	3	4	5	4

Table 5-37. Summary of reach characteristics in the City of Kelso Assessment Unit.

			Average Conditions by Parcel						Total by Reach		
Waterbody	City/ UGA	Reach Label	Parcel Size (acre)	Parcel Width (ft)	Parcel Depth (ft)	Shoreline Setback (ft)	Average Depth of Vegetated Area (ft)	Vegetated Condition	Overwater Structures	Shoreline Armoring %	Impervious %
Columbia	City	Columbia 20	39.8	1023	1496	155	876	4	0	25	3
Owl Creek	City	Columbia 42	35.2	781	1285	NA	472	4	0	0	11
	UGA	Columbia 43	4.4	434	166	4,076	469	5	0	0	6
Cowlitz River	City	Cowlitz 002	90.1	199	2115	NA	2,648	4	0	0	9
		Cowlitz 003	10.1	200	901	NA	88	2	0	0	12
		Cowlitz 004	45.4	169	1587	326	326	2	0	100	6
		Cowlitz 005	0.9	67	205	217	44	1	1	100	44
		Cowlitz 006	0.4	75	141	162	49	1	0	100	24
		Cowlitz 007	2.5	73	496	244	74	3	0	100	81
	UGA	Cowlitz 008	5.8	159	1292	NA	77	2	0	100	80
Coweeman River	City	Cowlitz 032	4.2	221	448	247	268	3	0	0	10
		Cowlitz 033	3.7	75	598	586	72	1	0	100	41
		Cowlitz 034	1.1	78	320	293	23	1	0	100	12
	UGA	Cowlitz 035	2.2	131	458	222	130	4	0	46	7
	City	Cowlitz 036	1.9	161	200	136	254	4	0	0	1
		Cowlitz 037	0.6	103	152	144	143	3	0	43	5
		Cowlitz 038	7.6	93	389	259	41	1	0	100	64
		Cowlitz 039	8.8	88	509	332	58	2	0	100	19
	UGA	Cowlitz 040	3.3	48	56	NA	NA	NA	0	0	0
		Cowlitz 041	32.5	230	857	200	49	1	0	100	83
	City	Cowlitz 042	0.5	48	68	173	105	3	0	24	4
	UGA	Cowlitz 043	5.5	243	513	281	341	3	1	32	3
		Cowlitz 044	7.3	179	897	135	335	3	0	45	22
		Cowlitz 045	20.3	213	1591	417	856	3	0	0	0
	City	Cowlitz 046	208.9	199	1323	NA	4,013	5	0	0	0

Restoration Opportunities

Hart's Lake in reaches Cowlitz 044 and Cowlitz 046, is noted as an area for potential restoration. This area has been targeted by the City of Kelso for the development of a regional wetland bank.

5.10.2 Land Use Characterization

Future Land Use (Assessment Unit Analysis)

Little change in land use conditions was observed in the Kelso Assessment Unit over the past ten years (Table 5-38). The area of vacant lands within shoreline jurisdiction stayed the same, although because the area incorporated into the analysis of land use changed slightly, the percent change gives the appearance of a reduction in vacant lands. The area of single family residential development showed the greatest increase of any land use type in the assessment unit, up 16 acres. The area categorized as transportation lands (including railroads and rights of way) decreased by approximately 6 acres. It is expected that this reduction is a primarily a result of differences in categorization of lands over time.

Table 5-38. City of Kelso Assessment Unit: land use change 2002-2012.

Category	2002		2012		Change in Percent of Total Acres
	Category Acres	Percent of Total Acres	Category Acres	Percent of Total Acres	
Vacant	538 ac.	63.9%	538 ac.	61.5%	-2.4%
Single Family Residential	105 ac.	12.6%	121 ac.	13.9%	+1.3%
Transportation	128 ac.	15.3%	122 ac.	13.9%	-1.3%

Permits within City of Kelso shoreline jurisdiction back to 2002 were obtained from the City of Kelso and reviewed for applicability. Permits with a use change, new development or significant expansion of an existing use are included in Table 5-39. Only three permits were identified within the designated period and shoreline area. These permits indicate that limited development of residential and transportation uses and ongoing dredging and dredge disposal has occurred.

Table 5-39. Ten-year permit history in the City of Kelso.

Reach	Permit Application	Activity	Location

Cowlitz 004	SHR09-003	Removal of approximately 50 trees from potential shoreline wetland area	South end of Kelso-Longview Airport runway (Parcel 240910100)
Cowlitz 005	06-001	Develop 54-unit townhomes	2200 Block of S. River Road (Parcel 24370)
Columbia 20	08-001	Continued use of existing 236 acre dredge material disposal site	Wasser-Winters Co. property at south end of Kelso, east bank of Cowlitz River between river mile 0 and 1.

Potential Use Conflicts

Kelso currently has no water-oriented uses, except for public access trails, and the storage of dredge spoils, due to the isolation of the shoreline in many areas by levees and transportation corridors. Because of the levees and transportation corridors there is little potential for use conflicts.

Areas with potential for future water-oriented uses include the area near the golf course (Cowlitz Reach 004 and 005), the area on the south bank of the Coweeman River within the UGA (Cowlitz Reach 032), and the east bank of Carrol's Channel (Columbia 20). All of these areas are currently vacant with no existing single-family dwellings or other potential conflicting uses.

Transportation and Utilities

In the City of Kelso, I-5 intersects the shoreline jurisdiction five times, twice running parallel within reaches Columbia 43 and Cowlitz 32, and three times crossing the Coweeman River. The BNSF Railroad is within shoreline jurisdiction in two general areas, in and near reaches Columbia 20, Columbia 42, Columbia 43, and Cowlitz 004 in the southern end of Kelso, and along the downtown waterfront beginning in reach Cowlitz 006 where the railroad is parallel with and within the shoreline jurisdiction from Cowlitz 006 north to Cowlitz 008. There are three crossings of the Cowlitz River within the city limits: Tennant Way (SR 432), Allen Street (SR 4) and W Cowlitz Way (SR 4).

Existing and Potential Public Access

Public access is described for each reach in the City of Kelso and its unincorporated UGA in Table 5-40 below.

Table 5-40. Public access opportunities in the Kelso Assessment Unit.

Reach	Potential Public Access Description
Cowlitz 004	Three Rivers Golf Course. Public course with frontage on river at its southern end.

Reach	Potential Public Access Description
	Vacant shore land that appears to be used for beach access, but is not officially public access. Further research is required.
Cowlitz 005	Access to short trail and sandy bank at shore at Yew Street. Further research is required.
Cowlitz 005-007	Cowlitz River Dike Trail
Cowlitz 008	Gravel extension of Cowlitz River Dike Trail
Cowlitz 034, 038, Cowlitz 40-42	Coweeman River Trail
Cowlitz 39	Tam O'Shanter Park and Coweeman River Trail

Reach Scale Analysis of Current Land Use, Water-dependent and Water–related uses, and Future Land Use

The City of Kelso shoreline reaches include low- and high-density residential, commercial, industrial, and recreational uses. The following descriptions for each reach will summarize existing and planned land uses and details regarding shoreline treatments and features.

Columbia River

Columbia 20 – City

Current Land Use: There are no structures in Columbia Reach 20, and the south and easterly portion of the site includes potential wetlands. The westernmost portion of the reach contains a permitted dredge disposal site, which is partially within shoreline jurisdiction. This reach is designated with IGM – General Manufacturing zoning in the City of Kelso.

Water-dependent Uses and Water-related Uses: None.

Future Land Use: The area is all designated for industrial use in the Kelso Comprehensive Plan. As much of this land is vacant, there is potential for future industrial development.

Columbia 42 – City

Current Land Use: This reach is along Owl Creek running between I-5 and a railroad line. No development exists along the creek or between these two transportation corridors. This reach is designated with IGM – General Manufacturing, and CMR – Major Retail Area zoning in the City of Kelso.

Water-dependent Uses and Water-related Uses: There are no water-oriented uses in this reach.

Future Land Use: This area is designated for industrial and commercial uses in the Kelso Comprehensive Plan. No plans are known for future development and no major use changes are anticipated.

Columbia 43 – UGA

Current Land Use: This reach follows Owl Creek on the east side of I-5 through a forested area along the creek in unincorporated Cowlitz County. It is surrounded by large lot, low-density residential development. The shoreline is not armored within this reach, and there are no overwater structures. This area is not designated with City of Kelso zoning.

Water-dependent Uses and Water-related Uses: There are no water-oriented uses in this reach.

Future Land Use: This area is not included in the comprehensive plan. No use changes are anticipated in this residential area. Further residential development may be possible.

Cowlitz River

Cowlitz 002 – City

Current Land Use: This reach begins just east of the confluence of Cowlitz River and Columbia River. It includes vegetated shoreline and is adjacent to the north boundary of a sediment dredge storage location owned by Wasser-Winters Co. This reach is designated with IGM – General Manufacturing zoning in the City of Kelso.

Water-dependent Uses and Water-related Uses: The sand/gravel/ash storage location was the result of dredging. The site does not, however, host any water-oriented uses.

Future Land Use: This area is designated for industrial use in the Kelso Comprehensive Plan. Land upland of reach Cowlitz 002 is considered vacant so there is potential for future industrial development.

Cowlitz 003 – City

Current Land Use: This reach begins at the railroad crossing and ends at the confluence of the Cowlitz River with the Coweeman River. There is a narrow band of riparian vegetation right along shore. The land is mostly vacant, and there is only one parcel in the reach. This reach is designated with IGM – General Manufacturing zoning in the City of Kelso.

Water-dependent Uses and Water-related Uses: There are no water-oriented uses in this reach.

Future Land Use: This area is designated for industrial use in the Kelso Comprehensive Plan. Land upland of reach Cowlitz 003 is considered vacant so there is potential for future industrial development, but significant use changes are not anticipated.

Cowlitz 004 – City

Current Land Use: At its southern end, Cowlitz 004 begins with a very narrow shore between the Cowlitz River and a railroad. Upland of the railroad is the south end of the runway at the Southwest Washington Regional Airport. Moving north, the shoreline includes beach potentially formed with dredge spoil deposits and riparian vegetation and a small portion of the adjacent Three Rivers Golf Course, which is open to the public. Further north in Cowlitz 004, the beach and riparian vegetation area is wider and the shoreline jurisdiction does not include the golf course. The beach and vegetation area is privately owned but has many crisscrossing foot paths that appear to be used to access the Cowlitz River. This reach is designated with OPN – Open Space and RMF – Residential Multi-Family zoning in the City of Kelso.

Water-dependent Uses and Water-related Uses: There are no water-oriented uses in this reach.

Future Land Use: Land upland of the railroad at the southern end of this reach is designated for industrial use in both the current zoning map and Kelso Comprehensive Plan. The remainder of this reach is designated as open space in the Kelso Comprehensive Plan. Plans are underway to extend the airport runway. The extension may involve impacts to wetlands with potential shoreline jurisdiction and mitigation may be required. This area may be appropriate for multi-family development and may present opportunities for associated restoration and public access. No other land use change or significant growth is expected in this reach.

Cowlitz 005 – City

Current Land Use: Cowlitz 005 begins at the north end of the Three Rivers Golf Course. The shoreline jurisdiction includes S. River Road and portions of medium-density single family residences at its southern end. North of Olive Street, the shoreline includes portions of an industrial use and unimproved land,

and then moves back to medium to low-density single family residential use again. West of Riverside Drive, the bank appears partially armored, and there is minimal riparian vegetation. Industrial uses and potentially one or two residential uses are near the river. There is unparcelized right-of-way land (approximately aligned as if Yew Street were to extend to the Cowlitz River) that has a sandy beach that has a trail leading down to the shore. Ownership of this area is unclear and needs further research. This area also the southern terminus of the Cowlitz River Dike Trail, which lies adjacent to the railroad on the Cowlitz River Dike, separated by a high safety and security fence. In this reach, the trail is separated from the river by Riverside Drive and industrial uses. This reach ends at approximately Mill Street.

There is one small dock over the water near the north end of the golf course within this reach. This reach is designated with RSF-10- Residential Single Family zoning in the City of Kelso and possibly ILM – Airport Industrial/Light Industrial..

Water-dependent Uses and Water-related Uses: The unofficial recreation access across from Yew Street provides a water-enjoyment use that may or may not be appropriate over time. Further research is required.

Future Land Use: This area is designated with industrial and commercial uses in the comprehensive plan, not consistent with the current single family zoned area. There may be potential for use change if property in this area is redeveloped. There are also several parcels classified as vacant which presents the potential for future development.

Cowlitz 006 – City

Current Land Use: Cowlitz 006 includes the east side of the Cowlitz River from approximately Mill Street to approximately Columbia Street. Just north of Mill Street, there is a City-owned undeveloped vegetated parcel at the shore. The shore between the river and the railroad is quite narrow north of this point up to the end of this reach at approximately Columbia Street. The bank has approximately 40-50 feet of vegetation. The shoreline jurisdiction extends inland beyond the levee and railroad at approximately Cedar Street continuing north to Allen Street. Land uses within the shoreline jurisdiction between Cedar Street and Allen Street include light industrial, rail station, and office uses. North of Allen Street, the shoreline jurisdiction area includes the rail line and areas used

for rail-related activities and the vegetated shore up to approximately Columbia Street.

Throughout this reach, the Cowlitz River Dike Trail lies on the Cowlitz River Dike between the river and the BNSF railroad. The trail is separated from the railroad by a high safety and security fence. There are no official rail crossing locations providing access to the trail, but users typically cross at grade at Mill Street or at Yew Street.

The reach also includes a small area along the west side of the Cowlitz River, in West Kelso from approximately Fishers Lane, to approximately Washington Street. This area includes a levee, local roads, some beach areas, medium density residences, and office and retail uses.

Two bridges cross the Cowlitz River within this reach. This reach is designated with RSF-10- Residential Single Family, RSF-5- Residential Single Family OPN – Open Space, CTC – Town Center Community, CSR – Special Retail District, and CWK – West Kelso Community zoning in the City of Kelso.

Water-dependent Uses and Water-related Uses: There are no water-dependent uses in this reach. The Cowlitz River Dike Trail provides a water- enjoyment opportunity on the shoreline.

Future Land Use: This area is designated with high-density residential and commercial uses in the Kelso Comprehensive Plan, consistent with current zoning. No significant growth or use changes are anticipated for the downtown area at this time.

Cowlitz 007 – City

Current Land Use: This reach begins at approximately Columbia Street where the shore widens compared to the reach just to the south. Parcels waterward of the levee and the railroad are undeveloped and forested with some trails that potentially connect to the Cowlitz River Dike Trail (the paved portion of the trail ends at Barnes Road). Some of these parcels are owned by the City of Kelso and some by private owners, and it appears there may be limited dock access to the river. At approximately Redpath, the shoreline has a large sandy beach area with a utility use. Upland development inland of this reach is medium to low-density residential. This reach is designated with RSF-5- Residential Single Family and OPN – Open Space zoning in the City of Kelso.

Water-dependent Uses and Water-related Uses: There may be potential water-dependent recreational uses if a dock are present (available aerial photography was inconclusive). The Cowlitz River Dike Trail provides recreational access along the river as a water-enjoyment use.

Future Land Use: Land in this reach along the river is designated as commercial use in the Kelso Comprehensive Plan, while land adjacent to the railroad is designated as low or high density residential. The commercial designations may not be consistent with the current open space zoning applied to portions of this reach, but given the limited access, there is little potential for use change in the future. No known plans for development were identified.

Cowlitz 008 – UGA

Current Land Use: This reach begins at approximately Barnes Street and is in unincorporated Cowlitz County. The shoreline is mostly inaccessible due to the multiple rail lines, although it is fairly wide and vegetated. Landward of the rail yard there are low-density residential developments. This reach is not included in City of Kelso zoning.

Water-dependent Uses and Water-related Uses: There are no water-dependent uses in this reach. The Cowlitz River Dike Trail provides a water- enjoyment opportunity on the shoreline.

Future Land Use: This reach is outside the limits of the comprehensive plan. No known plans for this residential area were identified and no use changes are anticipated.

Coweeman River

Cowlitz 032 – City

Current Land Use: This is a long reach on the eastern shore, starting at the confluence of the Coweeman River with the Cowlitz River. The shore of the Coweeman has a narrow band of riparian vegetation. Landward, there are local roads, undeveloped but development-prepared land, and two commercial built lots. Moving north up the Coweeman River, there is a forested area with the shoreline jurisdiction extending into the I-5 right-of-way. The forested shore narrows and is more sparsely vegetated moving further north. This reach also includes an I-5 crossing of the Coweeman River and one single-family residence. The Talley Way Bridge crosses over the Cowlitz River in this reach. This reach is designated with RSF-15- Residential Single Family, and CMR – Major Retail Area zoning in the City of Kelso.

Water-dependent Uses and Water-related Uses: There are no water-oriented land uses in this reach.

Future Land Use: Kelso Comprehensive Plan designations within this reach include Commercial, Industrial, and Low-density Residential. The southern end of the reach includes several vacant parcels with commercial zoning, thus though no permits were identified for new development there, commercial growth is anticipated. No use changes or growth is expected in the remainder of the reach.

Cowlitz 033 – City

Current Land Use: This reach begins on the northern and western shores of Coweeman River just east of the confluence with the Cowlitz River. A levee exists about 60 feet landward from the water throughout this reach, and starts just east of Talley Way. A recreational trail, the Coweeman River Trail, runs along the top of the levee. The southernmost access point for the trail is at Talley Way. The shore between the levee and the water is vegetated with mowed grass or small shrubs. Landward of the levee, the shoreline jurisdiction includes vacant land, industrial uses and big box retail development. At the north end of this reach, there is a small oxbow lake with shoreline jurisdiction bordered by shrubby vegetation and industrial uses. This reach also includes an I-5 crossing of the Coweeman River and one single-family residence. The Talley Way Bridge crosses over the Cowlitz River in this reach. This reach is designated with ILM – Airport Industrial/Light Industrial Area zoning in the City of Kelso.

Water-dependent Uses and Water-related Uses: There are no water-dependent uses in this reach. The Coweeman River Trail provides a water- enjoyment opportunity on the shoreline.

Future Land Use: Land in this reach is all designated for Industrial use in the Comprehensive Plan, consistent with current zoning. There are several vacant parcels in the northern half of the reach that may provide potential for industrial development in the future. No use changes are anticipated.

Cowlitz 034 – City

Current Land Use: This reach begins at the south with the I-5 crossing of the Coweeman River and where there is undeveloped land that is sparsely vegetated. Moving north, there is a second I-5 crossing. Cowlitz 034 continues on the west side of the river and primarily includes a levee with the Coweeman River Trail. There is a small extension of shoreline jurisdiction to the west to the

west that includes some medium density residential development and two undeveloped lots within the shoreline jurisdiction bordering a creek that drains to the Coweeman River. The two I-5 bridges in this reach are overwater structures. This reach is designated with RSF-15- Residential Single Family, ILM – Airport Industrial/Light Industrial Area and CSR – Special Retail District zoning in the City of Kelso.

Water-dependent Uses and Water-related Uses: There are no water-dependent uses in this reach. The Coweeman River Trail provides a water- enjoyment opportunity on the shoreline.

Future Land Use: Land in this reach is designated with Industrial and Commercial uses in the Comprehensive Plan, consistent with current zoning. There are a few vacant parcels identified at the northern end of the reach, primarily surrounding a small wetland area. No significant growth or land use changes are expected for this reach.

Cowlitz 035 – UGA

Current Land Use: Cowlitz 035 is within unincorporated Cowlitz County with low-density residential development and forested areas. This area is not included in the City of Kelso Zoning.

Water-dependent Uses and Water-related Uses: There are no water-oriented uses in this reach.

Future Land Use: This area is outside of the comprehensive plan. No significant land use changes or significant development is expected in this reach.

Cowlitz 36 – City

Current Land Use: Cowlitz 36 consists primarily of forested riparian land, with the exception of the I-5 bridges at its southern extent. The Grade Street Bridge in this reach is an overwater structure. This reach is designated with CSR – Special Retail District zoning in the City of Kelso.

Water-dependent Uses and Water-related Uses: There are no water-oriented uses in this reach.

Future Land Use: A portion of the land in this reach is designated as Commercial use, consistent with current zoning and a portion shows no designation within the comprehensive plan. There is a large undeveloped area

within this reach with commercial zoning that may be suitable for future commercial development growth. No plans are known at this time.

Cowlitz 37 – City

Current Land Use: This reach along the south shore of the Coweeman River includes approximately five medium density single family residences, with at least one private floating dock to access the water. Cowlitz 37 includes another I-5 crossing as well as a local road bridge crossing at S. Kelso Road. North of S. Kelso Road, the reach is primarily undeveloped with shrubs/grasses along the shoreline. This reach is designated with RSF-15- Residential Single Family and RSF 10 – Residential Single Family zoning in the City of Kelso.

Water-dependent Uses and Water-related Uses: The private residential access docks within this reach are accessory water-dependent uses.

Future Land Use: Land in this reach is designated with Low-Density Residential and Commercial uses in the Comprehensive Plan, primarily consistent with current zoning. There are several undeveloped residential lots, but no significant growth or use changes are anticipated.

Cowlitz 38 – City

Current Land Use: This reach runs along the north side of the Coweeman River, with the levee and Coweeman River Trail continuing throughout the reach. There is a commercial restaurant use at the southern extent of the reach and a bridge crossing at Grade Street. To the northeast of Grade Street up to the I-5 bridges, the land is undeveloped. Near I-5, the shoreline jurisdiction also includes portions of local roads, parking lots and a commercial building. The Grade Street Bridge in this reach is an overwater structure. This reach is designated with RMF – Residential Multi-Family and CMR – Major Retail Area zoning in the City of Kelso.

Water-dependent Uses and Water-related Uses: There are no water-dependent uses in this reach. The Coweeman River Trail provides a water- enjoyment opportunity on the shoreline.

Future Land Use: Land in this reach is designated with Commercial use in the comprehensive plan, primarily consistent with current zoning. There are no vacant parcels in this reach and no use changes or significant growth is anticipated.

Cowlitz 39 – City

Current Land Use: The levee and Coweeman River Trail continue through the Cowlitz 39 reach along the north shore of the Coweeman River. The shoreline jurisdiction is expanded at the west end of this reach and includes the majority of a baseball field that is part of Tam O'Shanter Park. The shoreline jurisdiction primarily includes the levee and trail, but in places within this reach it also includes a sliver of the upland recreation field that is part of Tam O'Shanter Park. The trail can be accessed from Tam O'Shanter Park, but there is no direct river access.

This reach appears to have slivers of unincorporated Cowlitz County along the river side of the shoreline. The S. Kelso Road Bridge in this reach is an overwater structure. This reach is designated with RMF – Residential Multi-Family and OPN – Open Space zoning in the City of Kelso.

Water-dependent Uses and Water-related Uses: There are no water-dependent uses in this reach. The Coweeman River Trail provides a water- enjoyment opportunity on the shoreline.

Future Land Use: Land in this reach is primarily designated with Parks/Open Space use in the comprehensive plan, with a small portion of Commercial designation. The commercial area is currently zoned for multi-family residential uses, inconsistent with the Comprehensive Plan, however the current use is recreation, so no use changes are anticipated and no growth is anticipated in this reach.

Cowlitz 40 – UGA

Current Land Use: This reach contains a very thin strip of land that is within unincorporated Cowlitz County along the north and south banks of the Coweeman River along Cowlitz 39 and Cowlitz 37. This land is primarily undeveloped with a small portion of a residential use adjacent to Cowlitz 37. A portion of the Coweeman River Trail may be within Cowlitz 40. There is a portion of one 3.06 acre parcel in this reach, with a depth of 55.7 feet and a width of 48.4 feet. There are no buildings in this reach and no impervious surface. This reach is not included in City of Kelso zoning.

Water-dependent Uses and Water-related Uses: There are no water-dependent uses in this reach. The Coweeman River Trail provides a water- enjoyment opportunity on the shoreline.

Future Land Use: Land in this reach is designated with Parks/Open Space use in the Kelso Comprehensive Plan and the areas outside of the city limits have no future land use designation. No future growth or use changes are anticipated.

Cowlitz 41 – UGA

Current Land Use: This small reach includes undeveloped land including the dike and trail riverward of a mobile home park in unincorporated Cowlitz County. It only includes land within the UGA, not within the city limits. This reach is not included in City of Kelso zoning.

Water-dependent Uses and Water-related Uses: There are no water-dependent uses in this reach. The Coweeman River Trail provides a water- enjoyment opportunity on the shoreline.

Future Land Use: Land within this reach is not included in the Kelso Comprehensive Plan. No significant use changes or development are anticipated.

Cowlitz 42 – City

Current Land Use: Reach 42 includes the levee and Coweeman River Trail to their termini. The reach consists of the edge of a large mobile home park. Users are able to access the trail at the top of the dike at Allen Street. The shoreline also includes two small tributaries. This reach is designated with RMF – Residential Multi-Family zoning in the City of Kelso.

Water-dependent Uses and Water-related Uses: There are no water-dependent uses in this reach. The Coweeman River Trail provides a water- enjoyment opportunity on the shoreline.

Future Land Use: Land within this reach is designated with High-Density Residential use in the Comprehensive Plan. No future use changes or significant development is anticipated in this reach.

Cowlitz 43 – UGA

Current Land Use: Uses in this reach include low-density residential and undeveloped land within unincorporated Cowlitz County. There is one private dock overwater structure in this reach. This reach is not included in City of Kelso zoning.

Water-oriented Uses: The private residential access dock within this reach is an accessory water-dependent use.

Future Land Use: Land within this reach is not included in the Kelso Comprehensive Plan. There are several parcels identified as vacant within this reach that may be suitable for future low-density residential development, however no use changes or significant growth is anticipated.

Cowlitz 44 – UGA

Current Land Use: This is a large reach that exists along the north and south shores of the Coweeman River in unincorporated Cowlitz County, to the east of the city limits. It includes a large wetland area south of the river. Land in this reach is undeveloped or in agricultural uses. Note that this reach includes a small, non-contiguous piece of land north of Allen Street along a small tributary to the Coweeman River. This area is also undeveloped. This reach is not included in City of Kelso zoning.

Water-dependent Uses and Water-related Uses: There are no water-oriented uses in this reach.

Future Land Use: Land within this reach is not included in the Kelso Comprehensive Plan. No use changes or significant growth is anticipated in this reach.

Cowlitz 45 – UGA

Current Land Use: This reach includes low-density residential and agricultural uses to the north of the shoreline jurisdiction. The majority of the land within shoreline jurisdiction directly adjacent to the river is partially forested. This reach is within unincorporated Cowlitz County and is not included in City of Kelso zoning.

Water-dependent Uses and Water-related Uses: There are no water-oriented uses in this reach.

Future Land Use: Land within this reach is not included in the Kelso Comprehensive Plan. No use changes or significant growth is anticipated in this reach.

Cowlitz 46 – UGA

Current Land Use: This small reach in unincorporated Cowlitz County consists of the southern edge of the large wetland complex described in Cowlitz 44, consisting of some open grassy areas and some shrubby areas. This reach is not included in City of Kelso zoning.

Water-dependent Uses and Water-related Uses: There are no water-oriented uses in this reach.

Future Land Use: Land within this reach is not included in the Kelso Comprehensive Plan. No use changes or significant growth is anticipated in this reach.

5.11 City of Woodland and UGA

The City of Woodland is located on the lower North Fork Lewis River, approximately 2 miles upstream of the confluence with the East Fork Lewis River and 5 miles upstream from the confluence with the Columbia River. The City of Woodland also includes shorelines on Horseshoe Lake, an 85 acre historic oxbow that was isolated from the Lewis River when Interstate 5 was constructed in 1940. In total, the assessment unit includes 237 acres of shoreline jurisdiction.

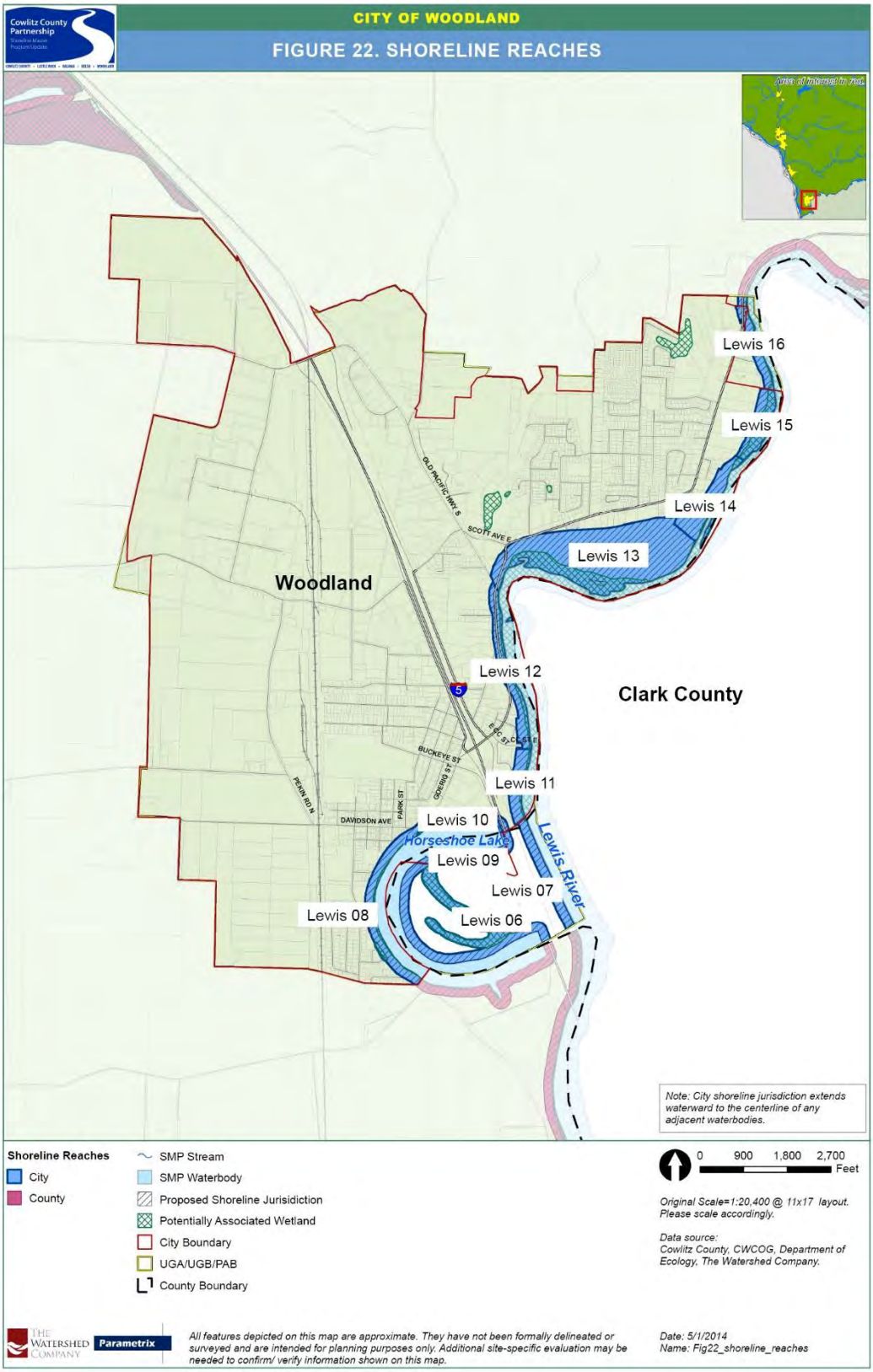


Figure 5-32. Map of City of Woodland shoreline jurisdiction.

5.11.1 Ecological Characterization

Critical Areas

The NWI identifies wetlands on approximately 24 percent of shoreline jurisdiction. A levee separates Horseshoe Lake from the Lewis River, and the levee extends north to Lewis Reach 12. Nearly half of the total shoreline area is within the mapped floodplain, 33 percent of which falls within the floodway. The majority of the floodway area occurs in Reach 13 and Reach 15. In addition to listed salmonids using the Lewis River, priority species in the City include a bald eagle's nest in Lewis Reach 15. Horseshoe Lake is isolated from anadromous fish use, but the lake is stocked with rainbow trout and brown trout for recreational fishing opportunities.

Reach Scale Functions

The City's northern shoreline area (Reaches 13-15) includes riparian vegetation and off-channel backwater habitats. Large woody debris is present in the backwater habitats, and is occasionally present along riparian habitats in the mainstem river. Mid-channel islands are vegetated with early colonizing shrubs and trees, providing instream habitat complexity. Reaches 13 and 15 provide the most densely vegetated forested shoreline in the City. These reaches also provide some of the highest functioning reach for hydrologic processes in the City because they provide hydrologically connected floodway areas (Table 5-41).

Riparian vegetation is limited in the City's core downtown area. The levee that separates Reach 12 from the River acts to channelize the River through the City's core area.

The City's shoreline on Horseshoe Lake is developed with roads, parks, and residential and commercial development. At least eighteen overwater structures are present on Horseshoe Lake, associated with existing residential development (Table 5-42).

Table 5-41. Functional scores for reaches in City of Woodland Assessment Unit.

Waterbody	City/UGA	Label	Hydrologic Overall	Hyporheic Overall	Habitat Overall	Vegetative Overall
Horseshoe Lake	UGA	Lewis 06	1		4	3
Lewis River		Lewis 07	1	4	4	3
Horseshoe Lake	City	Lewis 08	3		2	3
		Lewis 09	2		2	2
		Lewis 10	2		2	2

Waterbody	City/UGA	Label	Hydrologic Overall	Hyporheic Overall	Habitat Overall	Vegetative Overall
Lewis River	City	Lewis 11	1	4	3	3
		Lewis 12	1	3	2	2
		Lewis 13	3	4	4	4
		Lewis 14	3	4	4	4
		Lewis 15	3	4	4	4
		Lewis 16	2	3	2	3

Table 5-42. Summary of reach characteristics in the City of Woodland Assessment Unit.

			Average Conditions by Parcel						Total by Reach		
Waterbody	City/ UGA	Reach Label	Parcel Size (acre)	Parcel Width (ft)	Parcel Depth (ft)	Shoreline Setback (ft)	Average Depth of Vegetated Area (ft)	Vegetated Condition	Overwater Structures	Shoreline Armoring %	Impervious %
Horseshoe Lake	Clark Co. UGA	Lewis 06	79	N/A	N/A	850	800	5	0	0	<1
Horseshoe Lake	Clark Co. UGA	Lewis 07	39.8	1,496.5	1,022.6	154.7	876.4	3.8	0	0	3
Horseshoe Lake	Clark Co. UGA	Lewis 09	2.23	325.9	127.3	149.5	60.4	1.9	18	0	8
Horseshoe Lake	City	Lewis 08	0.6	102.0	77.2	123.8	55.5	1.7	10	4	23.6
		Lewis 10	4.5	747.1	117.1	69.8	121.5	2	0	94	24
		Lewis 11	1.8	279.7	99.7	343.6	32.8	1.5	0	0	17
		Lewis 12	1.4	220.6	87.5	178.3	71.5	3	0	0	30
		Lewis 13	1.2	158.4	203.3	671.3	262.4	2.1	0	0	6
		Lewis 14	0.5	93.6	173.6	154.8	181.6	1.8	2	15	12
Lewis River		Lewis 15	4.7	264.2	146.4	328.4	554.9	1.9	0	0	2
		Lewis 16	1.1	149.3	137.6	112.6	86.9	1.9	3	30	12

Restoration Opportunities

There are several restoration sites available within the City of Woodland. The areas zoned for floodway are the most obvious areas for restoration and are generally found in the Lewis 13, 14 and 15 reaches. There are also restoration opportunities to found south of the CC Street Bridge within the floodway. In this location there are lots of invasive species and informal camping.

5.11.2 Land Use Characterization

Future Land Use (Assessment Unit Analysis)

The area of vacant lands and land designated as undeveloped decreased over the past ten years (Table 5-43). The area designated as multi-family residential use decreased by four acres, while single family uses increased by three acres. Based on these past trends in land use, continued gradual infill of single family residential development is anticipated. Growth in multi-family residential development is not expected in the foreseeable future.

Table 5-43. City of Woodland Assessment Unit: significant land use change 2002-2012.

Category	2002		2012		Change in Percent of Total Acres
	Category Acres	Percent of Total Acres	Category Acres	Percent of Total Acres	
Vacant	70 ac.	50.2%	64 ac.	50.4%	-0.2%
Undeveloped	77 ac.	55.7%	68 ac	54.1%	-1.6%
Single Family Residential	23 ac.	16.8%	26 ac.	20.2%	+3.4%
Multi-Family Residential	14 ac.	10.2%	10	7.6%	-2.6%

Permits within City of Woodland shoreline jurisdiction back to 2002 were obtained from the City of Woodland and reviewed for applicability. Permits with a use change, new development or significant expansion of an existing use are included in Table 5-44. These permits indicate that development of residential, including subdivision of land, and transportation uses and ongoing dredging and dredge disposal has occurred.

If similar land use and permit trends continue in the future, gradual expansion of single family residential uses is likely to continue in the City.

Table 5-44. Ten-year permit history in the City of Woodland.

Reach	Permit Application	Activity	Location
Lewis 06 – Clark County – Horseshoe Lake	No substantial activity		
Lewis 07 –Clark County – Horseshoe Lake	No substantial activity		
Lewis 08 – City – Horseshoe Lake	202-933	Street reconstruction (Davidson & Goerig, from 5th to Bozarth)	S24, T5N,R1W
	210-925	Rocks to bolster road embankment	in ROW, E of S Pekin, SE of intersection of S Pekin & Windflower, and NE of 449 Windflower Dr.
	211-903	Construct 300' of sidewalk on W side of S Pekin Rd.	155 S Pekin Rd, parcel 5078
	204-907	Street reconstruction	Dunham Ave.
	205-920	3 lot subdivision	201 S Pekin Road
	205-947	Harmony Park, 21 lot subdivision.	East of the BNSF, west of S Pekin Rd adjacent to Horseshoe Lake
	214-911	Safe Route to School (sidewalk construction)	South Pekin
	213-935	Lilac Lane Subdivision (proposed 12 lot subdivision)	Approx. 106/110 South Pekin
Lewis 09 – Woodland UGA/Clark County – Horseshoe Lake	203-931	Bulkhead and floating dock	354 Island Aire Dr, parcel 5-0645-515-039
	205-932	Retaining wall + fill placed behind retaining wall (Applicant ordered to remove retaining wall and all fill brought in.)	442 Island Aire Drive
Lewis 10 – City – Horseshoe Lake	202-933 (also in Lewis 8)	Street reconstruction (Davidson & Goerig, from 5th to Bozarth)	S24, T5N,R1W
	205-929	Outdoor skate park	Horseshoe Lake Park, S24, T5N, R1W, W.M.
Lewis 11 – City –Lewis River	No substantial activity		
Lewis 12 – City –Lewis River	204-908	Lewis River bridge seismic rehabilitation	CC Street, S19, T5N, R1E
	206-941	Ranney Well/Pump Replacement	1380 Lewis River Rd., parcel 5-056401.
	209-926	Establish resturant in with tavern, demo existing single family dwelling.	1382 N Goerig, parcel 5-0564

Reach	Permit Application	Activity	Location
	213-930	Ranney Well Improvements (new laterals / cleaning of existing laterals)	1380 Lewis River Road
	213-923	Woodport Place duplexes (constructing 6 new duplex buildings)	1489 Goerig
Lewis 13 – City –Lewis River	206-918	Riverwood Short Plat. 4 lots	1772 Lewis River Rd
	206-904	Lewis River Front Park #4, 2.93 acres for 14 lot PURD.	1874 Lewis River Rd.
Lewis 14 – City –Lewis River	No substantial activity		
Lewis 15 – City –Lewis River	205-942	109 lot subdivision (Riverview Residential)	2215 Lewis River Road, between the State Highway and the Lewis River
Lewis 16 – City –Lewis River	No substantial activity		

Potential Use Conflicts

Woodland currently has no water-oriented uses except for public recreation areas on Horseshoe Lake. The commercial areas along the Lewis River and Horseshoe Lake are likely to provide some water-oriented uses as well as ecological enhancement and public access. These areas are largely abutted by commercial areas which are not likely to present use conflicts.

Transportation and Utilities

The majority of the transportation routes within the City of Woodland shoreline jurisdiction areas are local roads. The exceptions are where I-5 travels adjacent to Horseshoe Lake and where Lewis River Road (SR 503) travels parallel to the Lewis River through reach Lewis 12 and a small portion of reach Lewis 13. There are no railroads within shoreline jurisdiction. A portion of the Woodland State Airport is adjacent to Lewis 07.

Existing and Potential Public Access

Public access is described for each reach in the City of Woodland and its unincorporated UGA in Table 5-45 below.

Table 5-45. Public access opportunities in the Woodland Assessment Unit.

Reach	Potential Public Access Description
Lewis 07	Informal fishing access on state airport property
Lewis 09	Informal fishing/ swimming location at start of Island Aire Drive

Lewis 10	Horseshoe Lake Park – this is a public Park with public boat ramp, adjacent amphitheater, skatepark and picnic shelters
Lewis 12	Informal fishing/ swimming location accessed Goerig St and Cherry Blossom Lane
Lewis 13	Informal fishing/ swimming location accessed from southern end of Gun Club Road
Lewis 15	Informal fishing/ swimming location accessed from businesses on McCracken Road.

Reach Scale Analysis of Current Land Use, Water-dependent and Water–related uses, and Future Land Use

Lewis 06 – Clark County – Horseshoe Lake

Current Land Use: This reach is almost entirely made up of one large-lot single-family residential parcel (255196000). This parcel occupies the vast majority of land acreage inside of Horseshoe Lake. With the exception of the residential structure, the remainder of the parcel (including the shoreline) is undeveloped. The remainder of the reach occupies local street and Interstate 5 right-of-way. The parcel is 79 acres in size. The single building setback is 850 feet from the southern shore, which is the nearest to the house. Much less than 1 percent of the parcel area for this reach is impervious surface. The shoreline vegetated area depth is 800 feet between the house and the southern shore with a vegetated condition score of 5. The shoreline is not armored within this reach, and there are no overwater structures. This area is not included in City of Woodland zoning.

Water-dependent Uses and Water-related Uses: There are no water-related or water-dependent uses in this reach.

Future Land Use: The Comprehensive Plan includes low-density uses within this reach, but does not include areas along Interstate 5 right-of-way. It is anticipated that this area will not see much new development in the future, though the addition of some new residential dwellings is possible.

Lewis 07 –Clark County – Horseshoe Lake

Current Land Use: The west half of this reach resides in local street and I-5 right-of-way. The east half of this reach is exclusively made up of a state-owned parcel that encompasses a runway at Woodland State Airport and associated airport property. The land closest to the shoreline is not within any tax lot. The airport parcel is 39.75 acres, average width is 1,496.5 feet, and average depth is 1,022.6 feet. The average building setback is 154.7 feet, and 3 percent of the parcel area for this reach is impervious surface. Shoreline vegetated area depths range from

294.9 feet to 1,585.8 feet, with an average depth of 876.4 feet. The average condition score of the vegetated area, as estimated from aerial photos, is 3.8. The shoreline is not armored within this reach, and there are no overwater structures. This area is not included in City of Woodland zoning.

Water-dependent Uses and Water-related Uses: There are no water-related or water-dependent uses in this reach.

Future Land Use: The extreme southwest portion of the west half of the reach is envisioned as low-density residential. However, this portion of the reach is almost entirely street and highway right-of-way. On the east half, the Comprehensive Plan includes public/institutional uses within this reach, referring to the continued operation of the airport. Multi-building commercial development is expected in this area between the airport and CC Street.

Lewis 08 – City –Horseshoe Lake

Current Land Use: The south half of this reach is predominantly single-family detached residential, several of which back onto the lake and include docks for personal boats. The north half is more mixed with retail, offices/services, an apartment complex, street right-of-way and civic uses. There are vacant properties throughout the entire reach, but are more prevalent in northern half. Much of the shoreline, including a parking lot and driveway access for businesses along Davidson Ave, is not within any tax lot. Shoreline vegetated area depths range from 61.1 feet to 183.9 feet, with an average depth of 55.5 feet. The average condition score of the vegetated area, as estimated from aerial photos, is 1.74. The shoreline is not armored within this reach though there are numerous small boat docks. This reach is designated with LDR-8.5- Low-density Residential, LDR-6- Low-density Residential, HDR- High Density Residential, and C-1- Central Business District zoning in the City of Woodland.

Water-dependent Uses and Water-related Uses: There are accessory water-dependent uses such as private in-water structures (docks) used presumably for recreation within single-family residential parcels.

Future Land Use: The Comprehensive Plan includes low-density residential, high-density residential and commercial uses within this reach. Land closest to the shoreline is not given a plan designation. Much of this area is built out with single family but there are some parcels that may see redevelopment in the future, likely to low to medium residential uses.

Lewis 09 – Woodland UGA/Clark County – Horseshoe Lake

Current Land Use: This reach occupies the developed northern shore of the peninsula surrounded by Horseshoe Lake. It includes a city-owned storage warehouse, manufactured park, several single-family residences, vacant land, and private road right-of-way. It also includes road right-of-way not within any parcel. Shoreline vegetated area depths range from 9.4 feet to 226 feet, with an average depth of 60.4 feet. The average condition score of the vegetated area, as estimated from aerial photos, is 1.9. The shoreline is not armored within this reach. There are, however, numerous boat docks at the parcels off Island Aire Drive. The majority of this reach is not zoned by the City of Woodland because it is within the UGA and is not annexed. It lies within Clark County jurisdiction; however, a portion is designated with LDR-6- Low-density Residential.

Water-dependent Uses and Water-related Uses: There are only accessory water-related structures uses (docks at single-family residential parcels).

Future Land Use: The Comprehensive Plan includes low-density uses within this reach, but does not include areas along Interstate 5 right-of-way. This reach is unlikely to see much, if any land use changes in the future since it is currently fully developed with single family residential uses.

Lewis 10 – City –Horseshoe Lake

Current Land Use: This reach is entirely encompassed by Horseshoe Lake Park with the exception of one office/retail establishment. It includes a covered picnic area, playground, gazebo, public lake access and the Rolling Freedom skate park. The reach also includes shoreline not within any tax lot, including land closest to Horseshoe Lake as well as right-of-way for Lakeshore Drive and Interstate 5. One parcel is nearly 9 acres, and the other is less than one tenth of an acre. The average shoreline vegetated area is 243 feet with an average condition score of 2. The shoreline is armored within this reach, and there are no overwater structures. A small portion of this reach is designated C-1- Central Business District zoning, while the remainder, comprised on Horseshoe Lake Park is designated with P/Q – P/I in the City of Woodland.

Water-dependent Uses and Water-related Uses: Horseshoe Lake Park is open for swimming, fishing, canoeing, and kayaking and as such is a water-enjoyment use.

Future Land Use: The Comprehensive Plan includes public/institutional uses within this reach. Land closest to the shoreline is not given a plan designation. Given the park and the institutional uses within this reach, no new development is expected.

Lewis 11 – City –Lewis River

Current Land Use: The parcels within this reach consist of Woodland State Airport and associated uses and services. There is an adjacent medium-size vacant parcels are also within this reach. Much of the shoreline is not within any tax lot. Shoreline vegetated area depths range from 19.7 feet to 45.8 feet, with an average depth of 32.75 feet. The average condition score of the vegetated area, as estimated from aerial photos, is 1.5. The shoreline is not armored within this reach, and there are no overwater structures. The northern half of this reach is designated with C-2- Highway Commercial/Light Industrial zoning while the remainder has no zoning designation in the City of Woodland.

Water-dependent Uses and Water-related Uses: There areb no water-related or water-dependent uses in this reach.

Future Land Use: The Comprehensive Plan includes public/institutional and commercial uses within this reach. Portions of the shoreline are not given any planning designation. There is likely to be some new commercial uses within this reach given the vacant commercial parcel and proximity to I-5. There is a site plan for an area between the state airport and CC Street for a multi-building retail commercial development that covers over 5 acres.

Lewis 12 – City –Lewis River

Current Land Use: There are various commercial uses in the south half of this reach including mobile home park, motel, fast food restaurants, a single residence, strip retail, grocery store, office, and bar. Further north, there are more residential uses, including single-family detached and apartments, as well as a moderately sized vacant parcel, retail store and an office west of Goerig Street. East of Goerig, there is a public/semipublic access point to the river at Cherry Blossom Lane, vacant parcels and street ROW along Lewis River. Portions of the shoreline are not within any tax lot. Shoreline vegetated area depths range from 33.8 feet to 323.7 feet, with an average depth of 71.5 feet. The average condition score of the vegetated area, as estimated from aerial photos, is 3. The shoreline is not armored within this reach, and there are no overwater structures. This majority of this reach is designated with C-2- Highway Commercial/Light

Industrial zoning, with smaller areas of LDR-6- Low-density Residential and HDR- High Density Residential.

Water-dependent Uses and Water-related Uses: The river access point represents a water-dependent use.

Future Land Use: The Comprehensive Plan includes commercial, high-density residential, and low-density residential uses within this reach. There is likely to be new commercial development in this reach in the future as there have been various development scenarios for the existing shopping center. In the long-term, the mobile home park may redevelop to a new residential use.

Lewis 13 – City –Lewis River

Current Land Use: There is diking and street ROW along east side of Goerig Street, with residential, office and a fabricated metal plant located to the north and east. Along the south side of Lewis River Road, there are single-family residences, apartments, street ROW, several medium-size vacant parcels, a mobile home park and two churches. A farm may have once been located between Insel Road and Valley Way, and there are several access points to the river through private property. A large portion of wetlands is not within any tax lot parcel. Shoreline vegetated area depths range from 12.4 feet to 1,360.9 feet, with an average depth of 262.4 feet. The average condition score of the vegetated area, as estimated from aerial photos, is 2.1. The shoreline is not armored within this reach, and there are no overwater structures. This reach is designated with a large area of FW- Floodway Use District zoning surrounding an area of P/Q – P/I zoning. Other, less prominent designations include MDR – Medium Density Residential and HDR- High Density Residential, and very small areas of C-3- Neighborhood Commercial, I-1- Light Industrial and LDR-6- Low-density Residential.

Water-dependent Uses and Water-related Uses: The river access point constitutes a water-dependent use in this reach.

Future Land Use: The Comprehensive Plan includes light industrial, commercial, high-density residential, low-density residential, floodway/open space and public/institutional uses within this reach. Portions of the shoreline are not given any planning designation. There is unlikely to be any new development in this reach due to the large amount of Floodway zoning.

Lewis 14 – City –Lewis River

Current Land Use: There are subdivided residential plots that include built homes and vacant parcels along Misty Drive and Court. There are also single family residential uses along Brothers and MacKenzie Roads. Some parcels do not extend entirely to the shoreline. Shoreline vegetated area depths range from 48.3 feet to 471.2 feet, with an average depth of 181.5 feet. The average condition score of the vegetated area, as estimated from aerial photos, is 1.8. The shoreline is slightly armored within this reach, and there are no overwater structures. This reach is designated with LDR-6- Low-density Residential, FW- Floodway Use District and LDR-7.2- Low-density Residential zoning in the City of Woodland.

Water-dependent Uses and Water-related Uses: There are several single-family residences that back onto the river and include in-water recreational structures (either piers or docks) that constitute an accessory water-dependent use.

Future Land Use: The Comprehensive Plan includes floodway/open space and low-density residential uses in this reach. Portions of the shoreline are not given any planning designation. Some additional homes may be added to the existing subdivision within this reach, but otherwise little new development is expected.

Lewis 15 – City –Lewis River

Current Land Use: There are several large vacant parcels in this reach as well as one single-family residence on a large-acre parcel. A large portion of wetlands is not within any tax lot parcel. Shoreline vegetated area depths range from 52.6 feet to 1036.90 feet, with an average depth of 554.9 feet. The average condition score of the vegetated area, as estimated from aerial photos, is 1.9. The shoreline is not armored within this reach, and there are no overwater structures. This reach is designated with LDR-6- Low-density Residential and LDR-7.2- Low-density Residential zoning in the City of Woodland.

Water-dependent Uses and Water-related Uses: There are no water-dependent or water-related uses in this reach.

Future Land Use: The Comprehensive Plan includes low-density residential uses in this reach but does not include land located closest to the shoreline. New low-density residential development is expected in this area in the future but would occur outside of shoreline jurisdiction.

Lewis 16 – City –Lewis River

Current Land Use: There are two vacant parcels, several single family residences, a mobile home and a bed and breakfast. The bed and breakfast and at least two residences include a dock for personal boats on the river. Portions of the shoreline are not within any tax lot. Shoreline vegetated area depths range from 24.4 feet to 178.8 feet, with an average depth of 86.9 feet. The average condition score of the vegetated area, as estimated from aerial photos, is 1.9. The shoreline is limitedly armored within this reach, and there are a small number of boat docks. This reach is not zoned by the City of Woodland.

Water-dependent Uses and Water-related Uses: There are several single-family residences, as well as a bed and breakfast that back onto the river and include in-water recreational structures (either piers or docks) that constitute an accessory water-dependent use.

Future Land Use: The Comprehensive Plan includes low-density residential uses in this reach. Some new low-density residential development is expected in this area when this area is annexed to the City of Woodland.

5.12 Restoration Opportunities Applicable to All Assessment Units

The Lower Columbia Salmon Recovery and Fish and Wildlife Subbasin Plan (2010) identified several actions applicable to each of the subbasins within Cowlitz County. Some of these actions apply to programs or regulations, while others relate to projects that could be implemented at many sites throughout the watershed (Table 5-46).

Table 5-46. Restoration opportunities applicable to all Assessment Units.

	Action	Status	Entity
Land Use Planning/Regulations	Expand standards in local government comprehensive plans to afford adequate protections of ecologically important areas (i.e. stream channels, riparian zones, floodplains, CMZs, wetlands, unstable geology)	Expansion of existing program	County, Cities
	Manage future growth and development patterns to ensure the protection of watershed processes. This includes limiting the conversion of agriculture and timber lands to developed uses through zoning regulations and tax incentives (consistent with urban growth boundaries)	Expansion of existing program	County, Cities
	Prevent floodplain impacts from new development through land use controls and Best Management Practices	New program	County, Cities, Ecology

	Action	Status	Entity
	Fully implement and enforce the Forest Practices Rules (FPRs) on private timber lands in order to afford protections to riparian areas, sediment processes, runoff processes, water quality, and access to habitats	Activity is currently in place	WDNR
	Conduct forest practices on state lands in accordance with the Habitat Conservation Plan in order to afford protections to riparian areas, sediment processes, runoff processes, water quality, and access to habitats	Activity is currently in place	WDNR
	Review and adjust operations to ensure compliance with the Endangered Species Act; examples include roads, parks, and weed management	Expansion of existing program	County, Cities
Funding/ Technical Assistance	Increase funding available to purchase easements or property in sensitive areas in order to protect watershed function where existing programs are inadequate	Expansion of existing program	LCFRB, NGOs, WDFW, USFWS, BPA (NPCC)
	Increase technical assistance to landowners and increase landowner participation in conservation programs that protect and restore habitat and habitat-forming processes. Includes increasing the incentives (financial or otherwise) and increasing program marketing and outreach	Expansion of existing program	NRCS, C/WCD, WDNR, WDFW, LCFEG, County, Cities
	Increase technical support and funding to small forest landowners faced with implementation of Forest and Fish requirements for fixing roads and barriers to ensure full and timely compliance with regulations	Expansion of existing program	WDNR
Protection/Restoration Projects	Create and/or restore lost side-channel/off-channel habitat for chum spawning and coho overwintering	New program	LCFRB, BPA (NPCC), NGOs, WDFW, NRCS, C/WCD
	Implement the prescriptions of the WRIA Watershed Planning Units regarding instream flows	Activity is currently in place	Ecology, WDFW, WRIAs, County, Cities
	Increase the level of implementation of voluntary habitat enhancement projects in high priority reaches and subwatersheds. This includes building partnerships, providing incentives to landowners, and increasing funding	Expansion of existing program	LCFRB, BPA (NPCC), NGOs, WDFW, NRCS, C/WCD, LCFEG
	Protect and restore native plant communities from the effects of invasive species	Expansion of existing program	Weed Control Boards (local and state); NRCS, C/WCD, LCFEG
	Assess the impact of fish passage barriers throughout the basin and restore access to potentially productive habitats	Expansion of existing program	WDFW, WDNR, County, Cities, WSDOT, LCFEG

6 SHORELINE MANAGEMENT OPTIONS AND RECOMMENDATIONS

The following are potential actions for translating inventory and characterization findings into the draft SMP policies, regulations, environment designations, and restoration strategies for areas within shoreline jurisdiction. In addition to the following analysis-specific recommendations, the updated SMPs will incorporate all other requirements of the Shoreline Management Act (RCW 90.58) and the Shoreline Master Program Guidelines (WAC 173-26).

6.1 Environment Designations

6.1.1 Background

As outlined in WAC 173-26-191(1)(d), "Shoreline management must address a wide range of physical conditions and development settings along shoreline areas. Effective shoreline management requires that shoreline master programs prescribe different sets of environmental protection measures, allowable use provisions, and development standards for each of these shoreline segments." In WAC 173-26-211(2)(a), the Guidelines further direct development and assignment of environment designations based on "existing use pattern, the biological and physical character of the shoreline, and the goals and aspirations of the community as expressed through comprehensive plans…" (note: The methodology discussion in Section 6.1.2 below describes how the function analysis scores presented in the *Shoreline Analysis Report* may be considered in assigning preliminary designations.)

The current SMP utilizes a system of four Shoreline Management Districts: Natural, Conservancy, Rural, and Urban. Descriptions and objectives for each are provided in Table 6-1 below. The shoreline environment designation map may no longer provide the best fit with the existing biological and land use character or the community's vision as expressed in the latest Comprehensive Plan.

The Guidelines provide for six environment designations: Aquatic, Natural, Urban Conservancy, Rural Conservancy, Shoreline Residential, and High-Intensity. However, each jurisdiction may use alternate environment designations, as appropriate, as long as they provide equal or better protection than the standard. In cities and Urban Growth Areas (UGAs), consideration of shoreline designations that parallel local zoning classifications also may provide

for greater integration of regulatory requirements between upland areas and areas within shoreline jurisdiction.

Table 6-1, below summarizes Ecology's suggested criteria for each of their designations, and shows the approximate correlation between the County's existing system and Ecology's system.

Table 6-1. Comparison of existing and ecology shoreline environment designations.

Existing County Designation	Summary of County Designation Purpose and Criteria	Ecology Designation	Summary of Ecology's Designation Purpose and Criteria (WAC 173-26-211)	Comparison
Urban	Description: "Those shoreline areas suitable for intensive recreation, residential, industrial, and commercial development." Objective: "To identify those defined areas which are currently in such use and potentially capable of such use to satisfy the socio-economic needs of the present and future population of the county."	Several Ecology designations fit this description. Most appropriate may be High Intensity, but others to consider include Shoreline Residential and Urban Conservancy	High Intensity: Purpose: "to provide for high-intensity water-oriented commercial, transportation, and industrial uses…" Criteria: "shoreline areas within incorporated municipalities, urban growth areas, and industrial or commercial 'rural areas of more intense development'…if they currently support high-intensity uses related to commerce, transportation or navigation; or are suitable and planned for high-intensity water-oriented uses."	Compared to Ecology's High Intensity designation, the County's Urban designation includes a broader scope of uses (e.g. residential and recreational). Residential areas within UGA's and LAMIRDs could be designated as Shoreline Residential under Ecology's criteria. Similarly, recreational areas within similarly developed areas could be designated as Conservancy (Rural or Urban depending upon intensity of surrounding development). Separate commercial, industrial and multi-family shoreline environment designations could be designated to parallel local zoning provisions.
Natural	Description: "Those shoreline areas with unique natural features which would be severely affected by human intrusions." Objective: "To preserve those defined areas which should be relatively free of human impact."	Natural	Natural: Purpose: "…to protect those shoreline areas that are relatively free of human influence or that include intact or minimally degraded shoreline functions intolerant of human use. These systems	The County and Ecology's Natural designations are similar.

Existing County Designation	Summary of County Designation Purpose and Criteria	Ecology Designation	Summary of Ecology's Designation Purpose and Criteria (WAC 173-26-211)	Comparison
			require that only very low intensity uses be allowed..." Criteria: "…if any of the following characteristics apply: …shoreline is ecologically intact and therefore currently performing an important, irreplaceable function or ecosystem-wide process that would be damaged by human activity; …considered to represent ecosystems and geologic types that are of particular scientific and educational interest; …unable to support new development or uses without significant adverse impacts to ecological functions or risk to human safety."	
Rural	Description: "Those shoreline areas with soil and land areas suitable for intensive agriculture, capable of recreation site development, public access, and limited residential development." Objective: "To establish open spaces which will satisfy positive human needs for recreation, limit urban sprawl into areas beyond service capabilities, and preserve the limited agricultural resource base."	Rural Conservancy	Rural Conservancy: Purpose: "…to protect ecological functions, conserve existing natural resources and valuable historic and cultural areas in order to provide for sustained resource use…and provide recreational opportunities. Examples of uses that are appropriate…include low-impact outdoor recreation uses, timber harvesting on a sustained-yield basis, agricultural uses, aquaculture, low-intensity residential development and other natural resource-based low-intensity uses."	For the most part, Ecology's Rural Conservancy designation is very similar to the County's Rural designation. However, areas within UGA's and LAMIRDs could be designated as Urban Conservancy under Ecology's criteria.

Existing County Designation	Summary of County Designation Purpose and Criteria	Ecology Designation	Summary of Ecology's Designation Purpose and Criteria (WAC 173-26-211)	Comparison
			Rural Conservancy Criteria: "if any of the following characteristics apply: …currently supporting lesser-intensity resource-based uses, such as agriculture, forestry, or recreational uses, or is designated agricultural or forest lands…; …currently accommodating residential uses outside urban growth areas and incorporated cities or towns; …shoreline is supporting human uses but subject to environmental limitations, such as properties that include or are adjacent to steep banks, feeder bluffs, or flood plains or other flood-prone areas; …high recreational value or with unique historic or cultural resources; …shoreline has low-intensity water-dependent uses."	
Conservancy	Description: "Those shoreline areas endowed with resources which may be harvested and naturally replenished. Also, those areas which, through flooding, slide prone soils, or other natural parameters, are not suitable for intensive agriculture or high density human use." Objective: "To maintain those defined areas for a sustained yield philosophy of resource management, establish suitable areas for non-intensive agriculture uses, non-intensive	Rural Conservancy	Most similar to Rural Conservancy as outlined above.	The County's Conservancy and Ecology's Rural Conservancy designations are similar although the County's Conservancy designation would seem to be more restrictive to recreational uses and low intensity residential uses.

Existing County Designation	Summary of County Designation Purpose and Criteria	Ecology Designation	Summary of Ecology's Designation Purpose and Criteria (WAC 173-26-211)	Comparison
	recreation uses, and limited intensive public access."			
Other designations for consideration Urban Conservancy The County currently does not distinguish between urban and rural conservancy environment designations.		Urban Conservancy	Urban Conservancy Purpose: "…protect and restore ecological functions of open space, floodplain and other sensitive lands where they exist in urban and developed settings, while allowing a variety of compatible uses." Urban Conservancy Criteria: "appropriate and planned for development that is compatible with maintaining or restoring of the ecological functions of the area, that are not generally suitable for water-dependent uses and that lie in incorporated municipalities, urban growth areas, or commercial or industrial "rural areas of more intense development" if any of the following characteristics apply: … suitable for water-related or water-enjoyment uses; …open space, flood plain or other sensitive areas that should not be more intensively developed; … potential for ecological restoration; … retain important ecological functions, even though partially developed; or … potential for development that is compatible with ecological restoration."	The County's current Urban environment contains the closest resembling designation for Ecology's Urban Conservancy environment. An Urban Conservancy or similar type of designation may be appropriate for the incorporated cities and urban growth areas. A Rural Conservancy or similar type of designation may be appropriate for unincorporated areas. See discussion above under "Rural."

Existing County Designation	Summary of County Designation Purpose and Criteria	Ecology Designation	Summary of Ecology's Designation Purpose and Criteria (WAC 173-26-211)	Comparison
Residential The County currently does not distinguish a separate residential environment for areas of more intense residential development.		Shoreline Residential	Shoreline Residential Purpose: "…accommodate residential development and appurtenant structures that are consistent with this chapter… provide appropriate public access and recreational uses." Shoreline Residential Criteria: "inside urban growth areas, as defined in RCW 36.70A.110, incorporated municipalities, "rural areas of more intense development," or "master planned resorts," as described in RCW 36.70A.360, if they are predominantly single-family or multifamily residential development or are planned and platted for residential development."	The County's current Urban environment contains the closest resembling designation for Ecology's Shoreline Residential environment. A Shoreline Residential designation may be appropriate for the incorporated cities and urban growth areas. Additionally, unincorporated areas of more intense residential development, such as that along parts of Silver Lake, may warrant a similar type of designation. Designation of separate multi-family designations may be appropriate in cities and UGAs.
The County currently does not establish an aquatic environment.		Aquatic	Purpose: "…to protect, restore, and manage the unique characteristics and resources of the areas waterward of the ordinary high-water mark." Criteria: "…lands waterward of the ordinary high-water mark…may assign…to wetlands."	An Aquatic designation will need to be created to address all areas waterward of the ordinary high water mark.

Existing County Designation	Summary of County Designation Purpose and Criteria	Ecology Designation	Summary of Ecology's Designation Purpose and Criteria (WAC 173-26-211)	Comparison
Resource The Ecology designations in WAC 173-26-211 do not include a resource designation for agricultural and forest resource lands. Cowlitz County is currently developing its comprehensive plan and zoning regulations				

6.1.2 Methodology

It is difficult to describe a methodology for environment designation recommendations as there are very few firm rules. In general, the environment designation purpose and criteria will be utilized and further informed by the findings of this *Shoreline Analysis Report*, including the following typical data:

- Current land use
- Planned land use
- Ownership
- Wetlands
- Floodplains
- Vegetation
- Impervious surface
- Ecological function scores (provided in this *Shoreline Analysis Report*)

While current and future land use provide basic context for a given segment of land, recommended environment designations will not always correlate strongly with those parameters, particularly on currently undeveloped shoreline areas and shoreline areas with extensive critical areas (e.g., wetlands, floodways, channel migration zones, other geologically hazardous areas). Parcels are often quite large, and extend well beyond shoreline jurisdiction. For example, while the current land use code may indicate a single-family residential use, the actual development may not be in shoreline jurisdiction and would therefore not necessarily result in adverse impacts to shoreline condition.

Vegetation (including identification of wetlands) and impervious surface data provide better gauges of existing alteration level in shoreline jurisdiction, as well as the ecological function scores. For this reason, parcels that have a current or planned land use of residential (or other designation allowing alteration) may ultimately have a Conservancy, or even Natural environment shoreline designation if the function score is high and examination of aerial photos and specific data layers provides additional support. The parcel can still accommodate the use, perhaps even in shoreline jurisdiction, and satisfy the WAC requirements for consistency between the environment designations and the Comprehensive Plans (see WAC 173-26-211(3) for additional detail about consistency requirements).

In the Cities of Castle Rock, Kelso, Kalama and Woodland, current land use will be more strongly correlated with level of alteration and the resulting

environment designation because more often the entire parcel or a large portion of the parcel is in shoreline jurisdiction and the allowed level of development may already have occurred.

6.1.3 Recommendations

Based on the Background and Methodology outlined above, the following specific recommendations are provided for development and assignment of environment designations in the County and the Cities of Castle Rock, Kelso, Kalama and Woodland:

- It is recommended that the existing environment designations be updated with clear statements of purpose, designation criteria, and policies that incorporate any relevant elements of Ecology's system and eliminate any confusing criteria overlap, such as those related to objective intensities of recreational and residential land use. Additional environment designations should be considered to narrow the allowed uses as appropriate to the existing landscape. For consistency, consider utilizing Ecology's recommended designation system at a minimum. The Shoreline Master Program is required to be consistent with comprehensive planning and other development regulations as required by WAC 173-26-191(1)(e) and WAC 365-196-500. Consistency between shoreline environment designations and the local comprehensive plan is required by WAC 173-26-211(3) which notes that the comprehensive plan constitutes the underlying framework within which master program provisions should fit. The County is currently in the process of developing a comprehensive plan, the City of Kelso is updating its comprehensive plan, and the other cities have current comprehensive plans.
- Consider whether additional environment designations would be appropriate to further delineate unique areas that might warrant designation-specific use or modification regulations, such as levee corridors, waterfront parks, or port related uses.
- Substantively utilize inventory and characterization findings, such as GIS information and/or function scores, in this report to inform assignment of environment designations, as outlined in Methodology.

6.2 General Policies and Regulations

These recommendations do not constitute a full review of the County's SMP in meeting WAC Guidelines. Rather, the following discussions and recommendations are based upon the findings of this Shoreline Analysis Report and identify areas in the existing SMP which may need modification.

6.2.1 Archaeological and Historic Resources

- The findings of this Shoreline Analysis Report do not suggest a need for additional regulations beyond those mandated by the SMP Guidelines.

6.2.2 Critical Areas

- Consider whether the County's and Cities' critical areas regulations should be incorporated into the SMPs by reference or through direct inclusion (as an appendix or embedded within the master program). Either method of inclusion will likely require modification of the critical areas regulations to meet SMA criteria. For example, any exceptions, such as reasonable use, will need to be removed as the appropriate SMA process for such action is through the Shoreline Variance.
- The critical areas regulations will also need to be revisited to assess if changes are needed to:
    - "provide a level of protection of critical areas at least equal to that provided by the local government's critical areas ordinances adopted and thereafter amended pursuant to RCW 36.70A.060(2)."(RCW 90.58.090(4))
    - Accommodate water-oriented and other preferred uses, consistent with no net loss of ecological functions, which require an exception to buffer requirements for those elements of a use that must have direct access to the water.
- In particular, the County's existing fish and wildlife habitat conservation area buffers (150 feet for all Shorelines of the State) are based on a general classification system based on fish presence and not on the specific ecological conditions present in specific reaches.

Options for designation, rating and classification of critical areas.

- There is no universally accepted method for classifying rivers, streams, and lakes or related habitat areas for regulatory purposes. In Washington, there are a variety of classification systems used by different agencies based on specific regulatory needs. For example, Ecology classifies water types for the purposes of meeting water quality standards and employs a

system that emphasizes the use of the water and the requirements of the Federal Clean Water Act, while DNR employs a system based on forest practices needs.

- Washington DNR Stream Typing System. The DNR classification system was developed for forest practices and generally is based on the presence or absence of fish. This is the current system used in Cowlitz County. The designation of shorelines of the state as a separate classification is based primarily on the statutory limitations on forest practices within shorelines of statewide significance (in RCW 90.58.150) which allows only selective timber cutting. In general, the designation of streams over 20 cfs as a separate category may be relevant because of the wider range of processes provided in streams with higher flows, but the DNR designation is not based on the presence or absence of particular geomorphic processes or ecological functions.
- Fish Species and Lifestage Stream Classification System. The specific biological and ecological functions provided by individual streams differ substantially. Therefore, one potential classification system classifies stream reaches according to the fish species and lifestages present within the reach. The presence of salmonids in various life stages within a stream or river reach can indicate or infer information on the habitat quality and quantity of that specific reach. For example, if a headwater stream reach supports bull trout, it may indicate that riparian buffer conditions within that reach are relatively intact, and the buffers are of adequate size to provide for adequate moderation of water temperature and sediment filtration capability, because spawning bull trout require cool water and clean gravel. Likewise, a reach known to be occupied by spawning chum salmon can be assumed to be accessible to all other salmon species, because chum salmon are the least powerful swimmer of the salmon species. This approach could use the WDFW SalmonScape database to assign fish presence or life stage information. The database, however, is limited to information gained from field surveys and may not be accurate or complete for all stream reaches. The primary advantages of this system are in its biological and ecological relevance, coupled with a relatively complete, easily accessible database.

- Habitat Quality Based Classification System. A third type of classification system is based on ecological functions using known differences in habitat quality and limiting factors to classify streams. The relative quality and quantity of individual geophysical or habitat parameters have direct correlation to the ecological functions that a particular stream reach or subbasin provides. This approach would rely on review of available reports on habitat conditions and limiting factors to assign a classification system based on the relative ecological condition of a stream reach or subbasin. The primary advantage of such a classification system is that ecological relevance is built into the system. However, several major disadvantages are also present. For example, detailed, high-quality information on habitat quality is not available for many stream and lake reaches within the study area, and because different sources of information have used different methods for habitat evaluation. Available information, therefore, is not directly comparable. Furthermore, in many cases this approach would require reliance on best professional judgment to combine information on multiple ecological functions in order to classify a particular stream or subbasin. Most likely, the approach would be most practical to apply at a larger spatial scale, such as the subbasin or subwatershed level, which could potentially negate the benefits by blending ecological function.
- Landscape Assessment Options. An additional alternative approach is to focus on the variety of functions provided by particular elements within the landscape. The rationale for focusing on functions rather than the stream classification is to shift emphasis from a discrete element of the ecosystem, such as a stream, to a system of indicators that are integrated with other resource and habitat evaluations. Further, the current methodology relies on discrete stream evaluations. The alternative functional analysis would utilize structural components rather than particular features, such as streams, as the basis for units within sites. This also allows for a broader view of stream values that provides opportunities for including other functions, such as flood management functions, and evaluating water supply functions such as seeps and springs that have an integral part in aquatic ecological functions. This functional approach allows for a

detailed understanding of the ecosystem services provided by a natural or impacted site. Quantitative values can be developed for existing conditions in a natural or altered state, and alternatives can be compared in both restoration and impact scenarios. These values, or scores, allow for a clearer understanding of tradeoffs under site selection, design, or mitigation analysis. The basis of such a system is the stream rating system provided by this inventory.

6.2.3 Buffer Options

The predominant means of regulating uplands adjacent to water bodies and areas adjacent to wetlands and critical wildlife habitat has been through buffers. References to buffers in the Shoreline Master Program Guidelines (WAC 173-26) are numerous and include the following:

- WAC 173-26-221(2)(c)(i)(D) Buffers. Master programs shall contain requirements for buffer zones around wetlands. Buffer requirements shall be adequate to ensure that wetland functions are protected and maintained in the long term. Requirements for buffer zone widths and management shall take into account the ecological functions of the wetland, the characteristics and setting of the buffer, the potential impacts associated with the adjacent land use, and other relevant factors.
- WAC 173-26-221(5)(b) Local governments may implement these objectives through a variety of measures, where consistent with Shoreline Management Act policy, including clearing and grading regulations, setback and buffer standards, critical area regulations, conditional use requirements for specific uses or areas, mitigation requirements, incentives and nonregulatory programs.
- WAC 173-26-211(5)(f)(ii)(A) Standards for density or minimum frontage width, setbacks, lot coverage limitations, buffers, shoreline stabilization, vegetation conservation, critical area protection, and water quality shall be set to ensure no net loss of shoreline ecological functions, taking into account the environmental limitations and sensitivity of the shoreline area, the level of infrastructure and services available, and other comprehensive planning considerations.

Wetland Regulations

- The wetland classification system developed by Ecology, the Washington State Wetland Rating System for Western Washington - Revised (Ecology Publication #04-06-025, August 2004, annotated August 2006) is the most common system used locally. It incorporates multiple parameters for dividing wetlands into groups that have similar needs for protection. This system represents a tested approach to understanding wetland functions, ways to evaluate them, and what is needed to protect them. It provides a quick snapshot characterization of a particular wetland. In many cases, it provides enough information about existing wetland functions to allow adequate plan review and land use decisions to be made without the additional expense of a separate wetland functional assessment.
- Exemptions based on wetland size are often included in local regulations to exclude preservation of wetlands that would be isolated by surrounding urban or rural development and that would lose much of their ecosystem function due to the loss of the surrounding natural features. The scientific literature does not support a particular size for exempting wetlands based on function because many functions are not determined solely by area. One approach endorsed by Ecology provides multiple criteria for exempting wetlands and providing for mitigation, often through consolidation in larger on-site wetland mitigation programs or through watershed-based mitigation banks. Cowlitz County and most of the cities employ wetland exemptions, based on size, that Ecology believes are not supported by scientific literature.
- Many jurisdictions also exempt activities that are believed to have little or no environmental effect or are an emergency that threatens public health or safety. In the case of emergency response activities that affect wetlands and buffers, the responsible party may be required to obtain after-the-fact permits and to rectify impacts. Cowlitz County and most of the cities employ wetland use and emergency exemptions that Ecology has not taken exception to.

  Using wetland buffers as a management tool for protecting wetland functions depends on the specific wetland function being protected, what human activities are being separated from ecological functions or are being mitigated by natural functions provided by the wetland, and what ecosystem functions are being provided by the larger landscape including the wetland and surrounding lands. The buffer function of improving

water quality through sediment removal and nutrient uptake is greatest within the immediate outer portions of a buffer nearest the source of sediment/nutrient. In urban areas where stormwater systems may divert runoff into piped systems, buffers may not provide this function. To protect wetland-dependent wildlife species, a critical factor is whether all or only portions of their life cycles are contained within wetlands or whether they require upland habitats adjacent to the wetland. Species that rely on upland habitats need access to appropriate areas if upland habitat and the opportunity to move safely between habitat areas across a landscape to maintain viable populations is available.

- Cowlitz County wetland buffer regulations summarized in Table 6-2 are based on the Ecology wetland rating system. Ecology reviewers have questioned references to delineation methods, exemptions for small wetlands, and provisions for reduction of up to 50 percent of the buffer dimension.

Table 6-2. Cowlitz County Wetland Buffer Regulations Summary.

Cowlitz County; 19.15.120.C.4					
		Wetland Category			
		Cat 1	Cat 2	Cat 3	Cat 4
Development Intensity	Low	50-150*	50-150*	40-75*	25
	Moderate	75-225*	75-225*	60-110*	40
	High	100-300*	100-300*	80-150*	50
* Range is based on a sliding scale determined by habitat scores					
Averaging		No less than 50% of buffer width or 25 ft, whichever is greater			
Reduction		Cat III (habitat score<20) and IV; reduction to 50% of standard buffer with enhancement Cat I, II, and III (habitat score>20: reduction by one land use intensity rating provided management measures are implemented and habitat corridors are established,			

- City of Castle Rock wetland buffer regulations are summarized in Table 6-3. Ecology has questioned use of the 1993 wetland rating system, exemptions of wetlands based on size, and the designation of seven dwelling units per acre as low-intensity land use as it affects adequacy of wetland buffers to protect wetland habitat functions and mitigation.

Table 6-3. Castle Rock Wetland Buffer Regulations Summary.

Castle Rock; 18.10.120.C	
	Wetland Category

		Cat 1	Cat 2	Cat 3	Cat 4
Development Intensity	Low	200	100	50	25
	High (> 7 units per acre)	300	200	100'	50
Averaging		No less than 50% of buffer width or 50 ft, whichever is greater			

- City of Kelso buffer regulations summarized in Table 6-4 are based on the 1993 Ecology wetland rating system. Ecology has questioned exemption of some wetlands, buffers which are at the low end of current recommendations, and mitigation and buffer reduction provisions.

Table 6-4. Kelso Wetland Buffer Regulations Summary.

Kelso; 18.20.080.D				
	Wetland Category			
	Cat 1	Cat 2	Cat 3	Cat 4
	200	100	50	50
Reduction	To 75% with vegetation enhancement. To a maximum 50% or 25 feet.			

- City of Kalama wetland buffer regulations summarized in Table 6-5 are based on the Ecology 1993 wetland rating system. Ecology has questioned the rating system, exemptions for small wetlands, mitigation standards, and buffer reductions.

Table 6-5. Kalama Wetland Buffer Regulations Summary.

Kalama; Table 15.02.120-1					
		Wetland Category			
		Cat 1	Cat 2	Cat 3	Cat 4
Development Intensity	Low	200	100	50	25
	High	300	200	100	50
Averaging		Based on criteria for function			
Reduction		To 75% or 50 feet for except for Category IV with low or moderate intensity land uses			

- City of Woodland buffer regulations summarized in Table 6-6 are based on the Ecology wetland rating system. Ecology has questioned whether

the criteria for reduction of up to 50 percent of the buffer are supported by relevant scientific literature.

Table 6-6. Woodland Wetland Buffer Regulations Summary.

Woodland; Table 15.08.400-2					
		Wetland Category			
		Cat 1	Cat 2	Cat 3	Cat 4
Development Intensity	Low	50-125*	50 to 150*	40-75*	25*
	Moderate	75 to 225*	75-225*	60-110*	40*
	High	100-300*	100-300*	80-150*	50*
* Range is based on a sliding scale determined by habitat scores					
Averaging		To 75% or 50 feet.			
Reduction		To 75% or 50 feet.			

Riparian Buffers

- A wide range of buffer widths have been analyzed for a variety of functions. Variation in recommendations or buffer effectiveness is frequently due to variation in site conditions such as side-slope angle, stream type, geology, climate, etc. Design of riparian buffers must consider the ecological, cultural, and economic values of the resource, land use characteristics, and existing riparian quality throughout watersheds in order to address the cumulative impacts on stream functions and the resources being protected (Johnson and Ryba 1992; Castelle et al. 1994; 2000; Wenger 1999).
- Appropriate buffer sizes will depend on the area necessary to maintain the desired riparian or stream functions for the given suite of land-use activities. A wider buffer may be desired to protect streams from impacts resulting from high-intensity land use while narrower buffers may suffice in areas of low-intensity land use (May 2000). It should be noted though that opportunities for protection or improvement of buffer conditions in areas of high-intensity land use are often effectively foreclosed by existing development, or the existing habitat conditions are already highly altered. Under such conditions, establishing buffers wide enough to provide an effective full-range of riparian functions is likely unattainable; other actions may be required to improve habitat conditions beyond what riparian buffers are able to provide. In addition, buffer vegetation type, diversity, condition, and maturity are equally as important as buffer width, and the best approach to providing high-quality buffers is to strive

for establishing and maintaining mature native vegetation communities (May 2000).

- Potential riparian, lake wetland and habitat buffer frameworks include the following types, which are discussed in greater detail below:
    - Standard Single-Zone Buffers – Fixed-distance stream buffers based on the maintenance of individual aquatic functions. The buffer widths may be further divided by land use (e.g., urban versus rural) or by other variables.
    - Dual-Zone Buffers – This approach employs two smaller adjacent buffer zones, which, when combined, make up the overall riparian buffer. An inner "core" zone, directly adjacent to the aquatic feature, consisting of an area where uses are prohibited or severely restricted, and an outer riparian zone, adjacent to the core zone, where uses are still restricted, but to a lesser degree.
    - Reach Based Buffers – This approach is most relevant to streams and lakes that have been altered by human use. The approach focuses on "no net loss" of existing functions as they currently exist.
- All of the above approaches could potentially incorporate buffer averaging techniques, in cases where the overall buffer area will be equal to un-averaged conditions, and it can be clearly demonstrated that averaging will result in no net loss of aquatic functions.
- Standard Single-Zone Stream Buffers – Single-zone buffers are the most common type of riparian buffer, with a designated minimum buffer for each class or type of stream/habitat as defined by the applicable stream classification scheme. The advantages of single-zone stream buffers are that they are the most common buffer type and have had extensive best available science (BAS) and legal review; are relatively simple to understand from a public standpoint and lend themselves to straightforward and efficient administrative processing; and allow for buffer averaging. One disadvantage of such a system is that riparian buffers are not uniform in the functions they provide relative to the width of the buffer, as discussed further below.

- Table 6-2 summarizes this information in relation to the specific aquatic functions that are of greatest importance in maintaining conditions suitable to support fish and other aquatic life (e.g., LWD recruitment, stream temperature, sediment filtration). For each buffer width, the suitability of the buffer is rated by its ability to maintain these aquatic functions. Although this evaluation is qualitative, it is firmly based on BAS regarding ecological functions.

Table 6-7. Comparison of functions of stream and lake buffer widths.

	Buffer Width				
Function	**15 Feet**	**50 Feet**	**150 Feet**	**300 Feet**	**600 Feet**
Microclimate	X	X	N	P	F
Wildlife Habitat	X	N	P	P	F
LWD Recruitment	X	N	P	F	F
Pollutant Removal	N	N	P	P	F
Sediment Filtration	X	N	P	F	F
Water Temperature	X	N	F	F	F
Organic Litter	X	P	F	F	F
Bank Stability	X	F	F	F	F

KEY
F = Buffer width fully supports/maintains stream function.
P = Buffer width partially supports/maintains stream function.
N = Buffer width nominally supports/maintains stream function.
X = Buffer does not adequately support/maintain stream function.

- Dual-Zone Stream Buffers – This approach, commonly used in forestry applications, is similar to the single-zone stream buffer (see above). However, the overall stream buffer is composed of two smaller adjacent buffer zones, which when combined make up the overall riparian buffer. The two zones are:
  - An inner "core" buffer zone, located directly adjacent to the aquatic feature. In this area land uses are prohibited or severely restricted.
  - An outer riparian zone, landward and adjacent to the core zone, where land uses are still restricted, but to a lesser degree than within the core area.

  Dual-zone buffers are not as common as single-zone buffers and are more complex from a public understanding and City administrative standpoint, although buffer averaging could still occur within the outer riparian zone. The primary advantage of this type of buffer system is that

the dual-zone system recognizes that riparian buffers are not uniform in the functions they provide relative to the width of the buffer. Examples of specific ecologically relevant provisions that could be applied to the outer buffer zone include:

- A limit to the amount of clearing allowed within the outer buffer zone.
- A minimum amount of forest required to be retained within the outer buffer zone.
- A limit to the amount of impervious surface allowed within the outer buffer zone.
- A limit to the development density allowed within the outer buffer zone.

In this system, the overall buffer width for the combined dual-zone buffers would be wider than for the single-zone buffer, because more uses are allowed within the outer portion of the dual-zone buffer. This approach has the advantage that it is adaptable to a wide range of land use activities, and gives the applicant choice on which approach is best suited to their particular situation, while still maintaining equal levels of aquatic habitat functions for the overall system. A disadvantage of the system is that it may be more difficult to administer, as compared to a single-zone buffer approach.

- Reach Specific Stream or Lake Reach Buffers – An additional approach to stream buffers that combines some of the advantages of both the classification-based buffer system and a "no harm" approach are applying specific buffers for specific reaches based on assessment of the functions currently being provided by those reaches. This approach is particularly applicable to streams in areas of existing high-intensity land use where parcels are small and few remain undeveloped, and there is little practical opportunity to achieve buffers that will provide the full range of desired riparian functions. In this case, the objective of the management approach is to preserve the existing functions and to improve, if possible, a limited range of functions such as improving temperature and water quality. Improving temperature through providing effective overhead shade can be achieved to varying degrees with intensive management of smaller buffers. Water quality improvements can be achieved by stormwater management and control of fertilizer and other chemical applications near streams.

- "No Harm" Regulatory System – This type of regulatory system is best known in Washington State in its application to agricultural use in Skagit County. The approach was endorsed in challenges heard by the Growth Management Hearings Board for Western Washington and the Washington State Supreme Court (Swinomish v Skagit 2006). The "no harm" approach may be regarded as an "adaptive management" approach to protecting critical areas. Essential elements for such a program are adequate monitoring, benchmarks, and the ability to require changes to the program if benchmarks are not achieved. In assessing the difference between a prescriptive approach such as buffers and a "no harm" approach, both the hearings board and the court have held that local governments must either be certain that their critical areas regulations will prevent harm, or be prepared to recognize and respond effectively to any unforeseen harm that arises. Application to urban areas, however, would be substantially different than application to agriculture where changes in farming practices may be developed. It would be difficult to meet a "no harm" standard if monitoring of a specific buffer area determined that a functional criterion was not being met. If, for example, a particular buffer dimension was not effective, the presence of physical improvements such as roads or buildings would generally preclude its expansion. In addition, developing performance standards, implementing a monitoring system, and taking action to correct deficiencies would be very resource demanding both for property owners and the local jurisdiction.
- Cowlitz County and the cities of Castle Rock, Kalama, Kelso and Woodland all utilize similar WDFW/DNR stream classifications with a range of riparian buffer width regulations summarized in Table 6-8. Several jurisdictions also vary buffers according to the presence of adjacent mass wasting potential or according to stream width for Type 3 streams.

Table 6-8. Riparian Buffer Regulations.

	Stream Type				
Jurisdiction	**Type S**	**Type F (Type 2)**	**Type F (Type 3)**	**Type Np**	**Type Ns**
Cowlitz County	150	150	100	50	50
Castle Rock	250	200	150	150	NA
Kelso	Other regulatory programs and best management practices				
Kalama	250	200	150	150	25

	Stream Type				
Jurisdiction	Type S	Type F (Type 2)	Type F (Type 3)	Type Np	Type Ns
Woodland	250	200	150	100	100

- The jurisdictions have varying provisions for varying buffers based on site-by-site assessments of conditions. These provisions allow consideration of the existing buffer conditions and the functions the stream may provide for aquatic and upland species. This site-by-site review compensates somewhat for the fact that the WDFW/DNR water classification system is based on fish presence and not the ecological functions of the waterbody.

6.2.4 Flood Hazard Reduction

- Cowlitz County and the cities generally regulate development in floodplains through regulations designed to meet Federal Emergency Management Agency (FEMA) criteria for eligibility for flood insurance. These regulations focus on building construction standards such as maintaining the lowest floor above flood levels. These provisions do not address direction in 173-26-221(3) to preserve the dynamic physical processes of rivers, including preservation of floodplains.
- Levee systems are prevalent in the Columbia River, lower Cowlitz River, and lower Lewis River Assessment Units, and are critical protection elements for existing development and agriculture uses. Consistent with the WAC provisions in the Guidelines, the County should provide flexibility for developing and maintaining flood hazard reduction measures as needed to continue protection of existing uses. Emphasis should be given to maintaining existing ecological functions, at a minimum, through Ecology's no net loss criteria. The existing SMP section on Shoreline Protection Works, which currently includes a wide variety of shoreline stabilization methods, is too broad. Flood hazard reduction regulations, should be separated from other shoreline stabilization regulations.

6.2.5 Public Access

- Provide policies and regulations that recognize and facilitate implementation of existing parks, recreation, and open space plans.
- Provide public access, as feasible, in new commercial, industrial and multi-family development as well as publicly sponsored or financed utility and flood control facilities.

- Promote visual access where physical access is not feasible.

6.2.6 Shoreline Vegetation Conservation

- Build on the existing protections provided in the County's and Cities' critical areas regulations, paying special attention to measures that will promote retention of shoreline vegetation and development of a well-functioning shoreline which provides both physical and habitat processes.
- Include clear standards for fill, grading, and excavation by environment designation ensuring compliance with WAC requirements.
- Ensure that vegetation provisions allow for appropriate modifications to accommodate preferred uses, particularly water-oriented uses, public access and single-family residential development.
- Ensure that vegetation standards are clear regarding thinning, trimming and pruning of nearshore vegetation to maintain views and to minimize safety hazards.

Water Quality, Stormwater, and Nonpoint Pollution

- Consider incorporating regulations to facilitate maximum implementation of TMDL plans and controlling introduction of 303(d)-listed pollutants for which TMDLs have not yet been prepared.
- Ensure that regulations allow for placement of water quality improvement related structures or facilities in shoreline jurisdiction.
- Consider adding clarifying statements noting that the policies of the SMP will also be policies of the County's comprehensive plan (in development) and that the policies also apply to activities outside shoreline jurisdiction that affect water quality within shoreline jurisdiction. However, the regulations apply only within shoreline jurisdiction.

6.3 Shoreline Modification Provisions

6.3.1 Shoreline Stabilization

- Separate bulkheads, riprap, revetments and other shoreline armoring structures from other regulations which pertain to structures intended to attenuate open water waves and currents such as breakwaters, jetties, groins and weirs.

- Give preference to those types of shoreline modifications that have a lesser impact on ecological functions. Policies and regulations should promote "soft" over "hard" shoreline modification measures.
- Ensure “replacement” and “repair” definitions and standards are consistent with WAC 173-26-231(3)(a). Repair activities should be defined to include a replacement threshold so that applicants and staff will know when “replacement” requirements need to be met.
- Otherwise, fully implement the intent and principles of the WAC Guidelines. Reference appropriate exemptions found in the WAC related to “normal maintenance and repair” and “construction of the normal bulkhead common to single-family residences.” These are not exemptions from the regulations, however; they are exemptions only from a Shoreline Substantial Development Permit.
- Incentives could be included in the SMP that would encourage modification of existing armoring, where feasible, to improve habitat while still maintaining any necessary site use and protection.

6.3.2 Piers and Docks

- Develop detailed dimensional and material standards for new piers and docks as well as replacement/modified structures, customized for river and lake environments. Docks and piers have a variety of potential impacts including the following (Carrasquero 2001):
    - Avoidance of shaded areas by juvenile salmon
    - Changes in the food network
    - Changes in substrate and sediment movement
    - Changes in predator/prey relationships
    - Loss of habitat area, complexity and and fragmentation of remaining habitat
- Be consistent, to the extent practicable based on local conditions and requirements for no net loss, with Washington Department of Fish and Wildlife, Washington Department of Natural Resources, and U.S. Army Corps of Engineers design standards, and recognize special local issues or circumstances.
- Place emphasis on joint-use or community piers and docks over single-use structures.
- Similar to the recommendation under Shoreline Stabilization, ensure repair activities are defined to include a replacement threshold so that

applicants and staff will know when "replacement" requirements need to be met.

- Regulations may distinguish limit size of docks or prohibit them an based on Shoreline Environmental Designations with a focus on protecting ecological functions in conservancy and natural environmental designations.

6.3.3 Fill

- Restoration fills should be encouraged, including improvements to shoreline habitats, material to anchor LWD placements, and as needed to implement shoreline restoration.
- Fills waterward of the OHWM to create developable land should be prohibited, and should only be allowed landward of OHWM if not inconsistent with the requirement to protect shoreline ecological functions and ecosystem-wide processes.

6.3.4 Breakwaters, Jetties, Groins and Weirs

- Consider prohibiting new breakwaters, jetties, groins, or weirs in the SMP except where they are essential to restoration or maintenance of existing water-dependent uses.

6.3.5 Dredging and Dredge Material Disposal

- The Cowlitz and Columbia Rivers are subject to continued sedimentation from upstream deposits resulting from the eruption of Mt. St. Helens. It is likely that dredging for navigation and flood control will be needed for the foreseeable future. Provisions to allow continued dredging as part of a master program will facilitate needed dredging while addressing long term ecological issues.
- In watersheds not affected by Mt. St. Helens, restriction or prohibition of dredging should be considered with exceptions for purposes of shoreline restoration, flood hazard reductions, and maintenance of existing legal moorage and navigation.

6.3.6 Shoreline Habitat and Natural Systems Enhancement Projects

- Consider incentives to encourage restoration projects, particularly in areas identified as having lower function. For example, allow modification of impervious surface coverage, density, height, or setback requirements when paired with significant restoration. Emphasize that certain fills, such as streambed or nearshore gravels or material to anchor logs, can be an important component of some restoration projects.

- To facilitate planned water-dependent uses within ports, it may be advantageous to develop a region-wide mitigation system that targets mitigation sites to locations where the greatest ecological productivity will occur. This may include approval of resource banking sites.

6.4 Shoreline Uses

6.4.1 Agriculture

- The findings of this Shoreline Analysis Report do not suggest a need for additional regulations beyond those mandated by the SMP Guidelines.
- Maintenance of existing agriculture is commercially and locally important to Cowlitz County. Ensuring that agricultural uses and development are allowed (except as currently prohibited in the Natural environment) should be recognized in shoreline policies and regulations.
- Consider allowing low-intensity agricultural uses in the Natural environment per WAC 173-26-211(5)(a)(ii)(E).

6.4.2 Aquaculture

- The findings of this Shoreline Analysis Report do not suggest a need for additional regulations beyond those mandated by the SMP Guidelines.
- However, the regulations should appropriately differentiate between commercial aquaculture and species restoration aquaculture, and include special provisions for aquaculture activities that are temporary in nature.

6.4.3 Boating Facilities

- Cowlitz County includes a variety of commercial, public and private boating facilities, including marinas, port uses, and community and park boat moorage and launching facilities. Regulations for the over-water components should be developed to provide applicants with as much predictability as possible, while still allowing for an appropriate amount of flexibility based on site-specific conditions and use-specific needs.
- The County may consider additional requirements for demand analysis for new marinas as a means to minimize cumulative impacts from multiple facilities.
- Public access should be included as components of new marinas or expansions, where feasible.

6.4.4 Commercial Development

- Recognize commercial uses and provide for a clear priority for water-dependent, water-related and water-oriented uses.

- Consider incentives to attract water-oriented uses in appropriate locations along the shoreline.
- Ensure water-dependent uses are not restricted by other regulatory setbacks/buffers.
- Make provisions for the public access and ecological restoration requirements for non-water-dependent uses to provide clear requirements for those areas where water-dependent uses are not practical. Identification of mitigation sites or provisions for mitigation banking also could accommodate such development.

6.4.5 Forest Practices

- Provide general policies and regulations for forest practices according to the SMP Guidelines. As provided for in WAC 173-26-241(3)(e), the master program should rely on the Forest Practices Act for regulation of commercial forestry. There are, however, specific limits on clear cutting provided in RCW 90.58.150 which must be included, Exceptions to this standard should be by conditional use review.
- The SMP should apply to Class IV General forest practices where shorelines are being converted to non-forestry uses.

6.4.6 Industry

- Recognize industrial uses and provide for a clear priority for water-dependent, water-related and water-oriented uses.
- Consider incentives to attract water-oriented uses in appropriate locations along the shoreline.
- Ensure water-dependent uses are not restricted by other regulatory setbacks/buffers.
- Make provisions for the public access and ecological restoration requirements for non-water-dependent uses to provide clear requirements for those areas where water-dependent uses are not practical. Identification of mitigation sites or provisions for mitigation banking also could accommodate such development.

6.4.7 In-stream Structural Uses

- Small and large-scale in-stream structures intended to produce energy, moderate flooding, and retain sediment are found in Cowlitz County. Therefore, policies and regulations should allow such in-stream structural uses in the SMP while also ensuring the continued protection and preservation of ecosystem functions and cultural resources.

- Regulations may distinguish appropriate areas for in-stream structures based on Shoreline Environmental Designations or specific ecological functions.

6.4.8 Mining

- Provide general policies and regulations for mining according to the SMP Guidelines. Clearly differentiate between upland and aquatic mining.
- Integrate mining regulations with requirements of land use and development codes.
- Regulations may distinguish appropriate areas for in-stream structures based on Shoreline Environmental Designations or specific ecological functions.

6.4.9 Recreational Development

- Policies and regulations related to parks management should provide clear preferences for water-related recreation use and shoreline restoration consistent with public access needs and uses. Existing natural parks should be protected and enhanced.
- Coordinate with State, County, City, and private park owners (i.e. PacifiCorp) regarding applicable environment designations, existing and future land uses/developments, and restoration opportunities to ensure policies and regulations do not conflict with ongoing or future recreational developments and park management plans.
- Recreation access to the shoreline is a priority of the Act and should recognize that water-dependent recreation is a preferred use in shoreline jurisdiction. Include provisions for existing and potential recreational uses, including boating, kayaking, swimming, and fishing.
- Regulations may distinguish an appropriate intensity of recreation uses based on Shoreline Environmental Designations with less intensive uses in conservancy and natural Shoreline Environmental Designations.

6.4.10 Residential Development

- Address specific unincorporated areas of more intense residential development (i.e. Silver Lake) with appropriate regulations to match the existing condition.
- Incorporate clear dimensional criteria for residential development, including setbacks/buffers, lot coverage, height limits, etc.
- Recognize existing development patterns and existing ecological functions provide in specific areas in providing buffers, and other regulations.
- Include provisions which ensure that new development, including the creation of new lots, would not require new shoreline stabilization. New

primary and accessory residential structures should be located far enough from the shoreline to prevent such a need.

- For residential subdivisions which create five or more lots, require public or community access to the shoreline.
- Although single-family residential development is a shoreline preferred use, ensure that the master programs include provisions which assure meeting Ecology's no net loss standard.

6.4.11 Transportation and Parking

- Allow for maintenance and improvements to existing transportation facilities.
- Ensure that location of new roads and parking areas considers alternatives to location within shoreline jurisdiction and provide performance standards and for necessary new roads and parking areas where other locations outside of shoreline jurisdiction are not feasible.

6.4.12 Utilities

- Allow for maintenance and improvements to existing utility facilities.
- Ensure that location of new utilities considers alternatives to location within shoreline jurisdiction and provide performance standards for necessary new utilities where other locations outside of shoreline jurisdiction are not feasible.

6.5 Restoration Plan

A Restoration Plan document will be prepared at a later phase of the Shoreline Master Program update process, consistent with WAC 173-26-201(2)(f). The Shoreline Restoration Plan must address the following six subjects (WAC 173-26-201(2)(f)(i-vi)) and incorporated findings from this analysis report:

(i) Identify degraded areas, impaired ecological functions, and sites with potential for ecological restoration;

(ii) Establish overall goals and priorities for restoration of degraded areas and impaired ecological functions;

(iii) Identify existing and ongoing projects and programs that are currently being implemented, or are reasonably assured of being implemented (based on an evaluation of funding likely in the foreseeable future), which are designed to contribute to local restoration goals;

(iv) Identify additional projects and programs needed to achieve local restoration goals, and implementation strategies including identifying prospective funding sources for those projects and programs;

(v) Identify timelines and benchmarks for implementing restoration projects and programs and achieving local restoration goals; and

(vi) Provide for mechanisms or strategies to ensure that restoration projects and programs will be implemented according to plans and to appropriately review the effectiveness of the projects and programs in meeting the overall restoration goals.

The Restoration Plan will "include goals, policies and actions for restoration of impaired shoreline ecological functions. These master program provisions should be designed to achieve overall improvements in shoreline ecological functions over time, when compared to the status upon adoption of the master program." The Restoration Plan will mesh potential projects identified in this report with additional projects, regional or local efforts, and programs of each jurisdiction, watershed groups, and environmental organizations that contribute or could potentially contribute to improved ecological functions of the shoreline.

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8 LIST OF ACRONYMS AND ABBREVIATIONS

ADA..... Americans with Disabilities Act
AWS..... Available Water Supply
BLM ..... Bureau of Land Management
CAO..... Critical Areas Ordinance
C-CAP ..... Coastal Change Analysis Program
CFS..... Cubic Feet per Second
Corps ..... U.S. Army Corps of Engineers
CPP ..... County-wide Planning Policies
DFIRM..... Draft Flood Insurance Rate Map
DU ..... Ducks Unlimited
Ecology..... Washington Department of Ecology
EPA ..... Environmental Protection Agency
ESA ..... Endangered Species Act
FEMA ..... Federal Emergency Management Agency
Ft ..... Feet
GIS ..... Geographic information systems
GMA ..... Growth Management Act
HPA ..... Hydraulic Project Approval
LCREP ..... Lower Columbia Estuary Partnership
LWD ..... Large Woody Debris
OHWM..... Ordinary High Water Mark
MOU ..... Memorandum of Understanding
MUGA..... Municipal Urban Growth Area
NF ..... North Fork
NOAA ..... National Oceanographic and Atmospheric Administration
NPS ..... National Parks Service
NPDES..... National Pollutant Discharge Elimination System
NRCS ..... Natural Resources Conservation Service
NRL ..... Natural Resources Lands
NWI ..... National Wetlands Inventory
PAB ..... Planned Annexation Boundary
PAH ..... Polycyclic aromatic hydrocarbon
PCB ..... Polychlorinated biphenyl
PHS ..... Priority Habitats and Species
PNW ..... Pacific Northwest

PSE ..... Puget Sound Energy
PUD ..... Public Utility District
RCW ..... Revised Code of Washington
ROW ..... Right-of-Way
RGP ..... Regional General Permit
RM ..... River Mile
RV ..... Recreational Vehicle
SCL ..... Seattle City Light
SEPA ..... State Environmental Policy Act
SF ..... South Fork
SMA ..... Shoreline Management Act
SMP ..... Shoreline Master Program
Spp. ..... Species
SR ..... State Route
SSURGO ..... Soil Survey Geographic Database
SWSL ..... Surface Water Source Limited
TMDL ..... Total Maximum Daily Load
TPL ..... Trust for Public Land
TWC ..... The Watershed Company
UGA ..... Urban Growth Area
UGB ..... Urban Growth Boundary
USDA ..... U.S. Department of Agriculture
USFS ..... United States Forest Service
USFWS ..... U.S. Fish and Wildlife Service
USGS ..... U.S. Geological Service
WAC ..... Washington Administrative Code
WDFW ..... Washington Department of Fish and Wildlife
WDNR ..... Washington Department of Natural Resources
WRIA ..... Water Resource Inventory Area
WSR ..... Wild and Scenic Rivers
WWRP ..... Washington Wildlife and Recreation Coalition
Yr ..... Year

All appendices documents provided separately

APPENDIX A

Cowlitz County Assessment of Shoreline Jurisdiction

APPENDIX B

Shoreline Inventory Map Folio - County

APPENDIX C

Shoreline Inventory Map Folio - Cities

APPENDIX D

Cowlitz County Comprehensive Plan Map

APPENDIX E

Cowlitz County Zoning Maps

APPENDIX F

Functional Analysis Scoring Results by Reach

APPENDIX G

Demand for Water-oriented Uses

APPENDIX H

Longbell Log Pond Determination Letter

APPENDIX I

City of Castle Rock Supplemental Inventory