SUMNER SHORELINE MASTER PROGRAM UPDATE

Draft Shoreline Inventory and Characterization Report
Grant Agreement No. G1000024, Tasks 2.1, 2.2, 2.3

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City of Sumner

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1.0 INTRODUCTION

1.1 Background and Purpose

The purpose of this report is to conduct a baseline inventory of existing natural and built conditions in the City of Sumner's shoreline jurisdiction to provide a basis for the update of the City's Shoreline Master Program (SMP). Adolfson prepared an original shoreline inventory and characterization report for the City in 2002. Shortly thereafter, in 2003, the Washington State Legislature passed Substitute Senate Bill (SSB) 6012, which established timelines for all cities and counties to amend their local SMPs consistent with the Shoreline Management Act (SMA), Revised Code of Washington (RCW) 90.58 and its updated implementing guidelines, Washington Administrative Code (WAC) 173-26. The WAC 173-26 is commonly referred to as the 2003 shoreline guidelines.

The City of Sumner is required to prepare a comprehensive update to its SMP by the end of 2011.The City's first step towards this comprehensive SMP update is revising the 2002 shoreline inventory report to update technical information that has changed or been made available since, and to be consistent with the current 2003 shoreline guidelines. The report provides:

- Analysis and characterization of ecosystem-wide processes that affect the City's shorelines;
- Analysis and characterization of shoreline functions;
- Opportunities for protection, restoration, public access and shoreline use; and
- Shoreline management recommendations and policy options for consideration in subsequent phases of the SMP update.

The inventory and characterization documents current shoreline conditions and provides a basis for updating the City's SMP goals, policies, and regulations. This report will help the City establish a baseline of conditions, evaluate functions and values of resources in its shoreline jurisdiction, and explore opportunities for conservation and restoration of ecological functions.

Washington State Department of Ecology (Ecology) has provided state grant funds to assist the City in its comprehensive SMP update, including the completion of this report. The Ecology grant (No. G1000024) to the City is provided through the State General Fund. Recommendations outlined in Chapter 7 of the SMP Handbook provided by Ecology in draft form (August 2009) have been consulted related to the components of a complete inventory and characterization report (Ecology, 2010b).

1.2 Report Organization

This report is divided into six main sections. After Section 1.0, which provides background and introductory information, Section 2.0 describes the methods and data sources used to analyze the Sumner shorelines. Section 3.0 presents an ecosystem wide characterization, which includes historic land use along the City's regulated shorelines, watershed conditions, climate change, and a characterization of the shorelines' floodplains. Section 4.0 describes land and shoreline use patterns along the shorelines. Section 5.0 focuses on biological resources, and critical and hazard areas. Section 6.0 provides a segment-by-segment analysis of shoreline conditions and identifies restoration opportunities.

Also accompanying this report are several maps that identify the City's shoreline planning area; identify shoreline planning segments; and document various biological, land use, and physical elements. Maps are referred to throughout the document and are contained in Appendix A. Appendix B contains additional floodplain characterization data in table format.

Throughout this report the terms "left bank" and "right bank" are used. Right bank refers to the river bank which, when one is facing upstream, is to one's right. Similarly, left bank refers to that bank to the left when one is facing upstream[1].

1.3 Regulatory Overview

1.3.1 Shoreline Management Act and Shoreline Guidelines

Washington's Shoreline Management Act (SMA) was passed by the State Legislature in 1971 and adopted by the public in a referendum. The SMA was created in response to a growing concern among residents of the state that serious and permanent damage was being done to shorelines by unplanned and uncoordinated development. The goal of the SMA was "to prevent the inherent harm in an uncoordinated and piecemeal development of the state's shorelines." While protecting shoreline resources by regulating development, the SMA is also intended to provide for appropriate shoreline use by encouraging land uses that enhance and conserve shoreline functions and values.

The primary responsibility for administering the SMA is assigned to local governments through the mechanism of local shoreline master programs, adopted under guidelines established by Ecology. The guidelines (WAC 173-26) establish goals and policies that are

[1] "Upstream" of the White River extends generally to the north from where it joins the Puyallup River. "Upstream" on the Puyallup River generally extends to the south and east.

implemented through use regulations. The SMP is based on state guidelines but tailored to the specific conditions and needs of individual communities. The SMP is also meant to be a comprehensive vision of how the shoreline area will be managed over time.

1.3.1.1 Shoreline Master Program Update

The SMA is implemented through the development of local SMPs, which establish a system to classify shoreline areas into specific "environment designations." The purpose of the shoreline environment designation system is to provide a uniform basis for applying policies and use regulations within distinctly different shoreline areas. In a regulatory context, shoreline environment designations provide the governing policy and regulations that apply to land within the SMP jurisdiction. Portions of individual parcels that are outside SMP jurisdiction are governed by zoning and other applicable land use regulations. Generally, environment designations should be based on existing and planned development patterns, biological and physical capabilities and limitations of the shoreline, and a community's vision or objectives for its future development. Under the city's existing SMP (adopted in 2004) three shoreline environments are established: Urban, Shoreline Residential, and Urban Conservancy.

Refer to the existing SMP for additional information on the existing goals, policies, and environment designations (City of Sumner, 2004). Shoreline properties within the City's UGA are regulated under the Pierce County SMP, until such properties are annexed and the City's SMP is amended.

1.3.1.2 Shoreline Jurisdiction

Under the SMA, the shoreline jurisdiction includes waters that have been designated as "shorelines of statewide significance" or "shorelines of the state." These designations were established in 1972, and are described in Washington Administrative Code (WAC) 173-18.

- "Shorelines of statewide significance" are generally described as including portions of Puget Sound and other marine water bodies, rivers west of the Cascade range that have a mean annual flow of 1000 cubic feet per second (cfs) or greater, rivers east of the Cascade range that have a mean annual flow of 200 cfs or greater, and fresh water lakes with a surface area of 1,000 acres or more.

- "Shorelines of the state" are generally described as all marine shorelines and shorelines of all other streams or rivers having a mean annual flow of 20 cfs or greater and lakes with a surface area greater than 20 acres.

In Sumner, the designated shorelines of the state are the Puyallup River, White (Stuck) River[2], and Lake Tapps that fall within the Sumner city limits and urban growth area (UGA) (Map 1 in Appendix A). Both rivers and the lake are also designated as shorelines of statewide significance.

This report will also include a portion of the Puyallup River in Sumner's joint planning area (JPA) in unincorporated Pierce County. The study area boundary is bordered by the city limits and the Orting Highway (SR 162) on the west; city limits and SR 410 on the north; and extending east and south along the Puyallup River to the boundaries of Pierce County's Riverside County Park. This area is considered an area of special interest which may be considered for inclusion in the City's UGA sometime during the SMP update.

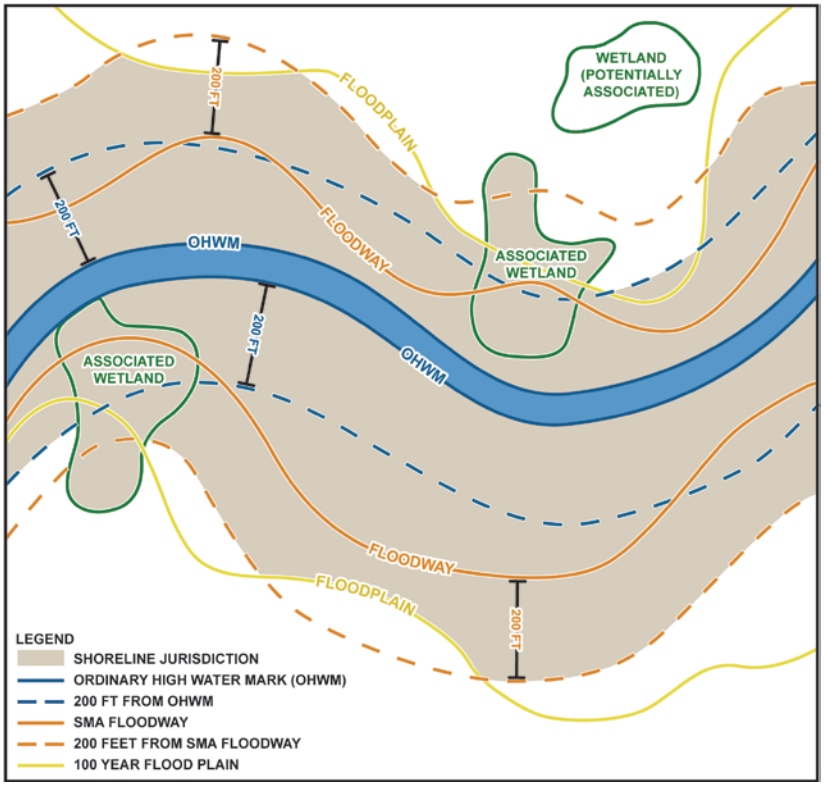
Unless otherwise stated, generalized references to the city or the city's shoreline jurisdiction include shorelines in the UGA and the study area boundary as described above.

The shoreline jurisdiction under SMA also includes "shorelands" adjacent to shorelines of the state. "Shorelands" or "shoreland areas" means those lands extending landward for 200 feet in all directions as measured on a horizontal plane from the ordinary high water mark (OHWM); floodways and contiguous floodplain areas landward 200 feet from such floodways; and all wetlands and river deltas associated with such streams, lakes, and tidal waters (see Figure 1-1).

"Associated wetlands" means those wetlands, that are in proximity to and either influence or are influenced by tidal waters or a lake or stream subject to the SMA (WAC 173-22-030 (1)). These are typically identified as wetlands that physically extend into the shoreline jurisdiction, or wetlands that are functionally related to the shoreline jurisdiction through surface water connection and/or other factors.

[2] Throughout this inventory, the terms "White (Stuck) River" and "White River" are used interchangeably to refer to that portion of this river system located in Sumner. In 1914, the White River was permanently diverted into the former channel of the Stuck River.

Figure 1-1. Graphic Depiction of the SMA Shoreline Jurisdiction Limits



The Puyallup River is located within Sumner's joint planning area from its southernmost point at approximately River Mile (RM) 13.3 downstream to its confluence with the White River at approximately RM 10.7, west of downtown Sumner. Downstream of Sumner's shoreline jurisdiction, the Puyallup River drains into Commencement Bay in Puget Sound. The White River is located within Sumner's city limits and urban growth area from approximately RM 5.5 at the northern border of the City's urban growth area downstream to its confluence with the Puyallup River at RM 0.3. Approximately 7,000 lineal feet of the northwestern portion of Lake Tapps is located within Sumner's UGA boundaries.

1.3.2 Existing Plans, Programs and Regulations

A variety of other regulatory programs, plans, and policies work in concert with the City's SMP to manage shoreline resources and regulate development near the shoreline. The City's Comprehensive Plan establishes the general land use pattern and vision of growth the City has adopted for areas both inside and outside the shoreline jurisdiction. The Growth Management Act provides that SMP goals and policies are integrated as an element of the Comprehensive Plan (RCW 36.70A.480). As such, SMP goals and policies should be consistent with general goals and policies for land use, environment, and other elements

contained in the Comprehensive Plan, and vice versa. Various sections of the City's municipal code are relevant to shoreline management, such as zoning, flood damage prevention, and stormwater management. The City's development standards and use regulations for environmentally critical areas are particularly relevant to the City's SMP. Designated environmentally critical areas are found throughout the City's shoreline jurisdiction, including streams, wetlands, aquifer recharge areas, wildlife habitat areas and flood hazard areas.

1.3.2.1 Comprehensive Plan, Zoning and Other City Regulations

City of Sumner Comprehensive Plan – The City of Sumner *Comprehensive Plan*, adopted in 2005, outlines general growth management goals over the next 20 years. The Plan includes goals and policies for shoreline management, land use, and the environment (City of Sumner, 2005). Amendments to the Comprehensive Plan are currently underway and are likely to be adopted by the end of 2010. Eleven "land use categories" are described in the Plan. These categories serve as the basis for more detailed zoning code designations. Land use categories include:

- *Residential*: Residential protection, low density residential, medium density residential, and high density residential
- *Commercial*: Agriculture, general commercial, interchange commercial, neighborhood commercial, central business district, mixed use development, and urban village
- *Manufacturing*: Light manufacturing and heavy manufacturing

The *Comprehensive Plan* references policies established in other adopted Sumner planning documents, including the City's Parks and Open Space Plan, Comprehensive Transportation Plan, Water System Plan, Stormwater Comprehensive Plan, and Sewer Collection System Comprehensive Plan.

Land use designations are relevant to this shoreline characterization report as they establish the general land use patterns and vision of growth the City has adopted for areas both inside and outside the shoreline planning area. Comprehensive Plan designations are shown on Map 8.

Sumner Municipal Code, Title 18: Zoning – Title 18 of the *Sumner Municipal Code* (SMC) establishes zoning districts in the city (City of Sumner, 2009c). These districts, which follow land use designations established in the City *Comprehensive Plan*, include eight residential zones, four mixed residential/commercial zones, a commercial-only zone, two manufacturing/industrial zones, and an agricultural zone. Zoning is shown on Map 9.

Sumner Municipal Code, Chapter 16.04 (State Environment Policy Act) and Division III, Chapters 16.40-16.58 (Natural Resource Lands and Critical Areas) – Chapter 16.04

of the SMC provides guidance to project applicants that require State Environmental Policy Act (SEPA) environmental review. Division III of the SMC (Chapters 16.40-16.58) establishes development standards, construction techniques, and permitted uses in critical areas and/or their buffers (wetlands, streams, wildlife habitat areas, aquifer recharge areas, landslide and erosion hazard areas, seismic hazard areas, volcanic hazard areas, and flood hazard areas) to protect these areas from adverse impacts. Division III also establishes protections for agricultural lands and regulatory standards for surface mining on mineral resource lands.

1.3.2.2 State and Federal Regulations

A number of state and federal agencies may have jurisdiction over land or development activities in the City's shoreline jurisdiction. Local development proposals most commonly trigger requirements for state or federal permits when they impact wetlands or streams; potentially affect fish and wildlife listed under the federal Endangered Species Act (ESA); result in over one acre of clearing and grading; or affect the floodplain or floodway. As with local requirements, state and federal regulations may apply throughout the city, but regulated resources are common within the City's shoreline jurisdiction. The state and federal regulations affecting shoreline-related resources include, but are not limited to:

- Endangered Species Act (ESA): The federal ESA addresses the protection and recovery of federally listed species. The ESA is jointly administered by the National Oceanic and Atmospheric Administration (NOAA) Fisheries (formerly referred to as the National Marine Fisheries Service [NMFS]), and the United States Fish and Wildlife Service (USFWS).

- Clean Water Act (CWA): The federal CWA requires states to set standards for the protection of water quality for various parameters, and it regulates excavation and dredging in waters of the U.S., including wetlands. Certain activities affecting wetlands in the City's shoreline jurisdiction or work in the adjacent rivers may require a permit from the U.S. Army Corps of Engineers and/or Ecology under Section 404 and Section 401 of the CWA, respectively.

- Hydraulic Project Approval (HPA): The Washington Department of Fish and Wildlife (WDFW) regulates activities that use, divert, obstruct, or change the natural flow of the beds or banks of waters of the state and may affect fish habitat. Projects in the shoreline jurisdiction requiring construction below the ordinary high water mark of rivers and lakes in the City could require an HPA from WDFW. Projects creating new impervious surface that could substantially increase stormwater runoff to waters of the state may also require approval.

- National Pollution Discharge and Elimination System (NPDES): Ecology regulates activities that result in wastewater discharges to surface water from industrial facilities or municipal wastewater treatment plants. NPDES permits are also required for stormwater discharges from industrial facilities, construction sites of

one or more acres, and municipal stormwater systems that serve populations of 100,000 or more.

1.3.2.3 National Marine Fisheries Service Biological Opinion on National Flood Insurance Program

The National Flood Insurance Program (NFIP) of the Federal Emergency Management Agency (FEMA) released draft Federal Insurance Rate Maps (DFIRM) that revised the extent of the White River and Puyallup River floodplain. The revised maps indicate a larger 100-year floodplain area than the maps that are currently in effect. Since the DFIRM maps have not been adopted by FEMA the 1987 maps remain in effect from a regulatory standpoint, based on City code.

In September 2008, a Biological Opinion issued by the National Marine Fisheries Service (NMFS) determined that the effects of certain elements of the NFIP throughout Puget Sound is likely to jeopardize the continued existence of the following species listed under the ESA: Puget Sound Chinook salmon, Puget Sound steelhead, Hood Canal summer-run chum salmon, and Southern Resident killer whales. The Biological Opinion also determined that NFIP is likely to adversely modify the following ESA designated critical habitats: Puget Sound Chinook salmon, Hood Canal summer-run chum salmon, and Southern Resident killer whale critical habitats. The biological opinion provides a reasonable and prudent alternative which can be implemented to avoid jeopardy and adverse modification of critical habitat. In response to the Biological Opinion, FEMA is in the process of developing guidance for NFIP participating communities, which includes the City of Sumner. The Biological Opinion establishes a 2010-2011 timeline for compliance for all NFIP participating communities within the Puget Sound Basin (NMFS, 2008).

1.3.3 Limitations Established by 24th Street Interchange Biological Opinions

The City of Sumner and WSDOT applied for a Corp of Engineer (COE) permit to authorize one acre of wetland fill to allow for development of the 24th Street Interchange, providing direct access from SR 410 to north Sumner. WSDOT submitted a Biological Assessment to the COE. The COE requested Endangered Species Act Section 7 formal consultation with the National Marine Fisheries Service and the U.S. Fish and Wildlife Service. Both agencies issued a Biological Opinion in 2003.

The Biological opinions issued by NMFS concluded that the proposed action is not likely to jeopardize the continued existence of Puget Sound (PS) chinook (*Oncorhynchus tshawytscha*) Evolutionarily Significant Unit (ESU) (NMFS, 2003). The Biological opinion issued by USFWS concluded that the proposed action is not likely to jeopardize the Coastal/Puget Sound bull trout (USFWS, 2003). The opinions established terms and conditions including the following which applied to the White River within the *action area*:

1. Establish and maintain in perpetuity a 200-foot buffer along the White River.

2. The City's proposed trail will incorporate the following features and/or measures:

    a. The trail will be placed on only one side of the White River.

    b. The trail will be no larger than 16 feet wide, including two-foot gravel shoulders, and be placed on the furthest landward edge of the buffer.

    c. If and where placement of the trail on the furthest landward edge of the buffer cannot be achieved, the trail must not be placed any closer than 100 feet from the White River.

    d. On the City owned lots on the east bank of the White River, and wherever possible, the trail will be placed outside the 200-foot buffer.

    e. Access from the trail to White River, should be granted no more than every 300 feet.

    f. The width of the water access trails should not exceed 36 inches.

In response, the City of Sumner incorporated the terms and conditions listed above into the 2003 Shoreline Master Program.

2.0 METHODS AND DATA INVENTORY

2.1.1 Data Sources

The Ecology 2003 shoreline guidelines state that shoreline inventory and characterizations to support local SMP amendments should be based on "best available scientific and technical information." Inventories should use existing sources of information that are both relevant and reasonably available (WAC 173-26-201(3)(c)). Aside from reconnaissance-level field visits completed as part of the 2002 Inventory, no new field-based data collection efforts were performed to develop the summaries and characterization included in this document.

This report incorporates and builds on past work the City of Sumner has undertaken relevant to it's SMPs. Key sources of information include city planning documents and technical studies (including comprehensive plans and basin plans), and watershed planning documents for WRIA 10 (Puyallup/White River). Mapping information and other studies from state agencies (including Washington Department of Fish and Wildlife, Department of Ecology, and Department of Natural Resources) were also used. To analyze spatial patterns and visually display data, numerous cartographic resources were consulted and used in ArcGIS (ArcMap 9.3).

A complete list of technical and scientific references is included in Section 9 of this report. The map folio prepared for this SMP update is provided in Appendix A.

2.1.2 Determining Planning Area Boundary and Study Segments

For the purposes of this inventory and characterization report, the study boundary for the City of Sumner is shown on Map 1 and referred to throughout this report as the "shoreline planning area." In general, it includes:

- The regulated waterbody, including submerged lands lying waterward of the ordinary high water mark (OHWM);
- 200 feet of adjacent upland extending from the mapped edge of the approximate OHWM or floodway, whichever is further landward; and
- Any bordering, neighboring, or contiguous mapped wetlands.

For the purposes of this study, the City's shoreline planning area was organized into ten distinct segments or "reaches" (Segments A through H; UGA-1; JPA-1) based broadly on the

physical distinction along the shoreline, the level of ecological functions provided by each segment, as well as existing land uses and zoning. Shoreline Study Segments are described in Table 2-1 and depicted on Map 1.

Table 2-1. Sumner Shoreline Study Segments

Location	Segment	Description	Approximate Length (miles)	River Mile
Puyallup River	**A**	City limits at Orting Highway (SR 162) to Traffic Avenue bridge; Rivergrove and Rainier Manor communities	1.35	12.0 to 10.7
Confluence – Puyallup and White Rivers	**B**	Traffic Avenue bridge to SR 410 bridge; Sumner Wastewater Treatment Plant, Confluence of White and Puyallup Rivers	0.79	10.7 (Puyallup) to 0.3 (White)
White River	**C**	SR 410 bridge to Union Pacific spur bridge; Downtown Sumner	0.86	0.3 to 1.1
White River	**D**	Union Pacific spur bridge to Tacoma Road Bridge; heavy industrial facilities	0.63	1.1 to 1.8
White River	**E**	Tacoma Road Bridge to City-owned property on right bank; industrial warehouses	0.85	1.8 to 2.6
White River	**F**	City-owned property to 8th Street Creek; farm land and Sumner Meadows Golf Links on right bank; industrial warehouses on left bank	1.64	2.6 to 4.2
White River	**G**	8th Street Creek to Stewart Road bridge; industrial facilities	0.74	4.2 to 5.0
White River	**H**	Stewart Road bridge to northern city limits; large wetland complex	0.56	5.0 to 5.5
Lake Tapps	**UGA-1**	Portion of Lake Tapps within Sumner's UGA	1.28	n/a
Puyallup River	**JPA-1**	Left Bank in Joint Planning Area beginning at southernmost tip of Riverside Park to city limits at Orting Highway (SR 162)	1.32	13.3 to 12.0
		TOTAL	10.02	

3.0 ECOSYSTEM WIDE CHARACTERIZATION

3.1 Historic Land Use and Watershed Conditions

Historically, the surface geology of the valley floor in Sumner has been determined by frequent flooding of the White and Puyallup Rivers. Periodic mudflows from Mount Rainier have historically covered the valley with layers of mud, silt, ash, and glacial debris. The most recent mudflow (named the Osceola mudflow) occurred in the valley about 5,600 years ago.

Sumner lies within the Puyallup-White River Water Resource Inventory Area (WRIA 10). This watershed includes both the White River and its major tributaries and the Puyallup River to its mouth at Commencement Bay in Tacoma (see Map 2). Both rivers originate from glaciers on Mount Rainier. Most of WRIA 10 lies within Pierce County with a portion that extends north into King County, Washington.

The White River subbasin originates at the terminus of the Winthrop, Fryingpan and Emmons glaciers on the slopes of Mt. Rainier and drains an area of approximately 494 square miles (Williams, 1975). Flowing from its origin to the confluence with the Puyallup River, the White River is approximately 68 miles in length.

The Puyallup River Basin was one of the earliest areas settled in the Puget Sound basin. Historically, the study area was characterized by large tracts of old-growth forests, fertile river valley soils, and abundant runs of salmon (Kerwin, 1999). Homesteads and settlements began appearing as early as 1850.

The headwaters of both the upper Puyallup and White Rivers are predominantly located within the Mt. Rainier National Park, Mount Baker-Snoqualmie National Forest and private commercial timberlands. Urbanization and development have been limited in these areas compared to urban areas in the Puget Sound lowlands. However, both the upper Puyallup and upper White River watersheds have been affected by timber harvest and road building practices that have reduced the ability of riparian areas to provide wood and shade to the rivers and stream channels. These areas also continue to contribute to fine sediments from road construction and landslides in each river system. These activities continue to adversely impact natural salmonid production (Kerwin, 1999).

The historic Puyallup River Basin was characterized by frequent seasonal flooding across an extensive river floodplain, which supported a complex network of wetlands and habitats for fish and wildlife. In addition, the river's mouth at Commencement Bay occupied an extensive tidal flat and wetland estuary delta. Urbanization and an extensive system of flood control structures such as dams, levees, and culverts, have radically altered much of the Puyallup River and its tributaries. The estuary delta at the mouth of the Puyallup River has

been almost completely replaced with the facilities of the Port of Tacoma, with less than 5% of the original estuarine habitat remaining.

Early in the 1900's the majority of the White River flow was naturally directed north into the Green and Duwamish Rivers. A small overflow channel, called the Stuck River, flowed south from the vicinity of Auburn into the Puyallup River at Sumner. A rain-on-snow event triggered a significant flood event on November 14, 1906, creating a debris dam in the White River and directing the entire flow into the Stuck River. The former White River channel into the Green River went dry as a part of this event (Stein, 2001). A permanent diversion wall was constructed at Auburn in 1915; as a result, the White River remains a tributary of the Puyallup today.

Photograph 3-1. Drift barrier to permanently divert White River at the upper end of the old Stuck Creek Channel, dated November 18, 1922 (Pierce County River Improvement District).

Formed in 1907, the Pierce County River Improvement District began straightening the Puyallup River and constructing levees as part of an overall flood control project for the Puyallup valley in the vicinity of Sumner. Channel straightening and levee construction resulted in a loss of floodplain wetlands and off-channel habitats.

Photograph 3-2. Marion drag line and dredging along the Puyallup River during channel straightening dated October 11, 1916 (Pierce County River Improvement District, 1991).

There are three major dams affecting flow on the rivers in Sumner: 1) Electron Dam, a hydroelectric dam operated by Puget Sound Energy on the Puyallup River, 2) Lake Tapps Hydroelectric Project, a diversion dam to Lake Tapps and 3) Mud Mountain Dam, a flood control dam on the White River. Mud Mountain Dam, constructed in the early 1940s, regulates flood events by holding back surface water from heavy rains and snow melt in the reservoir, and then releasing it slowly back to the White River. Salmon are blocked from passage at the Lake Tapps diversion dam (Shared Salmon Strategy, 2006).

As part of flood control efforts in the valley, river channels and embankments have been generally kept clear of debris such as gravel bars, large trees, logjams, and other woody debris. These modifications have radically altered the natural character of the rivers. River widths have been generally reduced and channel migration zones eliminated. Water now fills nearly all of the land between river banks, instead of the historic pattern of braided meanders and wetlands.

The chronology of events presented in Table 3-1 includes events and impacts resulting from settlement and water body modifications between 1792 and 2009.

Table 3-1. Puyallup River Basin Chronology of Events

Date	Event	Impacts
1792	First European description of the Puyallup River mouth	Initial description of attributes of Commencement Bay as a possible port
1850	Donation Land Claim Law	Encouraged settlement of Oregon and Washington
1851	Initial European settlers arrive in vicinity of Tacoma	Land clearing and farming begins
1852	Pierce County organized	First citizen based government formed
1852	First commercial lumber mill constructed	Timber harvest begins
1853	First railroad surveys conducted	First mapping attempts of historical habitat
1854	Medicine Creek Treaty signed	Large tracts of land are given up by the Puyallup and Muckleshoot Tribes
1858	Laws permitting draining passed Coal discovered in upper Carbon River subbasin	Wetlands drainage begins. Mining was initiated in 1873.
1870	Irrigation of agricultural lands begins	Water withdrawals from surface waters
1873	First railroad into Puyallup River valley	Allows easy access into and out of Tacoma
1874	Initial railroad construction across Commencement Bay tidal marshes	First filling of tidal marshes and tideflats in Commencement Bay
1883	First report of RR bridge across White River	Railroad is constructed east/west in the then White/Green river valley
1890s	Tacoma Land Co. began dredging of western channel of Puyallup River	Significant loss of estuarine environment and function in Commencement Bay
1899	Mt. Rainier National Park established	Headwaters of Puyallup and White rivers preserved
1903	Electron Power Project construction started. Began operation in 1904	26 miles of spawning and rearing habitat lost and 10 miles of mainstem river habitat impacted due to reduced flows
1906	Flood event (probably a 100-year flood event)	Log jam on White River diverts White into Stuck River and Puyallup River basin
1907	Washington State Legislature grants county governments authority to do flood protection work	Pierce County River Improvement District (PCRI) formed and channelization efforts begin between White River and Puyallup River mouth
1908	Channel realignment, bank stabilization and diking projects started in Puyallup, Carbon and White Rivers	Instream habitat losses associated with each project
1911	Debris barrier constructed in White River upstream of the 1906 diversion; Lake Tapps Reservoir and associated hydroelectric facilities were built by Puget Sound Energy	Removed large woody debris from portions of the White and lower Puyallup Rivers; Diverted water from RM 3.6 to RM 24.3 on the White River

Date	Event	Impacts
1913	State Legislation passed permitting Inter-County River Improvement District to be formed in 1914	Pierce and King counties work together to perform flood control projects
1914	Concrete Diversion constructed at Auburn permanently diverting White River into Stuck River	Increased Puyallup River flows by approximately 50 percent at confluence with White River
1917	Puyallup River Relocation Project complete	Channel relocation, diking alterations to salt/freshwater mixing, erosion and changes to the estuarine environment -- 1,800 acres of tidal marsh lost
1930s	Work on St. Paul, Wapato (Blair) and Hylebos waterways	Estimated 570 acres of mudflats and 121 acres of salt marsh filled
1933	Maximum discharge recorded at the USGS Gage Station on the Puyallup River at Puyallup	Major driver behind the 1936 authorization under the Flood Control Act for levee improvements and the construction of Mud Mountain Dam on the White River
1939	Mud Mountain Dam construction begins; completed in 1948	Barrier to anadromous fish migration
1946	Army Corps of Engineers' channelization and diking projects	Lower three (3) river miles of Puyallup River diked
1940s – 1970s	Major logging activities in the upper watershed	Logging road construction and impacts watersheds to riparian buffers and habitat
1950s	Construction of residential housing began along Lake Tapps Reservoir shoreline	Increase in impervious surfaces adjacent to Lake Tapps
By 1970s	Major channelization projects completed	45 miles of three rivers in basin had been channelized (14.7 miles of dikes with concrete armoring, 57.3 miles of dikes and river banks with rock riprap)
1974	County gravel removal projects started	Rivers maintained by lowering of riverbed instead of raising heights of dikes
1988	Puyallup Land Claims Settlement	Major property ownership issues settled
1996	Largest flood event since 1933	Flood levels at tops of levees, Mud Mountain Dam may have prevented overtopping
1999	Puget Sound Chinook Listed as Threatened under the federal Endangered Species Act	Chinook present in White and Puyallup Rivers
2004	White River Hydroelectric Project at Lake Tapps Reservoir ceased operation	Hydroelectric power from Lake Tapps Reservoir ceased
2008	Puyallup River flooded	Flood levels overtopped levees leading to evacuations and property damage.

Date	Event	Impacts
2009	Puyallup and White Rivers flooded	Flood levels overtopped levees leading to evacuations and property damage. Mud Mountain Dam may have prevented overtopping.
2009	On December 18, Cascade Water Alliance purchased the Hydroelectric Project	Cascade Water Alliance is proposing to utilize the Lake Tapps Reservoir as a water supply

(Source: Kerwin, 1999; Pierce County, 2009a; Cascade Water Alliance, 2010)

3.2 Climate Change

Many changes in global climate have been documented over the last century. Various reports published in recent years indicate that there is an overall warming climate trend. The nature and causes of these changes has been comprehensively documented in the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC, 2007). In 2009, a detailed report on climate change in the United States was published by the United States Global Change Research Program (USGCRP, 2009). The USGCRP report includes a brief analysis of the Northwest part of the United States. The Climate Impact Group (CIG) at the University of Washington (CIG, 2009) has developed climate models specifically focused on Puget Sound and published reports about possible climate impacts in Puget Sound. The possible climate impacts outlined in the 2009 report by the CIG include:

- Continued warming on the order of 0.2 - 1.0 ºF through 2050. The rate of change after the 2050s depends increasingly on the choice of greenhouse gas emissions scenarios.
- Possible decrease in summer precipitation and increase in winter precipitation with little change in the annual mean.
- Decrease in April 1 snowpack of 30 percent by the 2020s to 65 percent in the 2080s.

These factors have the potential to influence the functioning of Puget Sound ecosystems. Warmer temperatures will influence the nature and geographic extent of the snowpack that feeds the higher elevation streams. Warmer temperatures could also result in higher summer water temperatures, having the potential to negatively impact several water quality parameters. Additional precipitation, and a broadened rain-on-snow area, has the potential to influence flow regimes.

One of the anticipated effects of climate change in the Pacific Northwest is sea-level rise. Sea-level rise will likely change coastal processes and habitats, if water elevations increase as predicted. A recent study has been published by the National Wildlife Federation (NWF) on sea-level rise and coastal habitats in the Pacific Northwest (NWF, 2007). This study evaluated the Puget Sound, southwestern Washington, and northwestern Oregon coasts specifically, and identified 11 different sites within the Puget Sound for sea-level modeling. The model used a range of sea-level rise scenarios as predicted by the IPCC from 3.0 inches

increase in global sea levels by 2025 to a 27.3 inches increase to 2100. Sea-level rise within this range is anticipated to affect coastal habitats and fish and wildlife dependent upon the coastal areas of the Puget Sound. Mote et al. (2008) recently calculated sea-level rise projections specific to the Puget Sound region. Three estimates were reported based on greenhouse gas emissions scenarios. These new scenarios report rise in sea level ranging from 3 to 22 inches by 2050, and from 6 to 50 inches by 2100.

The Puyallup delta in Tacoma is already developed and protected by dikes and levees. Therefore, sea-level rise in Commencement Bay is likely to cause a loss of marine beaches at the mouth of the Puyallup, but not likely to impact riparian habitats or wetlands (since so few remain) (NWF, 2007). Sumner is located inland and may not be directly affected by sea level rise, but could be affected by changes in river flow regime due to climate change.

3.3 Watershed Conditions

NMFS (NMFS, 1996) and USFWS (NMFS and USFWS, 1998) define "not properly functioning" watershed conditions by the presence of many valley bottom roads, the disturbance of greater than 15 percent of a watershed, and fragmented riparian conditions. Beyond this threshold, watershed conditions can be expected to continue to degrade. In the Puyallup watershed, future land development is expected to continue, increasing peak flows within the White and Puyallup Rivers and exacerbating existing erosion, sedimentation, and water quality problems. In addition, due to past and ongoing urbanization, Sumner and its surroundings contain many valley bottom roads. These factors have resulted in a "not properly functioning" watershed condition. Section 6 includes details related to watershed conditions for each shoreline segment within the City of Sumner's shoreline planning area.

3.4 Floodplain Characterization

The 100-year (one percent annual chance) floodplain for Sumner and surrounding areas has been mapped by Federal Emergency Management Agency (FEMA) (Map 4) and released as draft Federal Insurance Rate Maps (DFIRM). Flooding along the Puyallup River and the White River is primarily due to high streamflow during winter months. Sumner is located in a low-lying area that includes a relatively wide floodplain for the majority of the SMP area (Map 3). The floodplain is partially confined in many areas by levees and concrete revetments. Section 5.5 includes a discussion of frequently flooded areas. Section 6 includes floodplain characterization, including modifications, for each shoreline segment within the City of Sumner's shoreline planning area.

The entire floodplain is not regulated under the SMP regulations for the City of Sumner, but is an essential part of the ecosystem characterization. The addition of additional impervious area and development within the designated floodplain may result in increases in water surface elevations and extent of flooding during a large flood event, such as a 100-year flood.

The 100-year floodplain designated by FEMA extends significantly farther than the Sumner SMP segments in many locations along the White River and Puyallup River (Map 4). Table 3-2 indicates the differences in acreage of floodplain area.

Table 3-2. Acres in Floodplain both inside and outside shoreline planning segments

Waterbody	Floodplain in Shoreline Planning Area Segments (acres)	Floodplain outside of Shoreline Planning Area Segments (acres)	Total Floodplain (acres)
Puyallup River	130	68	198
White River	425	587	1,012

The 100-year floodplain outside of the segments includes an additional 65 acres of developed area along the Puyallup River and 377 acres along the White River (Table 3-3). See Appendix B (graphs B-1 and B-2 for a more detailed breakdown of land cover).

Table 3-3. Summary of existing land cover outside of the segments

Type of Land Cover	Puyallup River Floodplain		White River Floodplain	
	Area (Acres)	Area (%)	Area (Acres)	Area (%)
Developed (0-100% Impervious Surfaces)	65	95	377	64
Agriculture (Cultivated, Pasture/Hay, Grass)	1	1	187	32
Vegetated (Forest, Shrubs, and Wetlands)	3	4	23	4
Total	**69**	**100**	**586**	**100**

The approximate impervious area percentages for the entire floodplain are significantly higher than in the floodplain within the segments along the Puyallup River and the White River (Table 3-4).

Table 3-4. Summary of approximate impervious area percentages

Water Body	Land Use (impervious percentage)	Floodplain within segment (percent)	Floodplain outside of segment (percent)	Entire Floodplain (percent)
Puyallup River	High Intensity Developed (80-100%)	1	4	2
	Medium Intensity Developed (50-79%)	12	39	21
	Low Intensity Developed (21-49%)	31	48	37
	Developed Open Space (0-20%)	13	4	10
	Total Impervious Area (0-100%)	**57**	**95**	**70**
White River	High Intensity Developed (80-100%)	3	25	16
	Medium Intensity Developed (50-79%)	9	16	13
	Low Intensity Developed (21-49%)	15	13	14
	Developed Open Space (0-20%)	5	10	8
	Total Impervious Area (0-100%)	**32**	**64**	**51**

Existing land use designations do not differ as dramatically between the floodplain area and the floodplain within shoreline segments. See Appendix B (Graphs B-3 and B-4) for graphs comparing existing land use designations.

- Existing land use within the Puyallup River floodplain within the segments is mainly a mix of low-density residential (36 percent) and multi-family residential (34 percent). Existing land use within the entire Puyallup River floodplain is similar with a slightly lower amount of low-density residential (29 percent) and higher amount of multi-family residential (36 percent).

- Existing land use within the White River floodplain within the segments is a mix of vacant lands (42 percent), industrial/manufacturing (23 percent) and low-density residential (15 percent). Existing land use within the entire White River floodplain is composed of less vacant lands (35 percent) and higher amount of industrial/manufacturing (31 percent).

Existing zoning designations are generally similar both within shoreline segments and within the entire floodplain. See Appendix B (Graphs B-5 and B-6) for graphs comparing zoning designations.

- Zoning designations within the *Puyallup River floodplain within the segments* is a mix of low-density residential (41 percent) and high-density residential (30 percent). Zoning designations within the entire Puyallup River floodplain are focused slightly less on low-density residential 1200 (36 percent) and more on high-density residential (33 percent). Pierce County zoning in Segment JPA-1 is almost identical when comparing the entire floodplain and the floodplain with the shoreline segment.

- Zoning designations within the White River floodplain within the segments are a mix of light industrial (69 percent) and agriculture (21 percent). Zoning designations within the entire *White River floodplain* is almost identical with a mix of light industrial (66 percent) and agriculture (19 percent).

There is a higher amount of documented wetland area in the White River floodplain within shoreline segments (7 percent) than within the entire White River (3 percent). The Puyallup River floodplain does not contain any documented wetland area. See Appendix B (Graphs B-7 and B-8) for graphs comparing wetland areas.

4.0 LAND AND SHORELINE USE PATTERNS

The City of Sumner, located approximately 12 miles east of Tacoma and 34 miles south of Seattle, encompasses an area of approximately 7.5 square miles. The city's UGA is approximately 1.3 square miles. The City is predominantly located on the valley floor of the Puyallup and White River valleys. As of 2009, the City's population was approximately 9,085. Over the recent past, the city has experienced a rapid growth rate, and a portion of this development has occurred in the shoreline areas of the White and Puyallup Rivers.

4.1 Existing Land Use

According to Pierce County Assessor records (City of Sumner, 2009b; Pierce County, 2008a), current land use in Sumner's shoreline planning area is a mix of vacant, industrial / manufacturing, residential, and parks/open space uses. Designated vacant lands are currently the dominant land use (43 percent of entire shoreline planning area) focused mainly in Segments F and UGA-1. While the term "vacant" may not always accurately reflect current conditions (such as protected open space, agriculture, wetlands, or lands with development restrictions), the classification generally indicates that no structural improvements have been made or assessed for taxes on the property.

Industrial/manufacturing is the second most common land use (16 percent of entire shoreline planning area) focused almost entirely along the White River, mainly in Segments E and G. Residential land uses are less common (14 percent of entire shoreline planning area) and mainly concentrated along the Puyallup River as well as Segments E and F on the White River. Designated parks and open space lands compose 11 percent of entire shoreline planning area with the largest acreage in Segment F (City of Sumner, 2009b; Pierce County, 2008a).

4.2 Comprehensive Plan

According to Sumner's *Comprehensive Plan* (City of Sumner, 2005), the city contains a variety of designated land uses, ranging from heavy industrial to residential (Map 8). The predominant comprehensive land use designation in the shoreline planning area within Sumner's city limits and UGA boundaries is Public/Private Utilities and Facilities (44 percent). Light Industrial is the second most common comprehensive plan designation (39 percent). Similar to existing land uses, residential land use designations are less common (10 percent) and are mainly located along the Puyallup River and Segment C on the White River. Remaining land use designations are almost evenly divided among General Commercial (4 percent) and Heavy Industrial (3 percent) (City of Sumner, 2009b).

The purpose of the Public/Private Utilities and Facilities comprehensive plan designation is

> *To identify lands utilized to provide public and private utilities, facilities, and services. Allowable uses include parks, schools, medical facilities, non-profit service uses/organizations, public and private utilities, and government buildings (City of Sumner, 2005).*

The types of uses the Light Industrial comprehensive plan designation allows for are described below:

> *Principle uses include light manufacturing (particularly assembling and manufacturing of products from previously prepared material), office, warehouse/distribution, and packaging plants. Secondary uses include service retail, restaurant, government, agricultural activities, and utilities subject to compatibility criteria (City of Sumner, 2005).*

Almost all properties designated Public/Private Utilities and Facilities within Sumner city limits are under City ownership. Most of the remaining properties similarly designated are under Puget Sound Energy ownership in the UGA-1 segment.

Pierce County's *Comprehensive Plan* (Pierce County, 1994) designates the shoreline planning area within JPA-1 since that area is located outside Sumner's city limits and UGA. Approximately 80 percent of JPA-1 is designated Rural-10 and 20 percent is designated Agriculture Resource Lands (Pierce County, 2006). The intent of the Rural-10 comprehensive land use designation is to allow for a basic density of 1 dwelling unit per 10 acres. Preservation of open space and clustering of units is encouraged through density bonuses (Pierce County, 1994).

4.3 Zoning Designations

The City's zoning designations generally follow land use designations from the City's comprehensive plan, discussed above (Map 9). Light Industrial is the most common zoning designation within Sumner's city limits and UGA (54 percent). Agriculture is the second most common zoning designation (15 percent). Residential zoning designations are the third most common (13 percent) and Public/Private Utilities and Facilities are the fourth (10 percent). Remaining zoning designations are almost evenly divided between Heavy Industrial (4 percent) and General Commercial (3 percent) (City of Sumner, 2009b).

The major difference between the Comprehensive Plan designations and zoning designations is that Public/Private Utilities and Facilities is not as prevalent a zoning designation as it is under the Comprehensive Plan. Almost the entire right bank of the White River is designated by the Comprehensive Plan as Public/Private Utilities and Facilities in Segment F. However, the zoning designations for those properties are a mix of Agriculture and Light Industrial. Regardless of the zoning designations, those properties are in public ownership, with a large majority either leased for turf farming or part of the Sumner Meadows Golf Links.

Pierce County zoning designations are identical to the comprehensive plan designations in Segment JPA-1. Approximately 80 percent of JPA-1 is designated Rural-10 and 20 percent is designated Agriculture Resource Lands (Pierce County, 2008a).

Table 4.1 identifies the relative percentage of existing land uses in each planning segment based on 2009 and 2008 Pierce County Assessor land use records (City of Sumner, 2009b; Pierce County, 2008a). Table 4.1 also includes Comprehensive Plan land use and zoning designations for each segment, as well as the approximate amount of developed area within each shoreline planning segment. Impervious area is based on land cover data from NOAA (Coastal Change Analysis Program [C-CAP] / National Land Cover Database [NLCD], 2006). Finally, Table 4.1 identifies the shoreline environment designations as established by Sumner's 2004 *Shoreline Master Program* and Pierce County's 1974's *Shoreline Master Program*. See Maps 8, 9, and 10 for comprehensive plan and zoning designations, and land cover.

Table 4-1. Land Use Table

Shoreline Segment	Existing Land Use	Percent	Comprehensive Plan Land Use Designations	Percent	Zoning Designations	Percent	Approximate Impervious Area	Percent	Shoreline Environments
A	Unknown[1]	27	High Density Residential	47	High Density Residential	47	High Intensity Developed (80-100%))	36	Shoreline Residential and Urban Conservancy
	Vacant	23	Low Density Residential 1	6	Low Density Residential 1200	34	Medium Intensity Developed (50-79%)	36	
	Multi-Family Residential	29	Low Density Residential 2	13	Low Density Residential 6000	10	Low Intensity Developed (21-49%)	7	
	Low-Density Residential	13	Public/Private Utilities and Facilities	34	Low Density Residential 7200	3			
	Public Facilities/Utilities	4			Low Density Residential 8500	6			
	Agriculture	3							
B	Public Facilities/Utilities	43	General Commercial	7	Low Density Residential 1	55	High Intensity Developed (80-100%))	13	Urban Conservancy
	Other [2]	20	Low Density Residential 3	48	Low Density Residential 1200	41	Medium Intensity Developed (50-79%)	31	
	Low-Density Residential	18	Public/Private Utilities and Facilities	45	Low Density Residential 6000	1	Low Intensity Developed (21-49%)	6	
	Vacant[3]	17			Low Density Residential 8500	3			
	Transportation	2							
C	Low-Density Residential	30	General Commercial	57	General Commercial	48	High Intensity Developed (80-100%))	23	Urban and Urban Conservancy
	Commercial	22	Light Industrial	5	Light Industrial	5	Medium Intensity Developed (50-79%)	42	
	Industrial/Manufacturing	16	Low Density Residential 3	14	Low Density Residential 1	10	Low Intensity Developed (21-49%)	13	
	Park/Open Space	13	Medium Density Residential	8	Low Density Residential 6000	11			
	Vacant	11	Mixed Use Development	13	Low Density Residential 8500	1			
	Other	4	Public/Private Utilities and Facilities	3	Medium Density Residential	10			
	Government/Institution	3			Mixed Use Development	15			
	Transportation	1							
D	Industrial/Manufacturing	38	Heavy Industrial	31	Heavy Industrial	31	High Intensity Developed (80-100%))	8	Urban Conservancy
	Public Facilities/Utilities	25	Light Industrial	69	Light Industrial	69	Medium Intensity Developed (50-79%)	24	
	Park/Open Space	19					Low Intensity Developed (21-49%)	5	
	Commercial	13					Developed Open Space (0-20%)	4	
	Vacant	3							
E	Vacant	38	Heavy Industrial	3	Heavy Industrial	3	High Intensity Developed (80-100%))	11	Urban Conservancy
	Agriculture	25	Light Industrial	87	Light Industrial	97	Medium Intensity Developed (50-79%)	13	
	Industrial/Manufacturing	22	Public/Private Utilities and Facilities	10			Low Intensity Developed (21-49%)	3	
	Low-Density Residential	15					Developed Open Space (0-20%)	41	
F	Vacant	55	Light Industrial	21	Agriculture	41	High Intensity Developed (80-100%))	5	Urban Conservancy
	Park/Open Space	25	Low Density Residential 1	1	Light Industrial	54	Medium Intensity Developed (50-79%)	8	
	Industrial/Manufacturing	9	Low Density Residential 2	5	Low Density Residential 8500	5	Low Intensity Developed (21-49%)	7	
	Low-Density Residential	5	Public/Private Utilities and Facilities	73			Developed Open Space (0-20%)	21	
	Public Facilities/Utilities	5							

Shoreline Segment	Existing Land Use	Percent	Comprehensive Plan Land Use Designations	Percent	Zoning Designations	Percent	Approximate Impervious Area	Percent	Shoreline Environments
G	Industrial/Manufacturing	60	Heavy Industrial	7	Heavy Industrial	17	High Intensity Developed (80-100%))	22	Urban Conservancy
	Vacant	30	Light Industrial	75	Light Industrial	83	Medium Intensity Developed (50-79%)	34	
	Park/Open Space	6	Public/Private Utilities and Facilities	9			Low Intensity Developed (21-49%)	3	
	Low-Density Residential	4	Urban Village	9					
H	Vacant	59	Light Industrial	100	Light Industrial	100	High Intensity Developed (80-100%))	6	Rural (Pierce County)
	Industrial/Manufacturing	36					Medium Intensity Developed (50-79%)	5	
	Agriculture	5					Developed Open Space (0-20%)	4	
UGA-1	Vacant	100	Public/Private Utilities and Facilities	100	Public/Private Utilities and Facilities	100	Medium Intensity Developed (50-79%)	0.4	Rural/Residential (Pierce County)
JPA-1	Low-Density Residential	36	Agriculture Resource Land	20	Agriculture Resource Land	20	High Intensity Developed (80-100%))	6	Rural and Conservancy (Pierce County)
	Multi-Family Residential	33	Rural - Ten	80	Rural – Ten	80	Medium Intensity Developed (50-79%)	36	
	Agriculture	15					Low Intensity Developed (21-49%)	17	
	Vacant	10							
	Other	3							
	Industrial/Manufacturing	2							
	Government/Institution	1							

[1]Parcels classified as unknown by the Pierce County assessor's data are likely part of the Riverwalk condominium community.
[2] These parcels correspond to City-owned open space east of the Sumner Wastewater Treatment Plant.
[3] These parcels are under public ownership
Source: City of Sumner 2009; Pierce County 2006; Pierce County 2007; Pierce County 2008a

4.4 Water-Dependent Uses

Water-dependent uses typically include marinas, docks, piers, boating facilities, outfalls and aquaculture. The Puyallup Tribe launch boats into the White River at the Confluence Park (described in Section 4.5) as part of their fish-counting research. There are no other docks, piers, boat ramps, boating facilities or marinas within Sumner shorelines. However, water-dependent uses are located in Lake Tapps outside of the Sumner shoreline planning area.

Water in Lake Tapps is released to the Dieringer Flume via an outfall structure. Even though the Puget Sound Energy Hydropower Project at Lake Tapps ceased operation in January 2004, this outfall structure is likely still considered a water-dependent use. Cascade Water Alliance has future plans for managing Lake Tapps as a municipal water supply which could involve water dependent activities. Other water-dependent use in Sumner's shoreline planning area is the outfall associated with the City's wastewater treatment plant on the White River in Segment B. One mapped stormwater outfall is located in Segment F along the White River. One mapped sewer overflow outfall is located in Segment A along the Puyallup River (see Map 12).

4.5 Public Access Sites

Existing and potential public access sites were identified from information provided in the *Sumner Parks and Open Space Plan* (City of Sumner Board of Park Commissioners and Sumner Community Development Department, 2000) and *Sumner Trail Master Plan* (City of Sumner Community Development Department, 2008). Public access sites were also identified from City staff field reconnaissance of the White and Puyallup River.

4.5.1 Existing Public Access Sites

Existing open space within the shoreline planning area includes both public and private utilities and facilities, along with wetlands, undeveloped agricultural lands, vacant land, and the river corridors themselves. As discussed under Section 4.1, above, substantial portions of Sumner's shoreline are occupied by public/private utilities and facilities. Major parks and facilities in the shoreline planning area providing public access to the shoreline are shown in Map 13. Some public access locations have been established directly through the city's shoreline permit process as a condition of approval of the permits. Public access to Lake Tapps within the shoreline planning area is not available. Public access locations along the White and Puyallup Rivers include the following:

- **Riverside Park:** (Segment JPA-1) This 50-acre site is located on the left bank of the Puyallup River in unincorporated Pierce County. The park is currently leased to River Valley BMX Racing for seasonal motorcross bicycle races and Tacoma Disc Golf Players Association for disc golf (Pierce County, 2009b). Access to the Puyallup River dike is available.

Photograph 4-1. Riverside Park

- **Riverside Trail:** (Segments A, B, D, E and F) The Riverside Trail is the planned and partially built, non-motorized trail along the banks of the Puyallup and White Rivers from the City's northerly limits to its southerly limits. The Riverside Trail is planned to link to four major regional trails: Foothills Trail from Buckley and Orting, Puyallup River Trail from Tacoma and Puyallup, Interurban Trail from Seattle, and White River Trail from Auburn. Additional links include connections to Lakeland Hills (to Lake Tapps) and Jovita Trail at Stewart Road (currently at a conceptual stage). The trail provides access to the river in several locations. See Map 13 for planned and already-built portions of the trail and trailhead locations.

- **Girard Park/Grand Park:** (Segment A) This 0.6-acre park is located on the south side of Highway 410, east of the BNSF bridge. Freeway construction drastically limited access to this park. The park can be reached through the Rainer Manor Mobile Home Park by walking along the Puyallup River bank.

- **City-owned Open Space:** (Segment B) This 4-acre undeveloped open space owned by the City is located along the Riverside Trail that provides access to the Puyallup River.

- **Confluence Park:** (Segment B) This 1.5-acre park is located at the confluence of the White and Puyallup Rivers near the City's wastewater treatment plant. Access to the river is available at several points along the bank. It is used frequently for fishing and for boat launching by the Puyallup Tribe.

- **63rd Street East Street-End:** (Segment B) Public access in the right-of-way (ROW) of the intersection of State Street and 63rd Street East is available on the right bank of the White River.

- **Spinning Avenue Street-End:** (Segment C) Public access in the ROW of the intersection of Spinning Avenue and West Main Street is available on the right bank of the White River.

- **City-owned Open Space:** (Segment C) This 0.2-acre undeveloped open space owned by the City is located on West Main Street directly adjacent to the White River.

- **Bridge Street Bridge:** (Segment C) Access to the White River is available in the ROW of Valley Avenue East on either side of the bridge.

- **Library and Community Center:** (Segment C) This is a 3-acre site on the right bank of the White River that houses the Sumner Pierce County Library. There is a 0.8-acre "park" with picnic tables near several large trees. The property offers direct access to the White River.

Photograph 4-2. Library and Community Center

- **Fryar Avenue Bridge:** (Segment D) Access to the White River is available in the ROW of Fryar Avenue on either side of the bridge.

- **City Public Works Shops:** (Segment D) Park associated with Riverside Trail.

- **Tacoma Avenue Bridge**: (Segment D/E) Access to the White River is available in the ROW of Tacoma Avenue on either side of the bridge.

- **145th Avenue Vacated ROW:** (Segment E) Access to the White River is available in the vacated ROW of 145th Avenue north of 45th Street East.

- **24th Street Trail Bridge:** (Segment F) Access to the White River is available in the ROW of 24th Street East on either side of the pedestrian bridge.

- **Open Space south of Golf Course:** (Segment F) This 40-acre site is currently an undeveloped, City-owned property. The site is currently leased out to be farmed. A band of trees are located along the river and a large stand of cottonwood extend inland from the river at 24th. A utility and pedestrian bridge has been constructed across the White River at 24th as part of the Riverside Trail network.

- **Riverbend Park:** (Segment F) This 8-acre site is located south of the Sumner Meadows Golf Links on the left bank of the White River. It is currently an undeveloped park characterized by cottonwoods along the river, blackberry and wetland areas. The banks in some areas are shallow offering good access to the water's edge.

- **Sumner Meadows Golf Links**: (Segment F) This 165-acre golf course is located on 8th Street East northeast of the White River. It includes an 18-hole course, a driving range, and a clubhouse. The park has an additional 94 acres yet to be developed (City of Sumner, 2003).

Photograph 4-3. Sumner Meadows Golf Links

- **Stewart Road Bridge:** (Segment G/H) Access to the White River is available in the ROW of Stewart Road on either side of the bridge.

4.5.2 Planned Public Access Sites

Improvements and enhancements to existing park and open space resources identified in the *Sumner Parks and Open Space Plan* and *Sumner Trail Master Plan* include the following:

- **Riverside Park:** The Capital Improvement Plan in the Pierce County Parks, Recreation and Open Space Plan Update (Pierce County, 2008b) identified preparation of a master plan for the park as a Priority 1 (defined as projects that are needed to maintain existing level of service) and implementation of master plan improvements as a Priority 3 (defined as projects that expand the park system). The Sumner Trail Master Plan identifies the park as a good place for a trailhead for the Riverside Trail.

- **Riverside Trail:** There is an on-going effort to continue constructing the Riverside Trail throughout Sumner. Map 13 shows the portions of the trail that are planned to be built in the future. The Sumner Capital Facilities Plan (City of Sumner, 2003a) allocated $2.3 million dollars towards the design and construction of the trail. The Sumner Master Trail Plan estimated the cost of implementing two major phases of the trail system to be $4.8 million. Phase 1 would involve constructing the following trail connections:

    - **Stewart Road to the White River –** Construct trail along the relocated 8th Street Creek from White River to Stewart Road.

    - **North Side of Stewart Road –** Construct 1,600 lineal feet along the north side of Stewart Road to ensure a connection between Lakeland Hills in Auburn and the trail system in Pacific. This project is currently under construction (City of Sumner, 2009a).

    - **Confluence Trail to Bridge Street Bridge –** Construct trail from SR 410 along West Main Street to Bridge Street Bridge.

- **Girard Park/Grand Park**: *The Sumner Parks, Recreation and Open Space Plan* identifies potential use of the park as trail and trailside park. Once the Riverside Trail along the Puyallup River is extended east of the Traffic Avenue bridge, public access to this park would be dramatically improved.

- **Confluence Park**: *The Sumner Master Trail Plan* identifies the park as a good place for a trailhead for the Riverfront Trail. Boat ramp, boat trailer parking, fisherman's shelters, and restrooms would be beneficial services added to the site.

- **Open Space south of Golf Course:** The Parks, Recreation and Open Space Plan identifies two alternatives for this property: 1) develop it as an active regional park

with river access including boat launches; or 2) develop it as an extension to the golf course. Development of this property is ranked as medium priority (to be implemented over the next 20 years).

The *Sumner Trail Master Plan* identifies the site as an excellent location for a major trailhead. The park could be developed with sport fields, expanded golf course, and parking lots. The Plan recommends that the wooded area near 24th be preserved and made more accessible with footpaths. According to the Plan, since most of the area is wetland and one of the last areas of riparian woodland, it should be preserved as habitat.

The City has received funding from the Salmon Recovery Funding Board to conduct a feasibility analysis for the future construction of a setback levee for the purposes of improving floodplain connectivity and salmon habitat. The feasibility analysis is expected to encompass this 40-acre property as well as 80 acres of City-owned property to the south.

- **Riverbend Park:** The *Parks, Recreation and Open Space Plan* identifies options for this park as including river access, kite flying, softball and recreation fields, and/or interpretive center. *Sumner Trail Master Plan* identifies Riverbend Park as a site for a trailhead.

4.6 Transportation Facilities

4.6.1 Roads

Sumner's shoreline planning area contains several roads, from two-lane neighborhood collectors to arterials. The highest road density is located in the vicinity of downtown Sumner, in Segment C. Refer to Section 6 and Map 12 in Appendix A for the location of roads in each shoreline segment.

4.6.2 Bridges

There are 11 bridge crossings documented in the shoreline planning area. Table 4-2 below lists the bridge crossings, the waterbody that is crossed, and the shoreline planning segment. Also see Map 12 in Appendix A for the location of bridges in each shoreline segment.

Table 4-2. Bridge crossings located in Sumner shorelines.

Bridge	Waterbody	Shoreline Reach
BNSF railroad bridge	Puyallup River	Segment A
Traffic Avenue East bridge	Puyallup River	Boundary between Segment A and B
SR 410	White River	Boundary between Segment B and C
Bridge Street Bridge	White River	Segment C
Union Pacific railroad spur bridge	White River	Boundary between Segment C and D
Fryar Avenue bridge	White River	Segment D
Tacoma Avenue bridge	White River	Boundary between Segment D and E
24th Street pedestrian bridge	White River	Segment F
Stewart Road bridge	White River	Boundary between Segment G and H
Sumner Tapps Highway East	Lake Tapps	Segment UGA-1
Orting Highway East (SR 162)	Puyallup River	Boundary between Segment JPA-1 and A

4.7 Utilities

4.7.1 Storm Water and Sewer Outfalls

The Sumner Wastewater Treatment Plant is located at the confluence of the Puyallup and White Rivers in shoreline Segment B. Sanitary sewage is conveyed to the treatment plant by a series of collectors, as well as the 36-inch Sewage Treatment Plant interceptor. There are 5 pump stations located in the shoreline planning area; these are the 41st Pump Station (right bank, Segment E), Tacoma Pump Station (right bank, Segment E), 142nd Pump Station (left bank, Segment D), the North Pump Station (right bank, Segment D) on the White River, and the Cherry Avenue Pump Station (left bank Segment A) on the Puyallup River. The City's sewer system also contains two overflow outfalls, one in the White River on the right bank of Segment C, and the other on the left bank of the Puyallup River near the Cherry Avenue Pump Station in Segment A (City of Sumner, 1993). The wastewater treatment plant provides sanitary sewer treatment for the City of Sumner and the City of Bonney Lake. The wastewater treatment plant is a secondary treatment facility that treats an average wet weather flow of 2.62 million gallons per day with a peak hydraulic capacity of 6.56 million gallons per day. The treated effluent is discharged to the White River through an outfall.

Within the core downtown area of Sumner, generally south of Puyallup Street and west of Valley Avenue, the City's storm drainage system consists of collection by a network of pipes and direct discharge to the White and Puyallup Rivers. North of the downtown core, a series of ditches and new tight-line systems convey drainage to the White River; these ditches are maintained to a specified design flow. Salmon Creek is used for stormwater conveyance and contains several stormwater discharge outfalls (City of Sumner, 1993).

4.7.2 Other Utilities

Commercial, residential, and industrial buildings located in the shoreline planning area are served by municipal water, as well as gas and electricity (Puget Sound Energy) and telephone (Qwest). There are no major utility structures along the Puyallup River shoreline planning area. However, there are utility facilities located along the White and Lake Tapps shorelines.

Photograph 4-4. Tailrace Canal looking east at Powerhouse

Other utilities include the recently-decommissioned Dieringer Powerhouse and its associated "tailrace" or discharge canal, located west of Lake Tapps and on the east bank of Segment F in the White River. While the powerhouse is no longer used to generate electricity, water is still diverted from the White River through Lake Tapps, and discharged back into the White River at the Dieringer Powerhouse. The tailrace consists of a

constructed canal approximately 30 feet wide that discharges water to the White River. During hydropower operation, the flows discharging from Tailrace Canal were high (Table 4-3) and the flows in the White River above the Tailrace Canal were low (Table 4-4). High flows through the canal create a false attraction for salmonid species, while low flows occur in river reaches below the diversion (Kerwin, 1999). These "ramping" rates may strand juvenile and adult fish (Kerwin, 1999). Since the hydropower operations ceased in 2004, the annual average flow discharging from Tailrace Canal is significantly lower while the average flow above the Tailrace Canal is higher (Cascade Water Alliance, 2010). There have not been studies completed to determine if the post hydropower flow is low enough to deter salmonid species from entering the canal. Flows are discussed in further detail in Section 5.3.4 of this report.

Table 4-3. Monthly Average Decrease in Flow Rates (cfs) at Tailrace Canal

Year Type	Hydropower Period (1988-2002)	Post-Hydropower Period (2004-2008)	Monthly Average Decrease in flow
Average	924	115	809
Wet Year (2007/1996)	899	88	811
Dry Year (2005/2001)	681	153	528

Source: Cascade Water Alliance, 2010.

Table 4-4. Monthly Average Increase in Flow Rates (cfs) in White River above Tailrace Canal

Year Type	Hydropower Period (1988-2002)	Post-Hydropower Period (2004-2008)	Monthly Average Increase in flow
Average Year	924	1565	861
Wet Year (2007/1996)	899	1930	504
Dry Year (2005/2001)	681	981	647

Source: Cascade Water Alliance, 2010.

The Public Works shops are located in the shoreline planning area (Segment D) on the left bank of the White River at 4711 142nd Avenue East. The property is 8.35 acres in size with 5 buildings that house offices, meeting rooms, vehicle and material storage, vehicle wash and repair, sign shop, and welding and fabrication shop (City of Sumner, 2003a).

On Lake Tapps, there is a large substation located west of 167th Avenue E, just west of the section of Lake Tapps that lies within the City UGA. This substation is owned and operated by Puget Sound Energy. Overhead transmission lines cross Reach UGA-1 en route to the substation. Transmission towers are located to the east and west of open water associated with Lake Tapps.

4.8 Shoreline Modifications

4.8.1 Flood Control Structures

Both the Puyallup and White Rivers are lined through their entire length in Sumner with a system of levees and concrete revetments that were built in the early 1900s. These structures are included in the planning area of the Pierce County River Improvement Division (PCRI). According to the *Puyallup River Basin Comprehensive Flood Control Management Plan* (PCRI, 1991), levees are defined as "structures designed, constructed, and maintained as flood proof structures with three feet of freeboard (as required by FEMA) above a design flood elevation." Revetments are "flood control structures not necessarily engineered or designed to be flood proof and do not have three feet of freeboard above the 100-year flood elevation."

Photograph 4-5. Construction of levees along the north bank of the Puyallup River dated July 9, 1916 (Pierce County River Improvement Division, 1991).

The Puyallup River within Segments A, B, and JPA-1 is almost completely lined with levees, while most of the White River within Segments B through H is armored with revetments. The levees within Segments JPA-1, Segment A, and Segment B have recently been classified

as ineligible for FEMA certification. Many of these levees have less than three feet of freeboard.

Over time, vegetation has grown and obscured many of the revetments and levees within the Sumner shoreline planning area. An agreement with the Puyallup Tribe in 1995 calls for retention and encouragement of plant growth near the ordinary high water mark and/or toe of the levees and revetments. Only woody plants with a trunk diameter exceeding six inches may be removed from that zone (PCRI, 1991). Maintenance of these flood control structures by the County is currently minimal and limited to vegetation removal to maintain access, and occasionally removal of larger diseased or damaged trees.

Photograph 4-6. White River revetments

4.8.2 Docks, Piers, and Over-Water Structures

With the exception of the bridges previously described, and various powerline crossings of the White and Puyallup Rivers (see Section 6 for more detail), there are no docks, piers, or over water structures located on the Puyallup River, White River or Lake Tapps in the Sumner shoreline planning area. The existing levees and high river flows limit water access to the White and Puyallup Rivers.

4.8.3 Culverts

The Pierce County Conservation District, in cooperation with the Puyallup Tribe, has documented the location and condition of culverts throughout the Puyallup River watershed (Pierce County Conservation District, 2000). Specifically, there are no culverts on the main channels of the White or Puyallup Rivers in Sumner. However, culverts that are barriers to fish passage have been identified on several tributaries to the White and Puyallup Rivers. Tributaries with culvert barriers within 200 feet of the mainstem reaches are identified near Segment G, Segment H, south of Segment A, north of Segment F, and on the Union Pacific rail spur bridge in the vicinity of Segment D.

4.9 Historical and Cultural Resources

Historic and cultural resources are documented through a variety of sources. Official registers include the National Register of Historic Places and the Washington State Heritage Register. In 2008, the City of Sumner adopted Chapter 18.39 of the SMC (Historic Preservation) to provide for the identification, evaluation, designation and protection of designated historic resources within the boundaries of the city. This action created the Sumner Historic Register and the Sumner historic preservation commission. The City provides nomination forms for community members wishing to designate property, buildings, or districts as historic. No properties have been formally listed on the City's register since a commission has not been formed. The City is actively searching for volunteers to serve on the commission (City of Sumner website, 2009).

A search of the National Register of Historic Places and the Washington State Heritage Register for sites within the City's shoreline planning area revealed one site near JPA-1 at 7473 Riverside Road East. The Charles W. Orton house was built in 1914 in the architectural style of bungalow. The property is listed on both the National and State Registers (Washington Department of Archaeology and Historic Preservation [WDAHP], 2009).

Native American use of waterbodies throughout western Washington has been well documented. Native peoples undoubtedly used the White, Stuck and Puyallup Rivers and associated tributaries as a fishery resource. The rivers themselves could be considered a significant traditional cultural place. Although Native Americans are known to have occupied much of the Puget Sound region prior to European settlement, few archaeological resources have been found in the Sumner area, mostly due to the lack of surveys (City of Sumner, 2005). The City evaluates archaeological and historical resources on a parcel-by-parcel basis during development review.

4.10 Site Contamination

According to Department of Ecology's Facility Site database, there is one known contaminated site in the shoreline planning area (Ecology, 2010a). The Manke Lumber Company site located in Segment H on the White River is listed on the Department of Ecology's Suspected and Confirmed Contaminated Sites List for confirmed soil contamination associated with Phenolic Compounds, considered hazardous by the Environmental Protection Agency. The site is also listed for suspected groundwater, surface water, and drinking water associated with Phenolic Compounds. According to Ecology's database, remedial action to clean up the contaminated site is currently pending.

5.0 BIOLOGICAL RESOURCES AND CRITICAL AREAS

This section identifies biological resources and critical areas as defined by the State's Growth Management Act (RCW 30.70.170). Critical areas within Sumner's shoreline jurisdiction include priority habitats and species; wetlands; streams; aquifer recharge areas; landslide, erosion, seismic, and volcanic hazard areas; channel migration zones; and frequently flooded areas. Maps showing the locations of critical areas are found in Appendix A.

5.1 Priority Habitats and Species

The Washington State Department of Wildlife (WDFW) maintains a Priority Habitats and Species (PHS) list, which is a catalog of habitats and species considered to be priorities for conservation and management (WDFW, 2008b). Digital PHS data were obtained and mapped as part of the inventory process (WDFW, 2008a). Three types of priority habitats were mapped within the shoreline planning area: wetland, urban natural open space, and waterfowl concentrations (Map 5).

According to the PHS data, the portions of the White and Puyallup Rivers within the shoreline planning area provide habitat for resident cutthroat and several species of anadromous salmonids. The PHS data does not identify any priority fish species within the portion of Lake Tapps in the shoreline planning area. Table 5-1 lists the salmonid species found within the shoreline segments.

Table 5-1. Documented Priority Salmonid Species within the Shoreline Planning Segments

Stream Segment	Type of Use	Species Name
JPA-1 and A	Anadromous - Presence	Winter Steelhead Fall Chinook Pink Salmon Coho Salmon Chum Salmon Bull Trout
	Anadromous - Rearing	Fall Chinook Coho Salmon
	Anadromous - Spawning	Pink Salmon
	Resident	Cutthroat
B-G	Anadromous - Presence	Winter Steelhead Fall Chinook Spring Chinook Pink Salmon Coho Salmon Chum Salmon Bull Trout Sockeye Salmon Bull Trout
	Anadromous - Rearing	Spring Chinook Coho Salmon Pink Salmon
	Resident	Cutthroat

Source: WDFW, 2008a

As shown in Table 5-2, three of the salmonid species present within the shoreline planning area are listed as threatened under the federal Endangered Species Act (ESA), and one species is classified as a species of concern (USFWS, 2007). NMFS and USFWS have designated the White and Puyallup Rivers as critical habitat for Puget Sound ESU chinook salmon and bull trout (Federal Register, 2005 & 2010). NMFS is currently developing critical habitat designations for Puget Sound ESU steelhead. Puget Sound ESU coho salmon is listed as a "species of concern" under ESA; therefore, it has no designated critical habitat.

The PHS data set does not identify any other federally listed species within Sumner's shoreline planning areas (WDFW, 2008a).

Table 5-2. Status of Salmonid species in the White and Puyallup Rivers

Species	Federal Status
Chinook	Threatened
Chum	Not Warranted
Coho	Species of Concern
Pink	Not Warranted
Sockeye	Not Warranted
Steelhead	Threatened
Bull Trout	Threatened

Threatened: Species are likely to become endangered within the foreseeable future.

Species of Concern: Concerns regarding status and threats, but insufficient information available that indicates a need to list the species under ESA.

Not Warranted: According to NMFS, species is not warranted to be listed under ESA at this time.

5.2 Wetlands

Information on wetlands within the shoreline planning area was obtained from the National Wetland Inventory (NWI) map and a wetland inventory conducted by the City in 2006, which was subsequently revised for accuracy by ESA in 2007 (City of Sumner, 2006; ESA Adolfson, 2007). This wetland survey data is shown on Map 1.

Because the entire shoreline for both the White and Puyallup Rivers within the City limits and the urban growth area is diked, the shoreline jurisdiction is assumed to extend 200 feet landward from the top of the bank of these rivers. For the purposes of this inventory, wetlands within the floodplain beyond the dike system are assumed to be associated with the shoreline only if they fall within 200 feet of the top of bank or if a surface water connection exists between the wetland and the shoreline. Additional site-specific review will be required by future project proponents to determine the presence of any additional associated wetlands, as well as wetland categories.

The portion of Lake Tapps within the shoreline planning area is mapped as wetland in the City's wetland inventory. Table 5-3 identifies wetlands currently within the shoreline planning area for each shoreline planning segment.

Table 5-3. Wetlands Mapped within the Shoreline Study Segments

Shoreline Segment	Total Wetland Acreage	Approximate Percent Coverage
A	0	0
B	0.1	<1
C	0.9	2
D	0.3	1
E	5.5	5
F	2.4	1
G	0	0
H	20.0	86
JPA-1	0	0
UGA-1	36.5	63
TOTAL	**65.7**	**9**

According to the City of Sumner Municipal Code (Chapter 16), Category I wetlands presently require a 150-foot buffer, Category II wetlands require a 100 or 125 foot buffer (depending upon the habitat quality of the wetland), Category III wetlands require a 75-foot buffer, and Category IV wetlands require a 35-foot buffer. Wetland categories are based upon the Washington State *Wetland Rating System for Western Washington (revised*) (Hruby, 2004).

5.3 Streams

5.3.1 Water Quality

According to the Ecology water quality database, there are no reaches of the Puyallup River or portions of Lake Tapps within the study vicinity that are on the Clean Water Act 303(d) list of polluted waters (Ecology, 2008). However, several reaches of the White River are on the 303(d) list. Seven-day mean maximum temperatures of over 66 degrees F have been recorded in the reaches between RM 0.2 to 0.5, 2.5 to 4.6, and 6.5 to 9. In addition, pH values in excess of water quality standards have been recorded in the reach between RM 6.5 and 9. Just upstream of the Puyallup River confluence, the reach of the White River between RM 0.5 and 1.4 is on the 303(d) list for high fecal coliform concentrations.

Both the White and the Puyallup originate from glaciers on the slopes of Mt. Rainier Rivers and cut through a relatively steep gradient and gravelly soils in their upper reaches. Turbidity and sediment load is therefore a significant factor in these rivers, with mostly fine sediments being transported out of the upper reaches of the rivers and deposited into lower gradient reaches (Kerwin, 1999). Sediment transport has been estimated to range from 440,000 to 1,400,000 tons annually in the White River (Kerwin, 1999). Mud Mountain Dam, operated by the U.S. Army Corps of Engineers upstream of the City limits at RM 29.6, disrupts the natural delivery of sediments by impounding fine sediments during high flow and/or high load periods and discharging those same sediments for persistent and prolonged periods during lower river flows (Kerwin, 1999). This increase in sediment and turbidity may negatively affect aquatic life; however, these conditions are beyond the scope of Sumner's jurisdiction.

5.3.2 Habitat Access

No barriers to fish migration have been identified on the portions of the mainstem Puyallup and White Rivers that flow through the study area. However, at the point where water from the Dierenger Powerhouse flows into the White River in Segment F, high velocity flows attract migrating adult salmonids into the discharge channel. These flows may cause a delay in the natural upstream migration of salmonids (Muckleshoot Indian Tribe, 1996). Since the hydropower operations ceased in 2004, the annual average flow discharging from Tailrace Canal has decreased dramatically. There have not been studies completed to determine if the post-hydropower flow is low enough to deter salmonid species from entering the canal.

5.3.3 Habitat Elements

Stream habitat elements include substrate, large woody debris (LWD), pool frequency, pool quality, off channel habitat and refugia, channel complexity, and bank profile and condition. (Collins et al, 2002; NMFS, 1996; USFWS, 1998).

The shorelines of the Puyallup and White Rivers within the shoreline planning area are dominated by concrete revetments and dikes along both banks, which have straightened, confined, and simplified the river channel (Kerwin, 1999; Lower Puyallup Watershed Management Committee [LPWMC], 2004; Pierce County, 2007). Channelization and dikes have eliminated connections with side- and off-channel aquatic habitats, decreased the contribution of prey organisms to the rivers by precluding functioning riparian vegetation habitats, and precluded the recruitment of small and large wood from areas most likely to contribute this material (Kerwin, 1999). Channelization and dikes have also reduced river processes that form pools, side channels and other habitat features used by salmonids and other aquatic organisms (Kerwin, 1999).

The Mud Mountain Dam on the White River blocks wood which flows into the dam reservoir (Pierce County, 2007). Some of this wood is retained as habitat logs, but most is burned.

The removal of this wood from the White River system reduces the quantity and quality aquatic habitat downstream of the dam. While not all of this removed wood can be characterized as LWD, small wood also creates highly functional habitats and provides necessary nutrients to the river system (Kerwin, 1999).

Debris removal by private parties and municipalities in the White and Puyallup Rivers is regulated by the Hydraulic Project Approval (HPA) permit process administered by WDFW (Kerwin, 1999). While these permits typically prohibit the removal of LWD from the "wetted" river channel, it is still often removed from the channel outside the wetted area, thereby reducing the amount of LWD debris available for redistribution during future flow events.

Salmonid spawning ground surveys conducted by staff from Puyallup Tribe of Indians indicate that there is only limited spawning activity throughout the portions of the Puyallup and White Rivers in the shoreline planning area (Kerwin, 1999). Bedload transport tends to be high because of dike-induced increases in water velocities. Survival from any spawning that does occur is believed to be low due to the bedload and increased velocity scouring of egg pockets, also known as "redds" (Kerwin, 1999).

5.3.4 Flow/Hydrology

There is an extensive network of paved roadways, parking areas, roofs, and other impervious areas in the City of Sumner. Impervious surface covers over 70 percent of some of the City's shoreline segments.

Other factors outside of Sumner's jurisdiction also influence the hydrology of the rivers. Historically, the White River was permanently diverted into the Puyallup at Auburn in 1915, redirecting flows into the present-day channel. The White River added 50 percent to the annual flow in the lower Puyallup River (Williams et al., 1975). Also, flow from the White River is diverted at a diversion dam located near Buckley at RM 23.4 through Lake Tapps and discharged back into the White River at the Dieringer Canal (Pierce County, 2007). During hydropower operation, low flows in the river reaches between the diversion and the canal were measured and high flows within the canal. Since 2004, when hydropower operations ceased there have been higher flows in the White River between the diversion and the canal and lower flows in the canal (Cascade Water Alliance, 2010). Table 4.2 shows that in an average, wet, and dry year, the flows in the tailrace canal were significantly higher in the hydropower period (1988-2002), than in the post-hydropower period (2004-2008) flows. Table 4.3 shows that in an average, wet and dry year, the flows above the Tailrace Canal were lower during the hydropower period than in the post-hydropower period. Tables 5-4 and 5-5 include monthly flow data comparisons for the hydropower period and post-hydropower period above the Tailrace Canal on the White River and at the Tailrace Canal.

Table 5-4. Change in Monthly Flow Rates (cfs) in White River above Tailrace Canal

Year Type	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Average
Average	-499	-584	-912	-915	-966	-1067	-1061	-948	-1289	-868	-339	-264	-809
Wet Year (2007/1996)	-1026	-458	-538	-1376	-1082	-1245	-869	-684	-972	-897	-447	-140	-811
Dry Year (2005/2001)	-720	-362	67	-677	26	-297	-863	-1250	-1071	-577	-285	-326	-528

Source: Cascade Water Alliance, 2010

Table 5-5. Change in Monthly Flow Rates (cfs) in White River at Tailrace Canal

Year Type	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Average
Average Year	502	922	929	1451	307	1005	610	1831	1249	775	357	390	**861**
Wet Year (2007/1996)	188	1053	-1119	868	-2659	3393	732	793	1146	930	523	199	**504**
Dry Year (2005/2001)	576	777	1401	1886	311	111	382	1148	484	437	147	101	**647**

Source: Cascade Water Alliance, 2010

A hydrologic evaluation of City shorelines was not conducted for this assessment. However, for the 14-year time period from 1980 to 1993, low instream flows were recorded at the lower Puyallup River gauge, downstream of the City, an average of 35 days annually (Kerwin, 1999). In addition to the factors discussed above, low flows may be attributed to increased groundwater withdrawal through unregulated wells (5,000 gallons or less per day) and increases in impervious surfaces that lead to a decline in groundwater and base surface water flows (Kerwin, 1999).

5.3.5 Aquifer Recharge Areas

Aquifer recharge areas are defined in the City's critical area regulations (SMC 16.48) as follows:

> *Areas with the two highest DRASTIC zones which are rated 180 and above on the DRASTIC index range, as identified in Map of Groundwater Pollution Potential, Pierce County, Washington, National Water Well Association, U.S. Environmental Protection Agency; or Wellhead protection areas designated for water supply wells and springs (pursuant to WAC 246-290-135) and located within the municipal boundary of the city of Sumner.*

According to the National Water Well Association (1985), due to its predominant valley location, the entire Sumner city limits is included as a groundwater resource area. As a result, the City's entire shoreline planning area along the Puyallup and White Rivers is in a high aquifer recharge area (Segment JPA-1, Segments A-H) (see Map 3). The National Water Well Association and United States Environmental Protection Agency provide indices of the groundwater potential and susceptibility to contamination. Within the City limits (and shoreline planning area), the valley floor is rated at 180 or greater, one of the highest indices for Pierce County (City of Sumner, 1993). This index corresponds to areas of high groundwater recharge potential. A layer of coarse gravel and sand lies approximately 80 to 150 feet below the land surface in the valley and another layer occurs approximately 400 feet below the surface (Walters and Kimmel, 1968). See Map 3 for extent of aquifer recharge area in the city.

According to the City of Sumner Aquifer Recharge Area Map (City of Sumner, 2003b), the shoreline planning area is located within wellhead protection areas of the following waters supply wells and springs:

- South Well
- Elhi Spring
- County Springs
- Cemetery Well

- Sumner Springs
- Weber Springs

5.3.6 Landslide Hazard Areas

Landslide hazard areas are defined in the City's critical area regulations (SMC 16.50) as those areas subject to risk of mass movement and meeting any of the following criteria:

1. *Areas of historic land failures, including areas of unstable old and recent landslides;*
2. *Areas with all three of the following characteristics:*
    a. *Slopes steeper than 15 percent; and*
    b. *Hillsides intersecting geologic contacts with a relatively permeable sediment overlying a relatively impermeable sediment or bedrock; and*
    c. *Any signs of springs or groundwater seepage; and*
    d. *Concave slopes and swales;*
3. *Slopes that are parallel or subparallel to planes of weakness, such as bedding planes, joint systems, and fault planes, in subsurface materials;*
4. *Slopes having gradients steeper than 80 percent subject to rockfall during seismic shaking;*
5. *Areas potentially unstable as a result of rapid stream incision, stream bank erosion, and undercutting by wave action;*
6. *Any area with a slope of 15 percent or steeper and with a vertical relief of 10 or more feet. A slope is delineated by establishing the toe and top and measured by averaging the inclination over at least 10 feet of vertical relief. Qualifying slopes of 15 percent or greater to less than 25 percent shall be termed "Type II landslide hazard areas" for purposes of this chapter. Qualifying slopes of 25 percent or greater shall be termed "Type I landslide hazard areas";*
7. *Areas which have a "severe" limitation for building site development because of slope conditions, according to the U.S. Department of Agriculture's Natural Resource Conservation Service;*
8. *Slopes that contain impermeable soils (typically silt and clay) frequently interbedded with granular soils (predominantly sand and gravel);*

9. *Any area which has indications of mass wasting during the Holocene epoch (from 10,000 years ago to the present) or which is underlain by mass wastage debris of that epoch.*

For the purpose of this inventory, slopes in the shoreline planning area steeper than 15 percent are identified on Map 7. This is consistent with the SMC designations and regulations presented in SMC 16.50. Information on the presence of steep slopes was obtained from the Puget Sound LiDAR Consortium that employs laser to map topography. Steep slopes are located in all segments along the White and Puyallup Rivers and Lake Tapps.

5.3.7 Erosion Hazard Areas

Erosion hazard areas are defined as "*those areas that are identified by the presence of vegetative cover, soil texture, slope, and rainfall patterns, or human-induced changes to such characteristics, which create site conditions which are vulnerable to excessive erosion. Erosion hazard areas are those areas that are classified as having moderate to severe, severe or very severe erosion potential according to the Natural Resource Conservation Service*" (SMC 16.50). Erosion prone soils identified by the Natural Resources Conservation Service include Alderwood gravelly sandy loam (15 to 30 percent slopes), Xerochrept soils, and Kapowsin gravelly loam. None of these soil types occur within river shoreline planning areas in the City. However, Alderwood gravelly sandy loam (15 to 30 percent slopes) is mapped within segment UGA-1 (Lake Tapps). Soils mapped by the NRCS occurring within the shoreline planning area include Pilchuck fine sand, Puyallup fine sandy loam, Riverwash, Alderwood gravelly sandy loam (6 to 15 and 15 to 30 percent slopes) (Zulauf, 1979). Generally, the greatest erosion and landslide potential areas in Sumner are located along the valley sides outside of the shoreline planning area (Map 7).

5.3.8 Seismic Hazard Areas

Seismic hazard areas are defined in the City's critical area regulations (SMC 16.52) as "*areas subject to severe risk of damage as a result of earthquake-induced ground shaking, slope failure, settlement, fault rupture, or soil liquefaction."* The entire shoreline planning area along the White River and Puyallup River (Segment JPA-1, Segments A-H) are located within a seismic hazard area (City of Sumner, 2003c). UGA-1 is located outside of the seismic hazard area.

5.3.9 Volcanic Hazard Areas

Volcanic hazard areas are defined in the City's critical area regulations (SMC 16.54) as *"areas within the city which show a likelihood of lahars, debris flows and related flooding associated with volcanic activity from Mt. Rainier."* The entire shoreline planning area along the White River and Puyallup River (Segment JPA-1, Segments A-H) are located within a

volcanic hazard area (City of Sumner, 2003d). UGA-1 is located outside of the volcanic hazard area.

5.4 Channel Migration Zones (CMZs)

The channel migration zones (CMZs) are typically defined as the lateral extent of likely movement along a stream reach with evidence of active stream channel movement over the past 100 years (Perkins, 1996). Channel migration refers to the abrupt (e.g. avulsion) or gradual movement of a channel within a floodplain (GeoEngineers, 2003). A Geomorphic Evaluation and CMZ analysis of the Puyallup, White, and Carbon River watershed was conducted for Pierce County by GeoEngineers (GeoEngineers, 2003). The CMZs include low, moderate and severe migration potential areas (MPAs). The severe MPAs, which are the areas regulated in unincorporated Pierce County, are shown on Map 5. Low and moderate MPAs along the Puyallup and White River within the City of Sumner are also shown on Map 5.

Channel migration in rivers, such as the Puyallup and White River, is an important source of sediment (GeoEngineers, 2003). As channels naturally migrate within the alluvial valley, erosion provides sediment to the channel. Land within the city limits broadens into a wide, relatively flat floodplain and would historically have supported movement of the river channel across much of the valley floor. Evidence of remnant oxbows exist upstream of the city limits on both rivers. However, since the late 1800s, both rivers have been incrementally confined within flood control structures such as revetments and levees. These structures have effectively removed or drastically reduced the ability of both river channels to migrate across their floodplains.

5.5 Frequently Flooded Areas

Both the Puyallup River and the White River have overtopped the existing dike system within the City limits, resulting in flooding. Major flood events recorded by the United States Geological Survey (USGS) in the Puyallup River at the Puyallup gage include events in December 1917, December 1933, January 1965, December 1977, November 1986, January 1990, November 1990, February 1996, and January 2009. The 1996 flood is the current peak flood of record for the Sumner region.

Photograph 5-1. Puyallup River flooding at 76th Street East on January 9, 2009.

Often called the base flood, the primary measure of flood potential is the 100-year flood. Mapped by the FEMA, the 100-year floodplain in Sumner fills a large portion of the valley within city limits. The floodplain is shown in Map 4 in Appendix A.

Throughout the basin, many former floodplain areas on the landward side of the dikes along the White River and Puyallup River have been converted into residential and industrial development. The loss of natural vegetation and wetlands in the Puyallup River basin has reduced the watershed's ability to store and process water in a manner that will minimize flood event duration and peaks. Because of increases in impervious surface and reduction of floodplain storage, this process results in increased peak flows, quicker peak flows, and reduced base flows (Booth, 1991; Booth and Jackson, 1997). Contributing to the increase in flood potential is the aggradation, or filling in of the river channel with sediment from upstream areas, which increases the potential for flooding. White River flows are regulated by Mud Mountain Dam (MMD) upstream of the City limits, at RM 29.6. The dam's primary function is to protect property along the lower three miles of the Puyallup River.

Along the White River, downstream of the King County–Pierce County line, the channel has the capacity to convey approximately 9,500 cubic feet per second (cfs), without overtopping the existing banks (USACE, 2009). A flow of this volume would leave no freeboard above the flood elevation along White River in this area. Puyallup River flows are presently uncontrolled. Sedimentation and encroaching vegetation within the White River has resulted in a reduction in channel capacity (the amount of water a channel can convey without causing overbank flooding) (USACE, 2009).

Several flooding "hot spots" within Sumner's City limits were identified in the *Puyallup River Basin Comprehensive Flood Control Management Plan* (PCRI, 1991). One area, Manor Mobile Home Park and adjacent apartments, was identified along the Puyallup River within Segment A. Some of the areas identified along the White River, including an area at the

mouth of 8th Street Creek in Segment F, the Dieringer Flume area in lower Segment F, and the golf course area in upper Segment F. Additionally, the area adjacent to Segment H, within the City of Pacific, is prone to significant flooding.

6.0 CONDITIONS BY INVENTORY SEGMENT

An overview of baseline inventory conditions for each of the ten inventory segments is provided below. Current land use, public access sites, critical areas, hazardous areas, shoreline modifications and restoration opportunity areas are identified for each segment. Segments are described from south to north.

6.1 SEGMENT JPA-1. Riverside Park to City Limits

Summary: Segment JPA-1 extends from approximately RM 13.3 to 12.0 along the Puyallup River. Only the left bank of the Puyallup River is being considered part of this segment. This area is located within the Sumner Joint Planning Area in unincorporated Pierce County. This segment is constrained by levees, rock groins, and rip-rap and offers limited instream habitat. Land use in Segment JPA-1 is predominantly residential. Public access is available at Riverside Park. No wetlands have been identified within the shoreline planning area.

6.1.1 Land Use Patterns

Land use patterns described below include: existing land uses, transportation facilities, utility crossings and utility facilities, and impervious surface areas.

Existing land uses within this segment are characterized by single-family residential and manufactured homes (66 percent of shoreline planning area) interspersed with agricultural fields (15 percent of shoreline planning area). There is one site with two large warehouse buildings. The zoning is predominately Rural-10 (80 percent of shoreline planning area) with the remaining area zoned Agriculture Resource Lands (20 percent of shoreline planning area) (City of Sumner, 2009b; Pierce County, 2008a).

Several roads and bridges occur within Segment JPA-1. Riverside Road East provides access to residential properties. 76th Street East runs parallel to the Puyallup River within the shoreline planning area. Orting Highway East (SR 162) is the only bridge that crosses the Puyallup River within Segment JPA-1. It is located at the western boundary of the segment. The bridge is two travel lanes in width.

There are no major utilities or wastewater or stormwater facilities located in the shoreline planning area.

Fifty-nine percent of the shoreline planning area has been cleared of vegetation and developed with a certain amount of impervious surface (0-100%) (NOAA C-CAP/NLCD,

2006). See Table 4.1 for more detailed data that categorizes impervious surface into 4 levels of impervious surface intensity.

6.1.2 Existing and Potential Public Access Sites

One existing park provides public access to the Puyallup River in Segment JPA-1 – Riverside Park. Riverside Park (a County owned park) is located in Segment JPA-1. This 50-acre site is currently leased to River Valley BMX Racing for seasonal motorcross bicycle races and Tacoma Disc Golf Players Association for disc golf (Pierce County website, 2009). 76th Street East runs parallel to the Puyallup River in this segment.

6.1.3 Biological Resources and Critical Areas

This section describes biological resources including priority habitat and species, wetlands, streams and riparian zones within the river segment.

The priority habitat and species data (2008a) documents fall chinook, pink, coho, and chum salmon, as well as winter steelhead and Dolly Varden/bull trout as using this segment of the Puyallup River for passage. Fall Chinook and coho salmon use this segment for rearing, and pink salmon for spawning. Cutthroat trout are resident in this segment.

The Sumner wetland inventory (2006) does not identify any wetland habitat within this segment.

A small unnamed tributary flows into the Puyallup in Segment JPA-1. This tributary enters the Puyallup River with a culvert?

The riparian corridor consists of a 25- to100-foot wide early successional/mixed age stand dominated by cottonwood. Most of the land area within this segment is agricultural, with a significant forested portion located in the eastern portion of the reach.

The entire shoreline segment is mapped as an aquifer recharge area (Map 6).

6.1.4 Hazardous Areas

Mapped hazard areas in Segment JPA-1 include landslide, seismic and volcanic hazard areas.

6.1.5 Shoreline Modifications

The major shoreline modifications along JPA-1 include:

- Rock groins placed to control channel migration;
- Levees and reinforced revetments placed to confine the channel and decrease the width;
- Rip-rap bank protection along channel banks;
- Agriculture development adjacent to river;
- Rural residential development adjacent to river; and
- In-channel gravel mining.

Along JPA-1 and much of the Puyallup River, the channel was partly confined in the early 1900s and almost completely confined in the early 1960s by levees and revetments (GeoEngineers, 2003). Before confinement, the channel throughout JPA-1 included laterally migrating meander bends and was highly sinuous. The confined channel in some areas decreased in width from approximately 1,100 feet in 1931 to approximately 250 ft in 1965 and migration was limited (GeoEngineers, 2003).

Prior to confinement, the gravel bars were larger and more abundant. In-channel gravel mining occurred from the 1970s to 1996. This reduced the bedload in many areas and formation and aggradation of gravel bars. Since the mining ceased, the Puyallup River may be subject to increased sediment loads. The full effect of the increased sediment loads on the channel dynamics is not known (GeoEngineers, 2003).

6.1.6 Opportunity Areas

Protection

A large, mature forest stand is located in the eastern portion of Segment JPA-1, which is documented by WDFW as valuable wildlife habitat. In addition, smaller forested patches are located adjacent to the river within this segment. Protection of these forested areas would help maintain quality habitat for sensitive species.

Restoration

There is limited opportunity to provide areas of overbank flooding and side channel habitat in this segment, given the existing levee and extensive adjacent development. In some portions of this segment, it may be feasible to setback the levee, which would increase the active channel width and subsequently enhance habitat-forming processes.

This reach has vegetation enhancements opportunities, which consist of removing non-native plant species (e.g. Himalayan blackberry), and installing native plantings. Plantings along the river bank would provide additional "over water" vegetation, provide increased protection from predation for fish species, increase habitat for birds, and input organic material to the river.

6.2 SEGMENT A. Eastern City Limits to Traffic Avenue Bridge

Summary: Segment A extends from approximately RM 12.0 to RM 10.7 on the Puyallup River. This segment extends entirely along the left bank of the Puyallup River except for one small area on the right bank. This segment is constrained by dikes and reinforced revetments and offers limited instream habitat. Land use in Segment A is predominantly multi-family residential. Riparian vegetation is generally limited to a narrow strip along the river bank. No wetlands have been identified within the shoreline planning area.

6.2.1 Land Use Patterns

Land use patterns described below include: existing land uses, transportation facilities, utility crossings and utility facilities, and impervious surface areas.

Land use in Segment A is predominately residential with Rainier Manor mobile homes, and Rivergrove and Riverwalk multi-family communities. High Density Residential is the main comprehensive plan and zoning designation (47 percent of shoreline planning area). Remaining properties are zoned Low Density Residential (53 percent of shoreline planning area) (City of Sumner, 2009b; Pierce County, 2008a).

There are several roads and bridges located within the Segment A shoreline planning area. 78th Street Court East runs parallel to the Puyallup River and provides access to two single-family houses. There are seven roadways that dead-end within the shoreline planning area which provide local access to the Riverwalk residential community. 142nd Avenue East runs parallel to the Puyallup River providing local access to the Rivergrove residential community. Several roadways provide access for the Rainier Manor mobile home park.

The Orting Highway East (SR 162) bridge serves as the eastern boundary of Segment A and Traffic Avenue bridge serves as the western boundary. Traffic Avenue bridge has three travel lanes, a middle left turn/right turn lane, and one parking shoulder lane. The BNSF Railroad bridge is also located within Segment A immediately east of Traffic Avenue. The bridge has two sets of railroad tracks.

There are no major utilities or facilities located in the shoreline planning area. There is one mapped sewer-overflow outfall east of Rainier Manor.

Seventy-eight percent of the shoreline planning area has been cleared of vegetation and developed with a certain amount of impervious surface (0-100%) (NOAA C-CAP/NLCD, 2006). See Table 4.1 for more detailed data that categorizes impervious surface into 4 levels of impervious surface intensity.

6.2.2 Existing and Potential Public Access Sites

The Riverside Trail is located along the Puyallup River in Segment A. Trail connections east to Orting Highway East (SR 162) and west to the Wastewater Treatment Plant are planned for development. Girard Park/Grand Park is also located in Segment A although access to the park has been limited by the construction of SR 410.

6.2.3 Biological Resources and Critical Areas

This section describes biological resources including priority habitat and species, wetlands, streams and riparian zones within the river segment.

According to PHS data (2008a), this segment is used for passage by fall chinook, pink, coho, and chum salmon, as well as winter steelhead and Dolly Varden/bull trout. Fall Chinook and coho salmon use this segment for rearing, and pink salmon use this segment for spawning. Cutthroat trout are resident in this segment.

The Sumner wetland inventory (2006) does not identify any wetland habitat within this segment. Several small tributaries to the Puyallup enter Segment A from the south (Map 1).

The most significant factor in this segment is the conversion of riparian habitat to residential land use and the corresponding increase in impervious surface. Riparian vegetation in this segment is limited for 50 percent of the shoreline, with a very narrow strip of vegetation paralleling the existing residential development. An approximately 100-foot wide early successional/mixed age stand dominated by cottonwood occurs in the narrow band of land between the river and SR 410.

The entire shoreline segment is mapped as an aquifer recharge area (Map 6).

6.2.4 Hazardous Areas

Mapped hazard areas in Segment A include landslide, seismic and volcanic hazard areas.

6.2.5 Shoreline Modifications

The primary shoreline modifications along Segment A of the Puyallup River include:

- Confinement of channel by reinforced revetments;
- Dikes;

- High-density residential development; and
- Upstream gravel mining operations.

By 1965, the entire segment was confined by reinforced revetments that restrict the river to a generally straight, northwest trending channel (GeoEngineers, 2003). There has been a large reduction in the size and distribution of gravel bars in this Segment. This may be due to the increase in channel gradient and sediment transport capacity resulting from the confinement, channel incision, and possible loss of bedload materials from the upstream gravel mining operations (GeoEngineers, 2003). Since the mining ceased, the Puyallup River may be subject to increased sediment loads. The full effect of the increased sediment loads on the channel dynamics is not known (GeoEngineers, 2003).

6.2.6 Opportunity Areas

Protection

The northern portion of Segment A contains a mature, riparian forest stand, which is likely productive wildlife habitat. Protection of this forested area could help maintain quality habitat for sensitive species.

Restoration

There is limited opportunity to provide areas of overbank flooding and side channel habitat in this segment, given the existing levee and extensive adjacent development. However, in the northern portion of the segment, adjacent to SR 410, it may be feasible to setback the levee. This would increase the active channel width and subsequently enhance habitat-forming processes.

This reach has vegetation enhancements opportunities, which consist of removing non-native plant species (e.g. Himalayan blackberry), and installing native plantings. Plantings along the river bank would provide additional “over water” vegetation, provide increased protection from predation for fish species, increase habitat for birds, and input organic material to the river.

6.3 SEGMENT B. CONFLUENCE OF WHITE AND PUYALLUP RIVERS

Summary: Segment B extends from approximately RM 10.7 to RM 10.1 on the Puyallup River, and RM 0.0 to RM 0.3 on the White River. This segment is constrained by concrete slabs and revetments and offers limited instream habitat. Land use in Segment B is predominantly public utilities. SR 410 and SR 167 meet in the vicinity of this segment. Riparian vegetation generally consists of narrow bands adjacent to the rivers. Less than one-acre of wetland is located within the shoreline planning area.

6.3.1 Land Use Patterns

Land use patterns described below include: existing land uses, transportation facilities, utility crossings and utility facilities, and impervious surface areas.

The City of Sumner's wastewater treatment plant and associated facilities cover approximately 43 percent of this segment. Most of the remaining properties are vacant lands owned by the City of Sumner and a few single-family properties (18 percent of shoreline planning area) located on the left bank of the White River. Zoning designations are entirely composed of low-density residential in Segment B (City of Sumner, 2009b; Pierce County, 2008a).

State Street and 63rd Street East provide access to the wastewater treatment plant. Houston Road provides access to the single-family houses on the left bank of the White River.

The Traffic Avenue bridge serves as the eastern boundary of Segment B and SR 410 serves as the northern boundary. SR 410 has six travel lanes and crosses the White River in an east / west direction.

The Sumner Wastewater Treatment Plant is located in Segment B. The plant has an outfall to the White River.

Impervious surface: Fifty percent of the shoreline planning area has been cleared of vegetation and developed with a certain amount of impervious surface (0-100%) (NOAA C-CAP/NLCD, 2006). See Table 4.1 for more detailed data that categorizes impervious surface into 4 levels of impervious surface intensity.

6.3.2 Existing and Potential Public Access Sites

The Riverside Trail is located almost along the entire left bank of the Puyallup River and the right bank of the White River in Segment B. There is City-owned open space to the east of the treatment plant that has potential to be developed as a park. Confluence Park is located to the west of the treatment plant and is used frequently for fishing and boat launching. 63rd Street East street-end provides access to the right bank of the White River.

6.3.3 Biological Resources and Critical Areas

This section describes biological resources including priority habitat and species, wetlands, streams and riparian zones within the river segment.

According to PHS data (2008a), this segment is used for transportation by fall chinook, spring chinook, pink, coho, chum, and sockeye salmon, as well as winter steelhead and Dolly Varden/bull trout. Spring chinook, coho, and pink salmon use this segment for rearing. Cutthroat trout are resident in this segment.

The Sumner wetland inventory (2006) identifies 0.1 acre of wetland habitat within Segment B, which is less than 1% of the total segment area.

The SR410 Bridge crosses the White River at the northern limit of this segment, and the Traffic Avenue Bridge crosses the Puyallup River at the eastern limit. Riparian vegetation consists of an approximately 25-to100-foot wide early successional/mixed age stand dominated by cottonwood, with an understory of non-native blackberry. Pacific willow is common along the river banks. Adjacent land use includes the City Wastewater Treatment Plant. The Plant treats mainly domestic wastewater, but also receives some manufacturing, commercial, and industrial wastewater. The outfall for the plant is on the White River approximately 400 feet upstream of the confluence with the Puyallup River.

The entire shoreline segment is mapped as an aquifer recharge area (Map 6).

6.3.4 Hazardous Areas

Mapped hazard areas in Segment B include landslide, seismic and volcanic hazard areas.

6.3.5 Shoreline Modifications

Segment B includes the confluence of the Puyallup River and White River. There are many shoreline modifications along both rivers in this segment. The primary modifications are discussed below, by river.

Some of the modifications in the Puyallup River, Segment B, include:

- Reinforced revetments to confine the channel; and
- Upstream gravel mining operations.

Some of the modifications in the White River, Segment B, include:

- Dredging the channel and adding revetments along the entire segment; and
- Installing concrete slabs and riprap revetments.

By 1965, the Segment B along both rivers was completely confined by reinforced revetments that restrict the rivers (GeoEngineers, 2003). There has been a large reduction in the size and distribution of gravel bars in this Segment. This may be due to the increase in channel gradient and sediment transport capacity resulting from the confinement, channel incision, and possible loss of bedload materials from the upstream gravel mining operations (GeoEngineers, 2003). Since the mining ceased, the Puyallup River may be subject to increased sediment loads. The full effect of the increased sediment loads on the channel dynamics is not known (GeoEngineers, 2003).

Segment B of the White River is deeply entrenched due to the human modifications along the river, such as channelization and dredging. An example of the extreme entrenchment along the White River is that the slabs and revetments built at the water edge in the early 1900s are now approximately 6 to 10 feet above the water edge (GeoEngineers, 2003).

6.3.6 Opportunity Areas

Protection

Black cottonwood-dominated forest is the most common vegetation assemblage found throughout all of the segments and is represented in this segment. Riparian forested areas are typically productive wildlife habitats. Protection of this forested area could increase potential habitat for many sensitive species.

Restoration

City property adjacent to the City's Wastewater Treatment Facility, at the confluence of the White and Puyallup Rivers, is used informally by residents for fishing access. Adjacent to

the confluence is an informal gravel and/or dirt parking lot, which has intruded into the riparian vegetation. Denuded areas could be planted with native riparian plant species. This site could be further improved by restricting access to a smaller area through use of fencing and signs.

The river banks within this segment are armored with riprap and concrete. These materials could be replaced with bank stabilization materials that would enhance fish and wildlife habitat, such as large woody debris and native plantings.

6.4 SEGMENT C. SR 410 BRIDGE TO UNION PACIFIC SPUR BRIDGE

Summary: Segment C extends from approximately RM 0.3 to RM 1.1 on the White River. This segment is constrained by revetments and concrete slabs and offers limited instream habitat. Land use in Segment C is a mix of residential, commercial, and industrial/manufacturing. Less than one-acre of wetland is located within the shoreline planning area.

6.4.1 Land Use Patterns

Land use patterns described below include: existing land uses, transportation facilities, utility crossings and utility facilities, and impervious surface areas.

Land use in this segment is a mix of single-family houses (30 percent of shoreline planning area) mainly south of Main Street except for those located along Pacific Avenue on the left bank of the White River; commercial activities (22 percent of shoreline planning area) including a furniture store, auto repair services, and professional services; and industrial/manufacturing activities (16 percent of shoreline planning area) which is mainly composed of a roofing company that has warehouse and office space, and vehicle equipment parking. The City's comprehensive plan and zoning designations in Segment C indicate predominantly future general commercial and low-density and multi-family residential land uses for the area (City of Sumner, 2009b; Pierce County, 2008a).

Main Street, Spinning Avenue, and Pacific Avenue are located in the shoreline planning area and provide local access to the residences.

The SR 410 bridge serves as the southern boundary of Segment C and the Union Pacific railroad spur bridge serves as the northern boundary. The railroad spur has one set of railroad tracks that cross the White River. A third bridge located in Segment C is the Bridge Street Bridge which has two travel lanes.

Electricity lines cross the White River generally between the Bridge Street Bridge and the Union Pacific railroad spur bridge.

Seventy-eight percent of the shoreline planning area has been cleared of vegetation and developed with a certain amount of impervious surface (0-100%) (NOAA C-CAP/NLCD, 2006). See Table 4.1 for more detailed data that categorizes impervious surface into 4 levels of impervious surface intensity.

6.4.2 Existing and Potential Public Access Sites

Two access points associated with street right-of-way are available in Segment C: Spinning Avenue street-end and Bridge Street Bridge. There is also one parcel owned by the City that is undeveloped open space located on West Main Street. A park associated with the Library and Community Center has picnic tables and offers access to the White River. The Riverside Trail is planned to be extended on the right bank of the White River along this segment.

6.4.3 Biological Resources and Critical Areas

This section describes biological resources including priority habitat and species, wetlands, streams and riparian zones within the river segment.

According to PHS data (2008a), this segment is used for transportation by fall chinook, spring chinook, pink, coho, chum, and sockeye salmon, as well as winter steelhead and Dolly Varden/bull trout. Spring chinook, coho, and pink salmon use this segment for rearing. Cutthroat trout are resident in this segment.

The Sumner wetland inventory (2006) identifies 0.9 acre of wetland habitat within Segment C, which is approximately 2% of the total segment area. In addition, Wapato Creek enters the White River within this reach (Map 1).

At certain points within this segment, land is cleared to the top of bank, leaving only a limited riparian fringe between the top of the bank and the ordinary high water mark. Some areas have only a narrow strip of riparian vegetation, approximately 10 to 40 feet wide including big leaf maple, cottonwood, and alder with an understory of snowberry. In other areas, the riparian zone is completely cleared to the river's edge. Streambank erosion was noted in several of these areas. In most areas within this segment, however, the riparian corridor consists of a 25- to100-foot wide early successional/mixed age stand dominated by cottonwood. The riparian fringe consists of willow, snowberry, and non-native blackberry.

The entire shoreline segment is mapped as an aquifer recharge area (Map 6).

6.4.4 Hazardous Areas

Mapped hazard areas in Segment C include landslide, seismic and volcanic hazard areas.

6.4.5 Shoreline Modifications

The shoreline modifications along Segment C include:

- Dredging the channel and adding revetments along the entire segment;
- Commercial and industrial development; and
- Installing concrete slabs and riprap revetments.

Segment C of the White River was completely confined in a dredged channel by 1931. By 1965, Segment C was completely confined by reinforced revetments and levees that restrict the river (GeoEngineers, 2003). Segment C of the White River is deeply entrenched due to the human modifications along the river, such as channelization and dredging.

6.4.6 Opportunity Areas

Protection

Portions of land within the riparian zone of Segment of the White River have relatively dense cover of riparian vegetation with moderate diversity. Protection of these areas could help maintain quality habitat for sensitive species.

Restoration

The river banks within this segment are armored with riprap and concrete. These materials could be replaced with bank stabilization materials that would enhance fish and wildlife habitat, such as large woody debris and native plantings. In addition, it may be feasible to setback the levee along the west bank of the White River, adjacent to Pacific Avenue. This would increase the active channel width and subsequently enhance habitat-forming processes.

This segment has significant vegetation enhancement opportunities, which consist of removing non-native plant species (e.g. Himalayan blackberry), and installing native plantings. Plantings along the river bank would provide additional “over water” vegetation, provide increased protection from predation for fish species, increase habitat for birds, and input organic material to the river.

6.5 SEGMENT D. UNION PACIFIC SPUR BRIDGE TO TACOMA ROAD BRIDGE

Summary: Segment D extends from approximately RM 1.1 to RM 1.8 on the White River. This segment is constrained by revetments and concrete slabs and offers limited instream habitat. Land use in Segment D is a mix of industrial/manufacturing and public facilities/utilities. The riparian vegetation is predominantly a 25- to100-foot wide along the bank of the river. Less than one-acre of wetland is located within the shoreline planning area. Sotain Creek enters the White River within this segment.

6.5.1 Land Use Patterns

Land use patterns described below include: existing land uses, transportation facilities, utility crossings and utility facilities, and impervious surface areas.

Existing land use is mainly a mix of industrial/manufacturing (38 percent of shoreline planning area) and public facilities/utilities (25 percent of shoreline planning area). Remaining land uses include parks/open space (19 percent of shoreline planning area) and commercial (13 percent of shoreline planning area). The comprehensive plan and zoning designations indicate that future land use would be a mix of light and heavy industrial (City of Sumner, 2009b; Pierce County, 2008a).

142nd Avenue East is the only roadway located within the shoreline planning area. It provides access to the north industrial area in Sumner.

The Union Pacific railroad spur bridge forms the southern boundary of Segment D and Tacoma Avenue bridge forms the northern boundary. Tacoma Avenue bridge has four travel lanes. Fryar Avenue bridge also crosses the White River about midway in the segment.

The Public Works shops are located on the left bank of the White River.

Forty-one percent of the shoreline planning area has been cleared of vegetation and developed with a certain amount of impervious surface (0-100%) (NOAA C-CAP/NLCD, 2006). See Table 4.1 for more detailed data that categorizes impervious surface into 4 levels of impervious surface intensity.

6.5.2 Existing and Potential Public Access Sites

The Riverside Trail is located on both banks of the White River near the Public Works shops forming a looped route between Fryar Avenue bridge and Tacoma Avenue bridge. The

planned extension of Riverside Trail in Segment C is proposed to continue north into Segment D along the right bank of the White River. Additional access down to the river is available as part of the street rights-of-way for Fryar Avenue bridge and Tacoma Avenue bridge.

6.5.3 Biological Resources and Critical Areas

This section describes biological resources including priority habitat and species, wetlands, streams and riparian zones within the river segment.

Similar to other segments, fall chinook, spring chinook, pink, coho, chum, and sockeye salmon, as well as winter steelhead and Dolly Varden/bull trout all use this segment of the White River. Spring chinook, coho, and pink salmon have documented rearing. Cutthroat trout are resident.

The Sumner wetland inventory (2006) identifies 0.3 acre of wetland habitat within Segment D, which is approximately 1% of the total segment area. In addition, Sotain Creek enters the White River within this reach (Map 1).

Land is cleared to the top of the bank in some areas, with a limited riparian fringe between the top of bank and ordinary high water mark. The bank is armored with concrete debris in areas and lacks vegetation cover, limiting habitat quality. In most areas, however, the riparian corridor is predominantly a 25- to100-foot wide early successional/mixed age stand dominated by cottonwood, with an understory of non-native blackberry. Sotain Creek, a fish-bearing stream, flows into the White River in this stream segment (Map 1)

The entire shoreline segment is mapped as an aquifer recharge area (Map 6).

6.5.4 Hazardous Areas

Mapped hazard areas in Segment D include landslide, seismic and volcanic hazard areas.

6.5.5 Shoreline Modifications

The shoreline modifications along Segment D include:

- Dredging the channel and adding revetments along the entire segment; and
- Installing concrete slabs and riprap revetments.

Segment D of the White River was completely confined in a dredged channel by 1931. By 1965, Segment D was completely confined by reinforced revetments and levees that restrict

the river (GeoEngineers, 2003). Segment D of the White River is deeply entrenched due to the human modifications along the river, such as channelization and dredging.

6.5.6 Opportunity Areas

Restoration

The river banks within Segment D of the White River are armored with riprap and concrete. These materials could be replaced with bank stabilization materials that would enhance fish and wildlife habitat, such as large woody debris and native plantings.

This segment has significant vegetation enhancement opportunities, which consist of removing non-native plant species (e.g. Himalayan blackberry), and installing native plantings. Plantings along the river bank would provide additional "over water" vegetation, provide increased protection from predation for fish species, increase habitat for birds, and input organic material to the river.

6.6 SEGMENT E. TACOMA ROAD BRIDGE TO PUBLIC LAND

Summary: Segment E extends from approximately RM 1.8 to RM 2.6 on the White River. This segment is constrained by concrete slabs and revetments and offers limited instream habitat. Land use in Segment E is mainly vacant lands, agricultural and industrial/manufacturing. Salmon Creek enters the White River within this segment. More than five acres of wetlands are located within the shoreline planning area.

6.6.1 Land Use Patterns

Land use patterns described below include: existing land uses, transportation facilities, utility crossings and utility facilities, and impervious surface areas.

Land use in Segment E is a mix of vacant lands (38 percent of shoreline planning area), agriculture (25 percent of shoreline planning area), and industrial/manufacturing (22 percent of shoreline planning area) and. The industrial/manufacturing facilities are generally made up of warehousing. Additional land use includes low-density residential (15 percent of shoreline planning area). The comprehensive plan and zoning map indicate future land use to be almost entirely composed of light industrial (City of Sumner, 2009b; Pierce County, 2008a).

145th Avenue East is located within the shoreline planning area. A road has been recently constructed as part of a proposed warehouse facility on the right bank of the White River. It is two lanes in width and crosses Salmon Creek.

The Tacoma Avenue bridge forms the southern boundary of Segment E.

There are no major utilities or facilities located in the shoreline planning area.

Sixty-eight percent of the shoreline planning area has been cleared of vegetation and developed with a certain amount of impervious surface (0-100%) (NOAA C-CAP/NLCD, 2006). See Table 4.1 for more detailed data that categorizes impervious surface into 4 levels of impervious surface intensity.

6.6.2 Existing and Potential Public Access Sites

The Riverside Trail is located on the right bank of the White River in the southern portion of Segment E. The trail is proposed to be extended as part of a proposed warehouse facility immediately to the north of where the trail currently ends. The trail is proposed to continue northerly on the right bank. Additional public access to the river is available at the vacated right-of-way of 145th Avenue.

6.6.3 Biological Resources and Critical Areas

This section describes biological resources including priority habitat and species, wetlands, streams and riparian zones within the river segment. According to PHS data (2008a), this segment is used for transportation by fall chinook, spring chinook, pink, coho, chum, and sockeye salmon, as well as winter steelhead and Dolly Varden/bull trout. Spring chinook, coho, and pink salmon use this segment for rearing. Cutthroat trout are resident in this segment.

The Sumner wetland inventory (2006) identifies 5.5 acres of wetland habitat within Segment E, which is approximately 5% of the total segment area.

Riparian vegetation along the river is an approximately 25- to100-foot wide early successional/mixed age stand dominated by cottonwood. Various willow species, as well as native shrubs and non-native Himalayan blackberry, line the river banks.

Salmon Creek and the associated riparian wetlands are of significance for wildlife habitat, providing water, food, and cover. Salmon Creek also serves as a wildlife corridor between the wooded east valley slopes and the White River. Salmon Creek flows year round and is a fish-bearing stream. Salmon Creek has experienced several water quality issues in the past, and a number of culvert barriers to fish passage have been identified.

The entire shoreline segment is mapped as an aquifer recharge area (Map 6).

6.6.4 Hazardous Areas

Mapped hazard areas in Segment E include landslide, seismic and volcanic hazard areas.

6.6.5 Shoreline Modifications

The shoreline modifications along Segment E include:

- Dredging the channel and adding revetments;
- Agricultural and industrial development; and
- Installing concrete slabs and riprap revetments.

Segment E of the White River was completely confined in a dredged channel by 1931. By 1965, Segment E was completely confined by reinforced revetments and levees that restrict the river (GeoEngineers, 2003). Segment E of the White River is deeply entrenched due to the human modifications along the river, such as channelization and dredging.

6.6.6 Opportunity Areas

Restoration

The river banks within this segment are armored with riprap and concrete. These materials could be replaced with bank stabilization materials that would enhance fish and wildlife habitat, such as large woody debris and native plantings. In some portions of this segment, it may be feasible to setback the existing revetments, which would increase the active channel width and subsequently enhance habitat-forming processes.

This segment has significant vegetation enhancement opportunities, which consist of removing non-native plant species (e.g. Himalayan blackberry), and installing native plantings. Plantings along the river bank would provide additional "over water" vegetation, provide increased protection from predation for fish species, increase habitat for birds, and input organic material to the river.

6.7 SEGMENT F. PUBLIC LAND to 8th Street Creek

Summary: Segment F extends from approximately RM 2.6 to RM 4.2. This segment is constrained by dikes, revetments, concrete slabs, and earthen levees which limit instream habitat quality. Land use in Segment F is a mix of vacant lands and parks and open space. The riparian vegetation is 25-100 feet wide along the banks of the river. More than two acres of wetlands are located within the shoreline planning area. The tailrace from the inactive Dieringer Powerhouse and 8th Street Creek enter the White River within this segment.

6.7.1 Land Use Patterns

Land use patterns described below include: existing land uses, transportation facilities, utility crossings and utility facilities, and impervious surface areas.

Land use is a mix of vacant lands (55 percent of the shoreline planning area) which are mainly under City ownership and leased for agricultural use and parks and open space (25 percent) most of which is the Sumner Meadows Golf Course Links. The comprehensive plan designation is predominately public/private utilities and facilities while zoning designations is generally split between agriculture and light industrial (City of Sumner, 2009b; Pierce County, 2008a).

24th Street East is a roadway on either side of the White River within the shoreline planning area that turns into a pedestrian/bicycle-only bridge as part of the Riverside Trail network. The bridge crosses over the White River. 148th Avenue East is also located within the shoreline planning area. 16th Street East dead-ends into the shoreline planning area on the left bank of the White River.

Electrical utility lines cross the White River near the southern border of the Sumner Meadows Golf Links. There is a mapped stormwater outfall located on the left bank of the river north of the Dieringer Flume.

Forty percent of the shoreline planning area has been cleared of vegetation and developed with a certain amount of impervious surface (0-100%) (NOAA C-CAP/NLCD, 2006). See Table 4.1 for more detailed data that categorizes impervious surface into 4 levels of impervious surface intensity.

6.7.2 Existing and Potential Public Access Sites

The Riverside Trail is located on the right bank of the White River on City-owned property, continues north and crosses the White River on the 24th Street pedestrian bridge, and extends both north along the left bank of the river and west along 24th Street East. The proposed trail alignment shows it continuing north through the Riverbend Park, across the White River to the Sumner Meadows Golf Links, and north along 8th Street Creek. Additional public access includes 24th Street trail bridge right-of-way, open space south of the golf course, Riverbend Park, and Sumner Meadows Golf Links.

6.7.3 Biological Resources and Critical Areas

This section describes biological resources including priority habitat and species, wetlands, streams and riparian zones within the river segment.

According to PHS data (2008a), this segment is used for transportation by fall chinook, spring chinook, pink, coho, chum, and sockeye salmon, as well as winter steelhead and Dolly Varden/bull trout. Spring chinook, coho, and pink salmon use this segment for rearing. Cutthroat trout are resident in this segment.

The Sumner wetland inventory (2006) identifies 2.4 acres of wetland habitat within Segment F, which is approximately 1% of the total segment area. In addition, 8th Street Creek enters the White River within this segment (Map 1).

Photograph 6-1. Tailrace Canal looking west

The outfall from the Dieringer Powerhouse/Lake Tapps enters the right bank of the White River at RM 3.5 within this segment. Prior to the closure of the hydropower electric plant, high velocity flows attracted migrating adult salmonids into this discharge channel causing delays in their upstream migration. Flows have dropped significantly since 2004; however, the affect of this change on salmonids has not been documented.

Photograph 6-2. White River gravel bar

The riparian corridor consists of a 25- to100-foot wide early successional/mixed age stand dominated by cottonwood. A large gravel bar was noted in this segment. A riparian island vegetated with early successional cottonwood and willow also occurs in this segment, forming a backwater side channel along the right bank. This feature has a significant amount of woody debris and offers good edge habitat. The primary channel along the left bank of the river also contains an accumulation of large woody debris. Eighth Street Creek, a fish-bearing stream, enters the White River within this segment.

The entire shoreline segment is mapped as an aquifer recharge area (Map 6).

6.7.4 Hazardous Areas

Mapped hazard areas in Segment F include landslide, seismic and volcanic hazard areas.

6.7.5 Shoreline Modifications

The primary shoreline modifications along Segment F include:

- Encroachment of vegetation, primarily upstream of the Dieringer Flume;
- In-channel erosion, primarily downstream of the Dieringer Flume;
- Building earthen levees composed of sand and silt; and
- Installing concrete slabs, riprap revetments, and dikes.

By 1965, Segment F was completely confined by earthen levees and riprap revetments that restrict the river to a generally straight, north trending channel (GeoEngineers, 2003). Much of the in-channel erosion along this segment is located downstream of the Dieringer Flume and is due to the flume discharge. The flume discharge generally carries no sediment and sometimes includes large flows. Segment F of the White River is deeply entrenched due to the human modifications along the river, such as channelization and dredging.

Vegetation occupies a third of the 1985 channel width in the upstream reach of Segment F, from RM 3.6 to 3.9, near the Sumner Meadows Golf Links, (USACE, 2009). The average open channel width in this reach reduced from about 200 feet in 1985 to approximately 125 feet in 2006 (USACE, 2009).

6.7.6 Opportunity Areas

Protection and Restoration

City-owned land along the length of the right bank offers opportunity for habitat preservation and restoration. This segment appears to function as significant rearing habitat for salmonids and therefore is a candidate for preservation. Riparian vegetation can be enhanced throughout this segment. The tailrace and drainage ditch offer potential surface water connections to wetland areas. Flow from the tailrace could be diverted through a separate channel through City-owned farmland, allowing the development of relatively natural meanders, and pool and riffle sequences. Diversion of water from these sources into created or enhanced wetland and stream channel areas could provide off-channel and rearing fish habitat in areas where there is adequate fish passage to the site.

Restoration

The river banks within this segment are armored with riprap and concrete. These materials could be replaced with bank stabilization materials that would enhance fish and wildlife habitat, such as large woody debris and native plantings. In some portions of this segment, it may be feasible to breach or setback the existing revetments and levees, which would increase the active channel width and connect the river with portions of its historic floodplain, which could significantly enhance habitat-forming processes.

This segment has significant vegetation enhancement opportunities, which consist of removing non-native plant species (e.g. Himalayan blackberry), and installing native plantings. Plantings along the river bank would provide additional "over water" vegetation, provide increased protection from predation for fish species, increase habitat for birds, and input organic material to the river.

The 24th Street Interchange Biological Opinion, described above in Section 5.3.4, included the following two conditions that pertain to the White River:

1. The City of Sumner must permanently prohibit impervious development on 30 acres of City-owned property east of the White River.
2. The City of Sumner must permanently restrict new development on 88 acres of City-owned property east of the White River to a maximum impervious coverage of 40 percent.

In addition, in the Biological Opinion USFWS recommended that nonfunctioning levees above the Dieringer Powerhouse outfall (RM 3.6) on the White River be removed or setback, in order to restore floodplain and riparian connectivity and create off channel habitat.

6.8 SEGMENT G. 8th Street Creek to Stewart Road Bridge

Summary: Segment G extends from approximately RM 4.2 to RM 5.0. This segment is constrained by dikes, concrete slabs, revetments, and earthen levees and offers limited instream habitat. Land use in Segment G is predominantly industrial/manufacturing. The riparian vegetation ranges from 25 to 100 feet in width along the river banks. No wetlands have been identified within the shoreline planning area.

6.8.1 Land Use Patterns

Land use patterns described below include: existing land uses, transportation facilities, utility crossings and utility facilities, and impervious surface areas.

The majority of land uses are concentrated in industrial/manufacturing (60 percent of shoreline planning area) and vacant lands (30 percent). Industrial/manufacturing businesses include a timber company and contractor services. One large vacant property located west of the Sumner Meadows Golf Links is proposed to be developed with multi-family development. Comprehensive plan and zoning designations are predominately light industrial (City of Sumner, 2009b; Pierce County, 2008a).

140th Avenue Court East is located on the right bank of the White River within the shoreline planning area. Stewart Road bridge forms the northern boundary for Segment G. The bridge has two travel lanes.

There are no major utilities or facilities located in the shoreline planning area.

Sixty percent of the shoreline planning area has been cleared of vegetation and developed with a certain amount of impervious surface (0-100%) (NOAA C-CAP/NLCD, 2006). See Table 4.1 for more detailed data that categorizes impervious surface into 4 levels of impervious surface intensity.

6.8.2 Existing and Potential Public Access Sites

The only form of public access currently available in Segment G is part of the Stewart Road bridge right-of-way. The Riverside Trail is proposed to cross the river on Stewart Road bridge.

6.8.3 Biological Resources and Critical Areas

This section describes biological resources including priority habitat and species, wetlands, streams and riparian zones within the river segment. According to PHS data (2008a), this segment is used for transportation by fall chinook, spring chinook, pink, coho, chum, and sockeye salmon, as well as winter steelhead and Dolly Varden/bull trout. Spring chinook, coho, and pink salmon use this segment for rearing. Cutthroat trout are resident in this segment.

The Sumner wetland inventory (2006) does not identify any wetland habitat within this segment.

The riparian corridor in Segment G is a 25- to100-foot wide early successional/mixed age stand dominated by cottonwood. Significant habitat limiting factors in this segment include gravel removal operations and low instream flows resulting from the diversion dam located upstream at RM 23.4.

The entire shoreline segment is mapped as an aquifer recharge area (Map 6).

6.8.4 Hazardous Areas

Mapped hazard areas in Segment G include landslide, seismic and volcanic hazard areas.

6.8.5 Shoreline Modifications

The primary shoreline modifications in Segment G include:

- Deposition of sediment;
- Encroachment of vegetation;
- Dredging the channel;
- Building earthen levees composed of sand and silt;
- Agricultural and industrial development; and
- Installing concrete slabs, riprap revetments, and dikes.

By 1965, Segment G was completely confined by earthen levees and reinforced revetments that restrict the river to a generally straight channel (GeoEngineers, 2003). Deposition of sediment in this reach is generally high, despite ongoing dredging efforts. Vegetation has encroached the river banks and the gravel bars in this reach (USACE, 2009).

6.8.6 Opportunity Areas

Protection

The riparian zone of this segment contains a relatively dense cover of riparian vegetation with moderate diversity. Protection of these areas could help maintain quality habitat for sensitive species, including salmonids.

Restoration

The river banks within this segment are armored with riprap and concrete. These materials could be replaced with bank stabilization materials that would enhance fish and wildlife habitat, such as large woody debris and native plantings. In the eastern portion of this segment, it may be feasible to breach or setback the existing revetments and levee, which would increase the active channel width and connect the river with portions of its historic floodplain, which could significantly enhance habitat-forming processes.

6.9 SEGMENT H. Stewart Road Bridge to City Limits

Summary: Segment H extends from approximately RM 5.0 to RM 5.5. This segment contains a portion of White River riparian habitat, but the river channel is located outside of the City's jurisdiction. Land use in Segment H is a mix of vacant lands and industrial/manufacturing. The riparian vegetation ranges from 100 to 800 feet in width along the river banks. A large 20-acre wetland is located within the shoreline planning area.

6.9.1 Land Use Patterns

Land use patterns described below include: existing land uses, transportation facilities, utility crossings and utility facilities, and impervious surface areas.

Land use is a mix of vacant lands (59 percent of shoreline planning area) and industrial/manufacturing (36 percent of shoreline planning area). Vacant lands generally correspond to a large wetland complex on the right bank of the White River. The industrial/manufacturing land use generally corresponds to warehousing and outdoor storage of materials. Comprehensive plan and zoning designations are entirely Light Industrial for this segment (City of Sumner, 2009b; Pierce County, 2008a).

No public roadways are located within the shoreline planning area. Stewart Road bridge forms the southern boundary of this segment.

There are no major utilities or facilities located in the shoreline planning area.

Fifteen percent of the shoreline planning area has been cleared of vegetation and developed with a certain amount of impervious surface (0-100%) (NOAA C-CAP/NLCD, 2006). See Table 4.1 for more detailed data that categorizes impervious surface into 4 levels of impervious surface intensity.

6.9.2 Existing and Potential Public Access Sites

The only public access opportunity available in Segment H is part of the Stewart Road bridge right-of-way. The Riverside Trail is proposed to cross the river on Stewart Road bridge.

6.9.3 Biological Resources and Critical Areas

No priority species presence is mapped in this segment (WDFW, 2008a).

The Sumner wetland inventory (2006) identifies 20.0 acres of wetland habitat within Segment H, which is approximately 86% of the total segment area.

Photograph 6-3. Wetland adjacent to White River

Segment H contains a portion of White River riparian habitat, but adjacent river channel is outside of Sumner's jurisdiction. The portion of the riparian corridor within the segment generally consists of a 25- to100-foot wide early successional/mixed age stand dominated by cottonwood.

The entire shoreline segment is mapped as an aquifer recharge area (Map 6).

6.9.4 Hazardous Areas

Mapped hazard areas in Segment H include seismic and volcanic hazard areas.

6.9.5 Shoreline Modifications

Segment H does not contain the White River stream channel. The following are primary shoreline modifications that are adjacent to Segment H:

- Deposition of sediment;
- Encroachment of vegetation
- Dredging the channel;
- Building earthen levees composed of sand and silt;
- Agricultural and industrial development; and
- Installing concrete slabs, riprap revetments, and dikes.

By 1965, Segment H was completely confined by earthen levees and reinforced revetments that restrict the river to a generally straight, north trending channel (GeoEngineers, 2003). Deposition of sediment is extremely high, despite ongoing dredging efforts. There was approximately a 4.5 foot rise in the riverbed between 1945 and 1971 at an inactive USGS station located at RM 5, which is the downstream end of Segment H (Dunne 1986 referenced in USACE, 2009). A comparison of channel cross-sections from 1988 to 2007 at RM 5.6, which is slightly upstream of Segment H, indicates an overall deposition of 4 to 5 feet in portions of the channel (USACE, 2009). Additionally, encroachment of vegetation on gravel bars and along the banks has decreased the channel surface area. Since 1985, the channel surface area has decreased by 15 percent (USACE, 2009).

6.9.6 Opportunity Areas

Protection

The majority of land within this segment is upland and wetland habitat, with moderate diversity. Protection of the land within this segment could help maintain quality habitat for sensitive species.

6.10 SEGMENT UGA-1 Lake Tapps

Summary: Segment UGA-1 corresponds to approximately 6,700 lineal feet along the western portion of Lake Tapps located in Sumner's UGA. Lake Tapps is a human made lake that was created in the early 1900s. This segment offers about 36 acres of wetland habitat. Land use in Segment UGA-1 is entirely composed of vacant lands.

6.10.1 Land Use Patterns

Land use patterns described below include: existing land uses, transportation facilities, utility crossings and utility facilities, and impervious surface areas.

Land use in Segment UGA-1 is entirely composed of vacant lands (100 percent of shoreline planning area). The comprehensive plan and zoning designations are entirely Public/Private Utilities and Facilities (City of Sumner, 2009b; Pierce County, 2008a).

The Sumner Tapps Highway East crosses Lake Tapps at the eastern most edge of the segment. The bridge has two travel lanes.

There is an outfall structure at Lake Tapps that releases water in Lake Tapps to the White River via the Dieringer Flume. Electricity lines cross Lake Tapps in two locations.

Segment UGA-1 has not been cleared for development and has no impervious surfaces (NOAA C-CAP/NLCD, 2006).

6.10.2 Existing and Potential Public Access Sites

There are no current or planned public access opportunities in Segment UGA-1.

6.10.3 Biological Resources and Critical Areas

This section describes biological resources including priority habitat and species, wetlands, streams and riparian zones within the river segment.

No priority species presence is mapped in this segment (WDFW, 2008a).

The Sumner wetland inventory (2006) identifies 36.5 acres of wetland habitat within Segment UGA-1, which is approximately 63% of the total segment area.

The shoreline of Lake Tapps within this segment exhibits low levels of human disturbance, and consists primarily of mature, mixed forest.

The segment does not contain any mapped aquifer recharged areas (Map 6).

6.10.4 Hazardous Areas

Mapped hazard areas in Segment UGA-1 include landslide and erosion hazard areas.

6.10.5 Shoreline Modifications

The shoreline modifications along this segment, which is part of the Lake Tapps Reservoir and the confluence with Dieringer Flume include:

- Residential development; and
- Hydroelectric operations;

The Lake Tapps Reservoir is a human made lake that was created in the early 1900s (Cascade Water Alliance, 2010). The reservoir was created by diverting water from the White River and connecting four natural lakes by a series of earthen dikes. Prior to 2004, the reservoir levels were controlled by hydropower operations.

6.10.6 Opportunity Areas

Protection

The shoreline of Lake Tapps within this segment generally consists of mature, mixed forest and scrub-shrub wetland. There is relatively little shoreline development within this segment. Protection of the land within this segment could help maintain quality habitat for sensitive species and the overall biodiversity of the area.

7.0 DATA GAPS

The following elements are data gaps that have been identified as part this inventory:

- Daily White River flow within City of Sumner.
- The affect the change in flow rates from the Dieringer tailrace has had on fish species in the White River.

8.0 SHORELINE MANAGEMENT RECOMMENDATIONS

The following recommendations synthesize the area-specific opportunities identified in Section 6 above and provide additional shoreline management recommendations in the context of other local and regional planning activities. These recommendations are intended to inform the update to the City's shoreline master program by identifying opportunities for ecological conservation and restoration and policy issues related to future shoreline use and development.

1. The City could explore developing a community education and incentive program to identify and develop restoration opportunities on private property which support the overall goals of shoreline management.

2. For new shoreline stabilization projects, demonstration of the need for engineering approaches to shoreline stabilization could be required before approval. The use of bioengineering, alternative bank stabilization, and/or soft-shore armoring techniques could be encouraged in the City's shoreline master program.

3. The existing shoreline environment designations should be re-evaluated to ensure consistency with both the 2003 state shoreline guidelines (WAC 173-26) and the findings of this shoreline inventory report. Specifically:

    a. Reconsider the Natural and Aquatic environment designations to determine applicability;

    b. Examine the rationale of applying Urban Conservancy and Shoreline Residential per the findings of this Shoreline Inventory and Characterization report;

    c. Determine an appropriate designation to replace the Urban environment since it is not an established designation per Ecology Guidelines.

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APPENDIX A – MAP FOLIO

APPENDIX B – TABLES