



PIERCE COUNTY SMP UPDATE CUMULATIVE IMPACT ANALYSIS

December 2013
(Revised October 2014)



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Chapter 1: INTRODUCTION

Pierce County is updating its existing Shoreline Master Program (SMP). This report is an analysis of the cumulative impacts that may be expected to occur over time as the new SMP is implemented. This report also addresses whether the SMP achieves “no net loss” of shoreline ecological functions, which is a requirement of the shoreline guidelines.

Note: This Cumulative Impacts Analysis (CIA) was issued as a draft to Pierce County in December 2013. The CIA report was then updated by ESA and the County staff to address minor issues and comments noted at the time of the draft report submittal.

This CIA report analyzes the Pierce County Draft SMP dated August 2013. Proposed Community Development Committee amendments and other updates considered since the August 2013 Draft SMP are not analyzed by this CIA report.

Section 1.1: Why is the County Updating the SMP?

According to Substitute Senate Bill 6012, passed by the 2003 Washington State Legislature, cities and counties are required to amend their local SMPs consistent with the Washington State Shoreline Management Act (SMA or the Act) (Revised Code of Washington 90.58) and Washington Administrative Code (WAC) implementing rules (WAC 173-26 also called the state’s Shoreline Master Program Guidelines).

Section 1.2: Why did the County Prepare this Report?

As part of this SMP update effort, the County is required to evaluate the cumulative impacts of reasonably foreseeable future development to verify that the SMP’s proposed policies and regulations for shoreline management are adequate to ensure “no net loss” of shoreline ecological functions. The determination of no net loss is required by WAC 173-26-186.

The proposed Pierce County SMP provides standards and procedures to evaluate individual uses or developments for their potential to impact shoreline resources on a case-by-case basis through the permitting process. The purpose of this report is to determine if impacts to shoreline ecological functions are likely to result from the aggregate of activities and developments in the shoreline that take place over time.

This analysis is not proposed for inclusion as regulatory code or as part of the Pierce County Comprehensive Plan or the PCC development regulations, but it may serve as a useful reference during SMP implementation.

The cumulative impacts to be addressed in this report are those expected to result from future development and uses within the SMA shoreline jurisdiction and regulated by the Draft SMP (Pierce County Council Draft, dated August, 2013).

Section 1.3: What are the State Requirements?

According to the state SMP Guidelines (WAC 173-26-186), the County is required to evaluate and consider cumulative impacts of “reasonably foreseeable future development” on the shorelines of the state as follows:

“To ensure no net loss of ecological functions and protection of other shoreline functions and/or uses, master programs shall contain policies, programs, and regulations that address adverse cumulative impacts and fairly allocate the burden of addressing cumulative impacts among development opportunities. Evaluation of such cumulative impacts should consider: (i) *current circumstances* affecting the shorelines and relevant natural processes; (ii) *reasonably foreseeable future development* and use of the shoreline; and (iii) *beneficial effects* of any established regulatory programs under other local, state, and federal laws.”

In addition, the guidelines (WAC 173-26-201) require evaluation of the effects caused by:

- Unregulated activities,
- Developments that are exempt from a shoreline substantial development permit, and
- Incremental impacts of residential bulkheads, residential piers, and runoff from newly developed properties.

The guidelines also require particular attention toward platting or subdividing property and installing infrastructure that could establish a pattern for future shoreline development. This report contains a series of questions and answers designed to provide the required information necessary to conclude whether or not the proposed SMP meets the test of “no net loss” of shoreline ecological functions.

The analysis provides a planning level assessment of the potential cumulative impacts that can be expected to occur if the proposed Pierce County SMP (dated August, 2013) is adopted and implemented as written. The assessment is limited to cumulative impacts of reasonably foreseeable future development in areas subject to SMA jurisdiction. Pierce County’s shorelines include approximately 697 linear miles, composed of 181 miles of marine shoreline, 368 miles of stream and river shoreline, and 148 miles of lakeshore.

This analysis is focused on those allowed uses or developments that have the greatest potential for adverse impacts when considered in a long-range or aggregate manner. For example, commercial signs are regulated under the SMP but are not considered in this context based on their limited size and effect on shoreline functions.

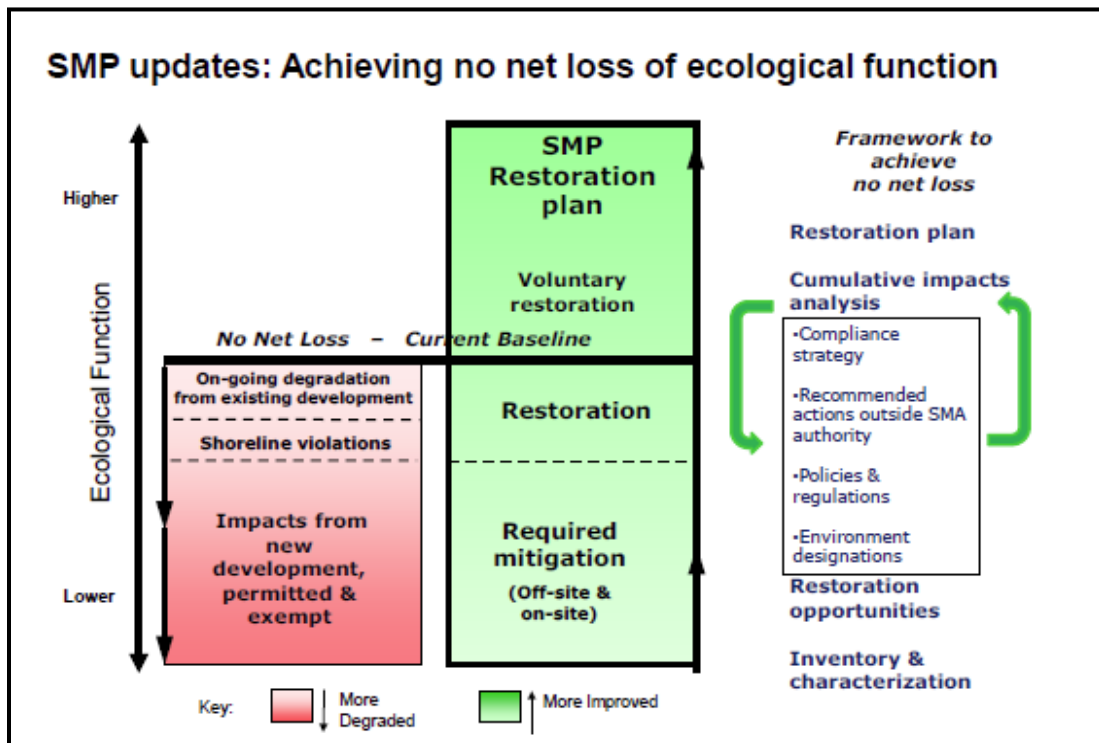
The discussion of “development exempt from shoreline permitting” is focused on those foreseeable activities listed in WAC 173-27-040 with the greatest potential for adverse cumulative impacts. Not all activities that may be exempt from substantial development permits are discussed (e.g., watershed restoration plans and projects; hazardous material remediation, etc.). Additionally, exempt development activities are still subject to compliance with the SMP

policies (e.g., to minimize impacts) and other regulations in place that protect shoreline resources (e.g., critical area regulations) as appropriate.

Exhibit 1-1 from Ecology illustrates the concept of the framework for achieving “no net loss” of ecological functions, with impacts from new development reducing shoreline functions below the current existing condition, and mitigation plus restoration increasing functions.

SMP Guidelines (WAC 173-26-201) suggest that impacts of “commonly occurring and planned development” should be assessed for cumulative impacts at the planning stage “without reliance on an individualized cumulative impacts analysis.” In contrast, developments that have unanticipated or uncommon impacts, which cannot be reasonably identified at the time of SMP development, should be evaluated via the shoreline substantial development and Conditional Use Permit processes to ensure that all impacts are addressed and that there is no net loss of ecological function after mitigation.

Exhibit 1-1. Diagram from Ecology illustrating how the SMP achieves no net loss.



Source: Department of Ecology

The objective of the analysis is to demonstrate that commonly occurring shoreline uses and developments within the County will not result in a net loss of shoreline ecological functions compared to baseline conditions. This assumes that impacts will occur, but that there are adequate measures in place to mitigate them such that the post-development conditions are no worse overall than the pre-development conditions. For this planning level assessment, the baseline conditions are generally identified and described in the County's Shoreline Inventory and Characterization Report (ESA Adolfson, 2009).

The Pierce County SMP includes standards and procedures for evaluating the effects of specific development actions on a case-by-case basis at the time individual shoreline development proposals are reviewed. These project-level analyses are focused on the specific use or action proposed and allow site-scale factors to be included in the assessment of baseline conditions to supplement the inventory information available for the County as a whole. To achieve no net loss, the SMP requires each project to mitigate impacts by avoiding, then minimizing, adverse effects, then replacing damaged resources through mitigation efforts.

The Draft SMP is the result of extensive public input and comprehensive review by the Pierce County Planning Commission, the County Council Community Development Committee, and County Planning and Land Services staff.

Chapter 2: CURRENT CONDITIONS AND CIRCUMSTANCES

Section 2.1: How Does Development Typically Affect Shorelines?

Shoreline development can cause a number of adverse effects on shoreline ecological resources. Without adequate planning and mitigation, development in the shoreline may result in impacts such as the following:

- Removal of riparian vegetation which negatively affects habitat and riparian functions;
- Hardening of shorelines through construction of bulkheads or rip-rap armoring which eliminates natural beaches, increases wave energy and negatively affects the intertidal zone;
- Construction of jetties, groins and breakwaters which disrupt natural beach formation and shore drift and impact the intertidal zone;
- Construction of overwater structures which can shade aquatic environments, resulting in the loss of native aquatic vegetation, disruption of forage fish spawning and refuge areas, and negatively affect salmon habitat by removing forage areas and creating areas more favorable to predatory fish; and
- Fill within floodplains or channel migration zones of large rivers resulting in flooding of downstream structures, disruption of flood flows, and avoidable damage to public health and safety.

The SMP Handbook prepared by Ecology (Revised November 2012) describes the effects of unmanaged development on shorelines in the State of Washington (Publication No. 11-06-010). For example, Chapter 11 of the SMP Handbook describes the values of vegetation conservation, buffers and setbacks for protection of native vegetation within the shoreline, as documented by the most current scientific and technical information available.

Vegetation helps to stabilize soils, filter pollutants and fine sediments, and contribute to improved water quality. Trees and shrubs provide habitat for many species and food sources for aquatic species as well. Stable banks and slopes reduce the occurrence of landslides and erosion, thereby reducing damage to structures and threats to life safety. Often, vegetated areas adjacent to water bodies are referred to as “shoreline buffers” and are established to protect the ecological functions of the shoreline and help to reduce the impacts of land uses on the water body.

Buffers provide a transition between the aquatic and upland areas. The shoreline vegetation conservation section (WAC 173-26-221(5)) defines vegetation conservation as “activities to protect and restore vegetation along or near marine and freshwater shorelines that contribute to the ecological functions of shoreline areas.” The benefits of buffers are discussed beginning on page 11 of Chapter 11 in the SMP Handbook:

The ecological benefits of buffers are discussed extensively in the following documents, which are briefly reviewed below. The first three documents were developed by the Aquatic Habitat Guidelines program, a partnership of state agencies, which conducted extensive reviews of the scientific literature for these documents. Ecology has participated in the development of the Aquatic Habitat Guidelines documents. The fourth document in the list was developed by the Washington Department of Fish and Wildlife.

- 1. Protection of Marine Riparian Functions in Puget Sound, Washington, 2009.*
- 2. Protecting Nearshore Habitat and Functions in Puget Sound, 2007, revised 2010.*
- 3. White Paper - Ecological Issues in Floodplains and Riparian Corridors, 2001.*
- 4. Management Recommendations for Washington's Priority Habitats: Riparian, 1997.*

In most cases, adverse effects from development in the shoreline can be managed or offset through careful planning, compliance with appropriate regulations, use of best management practices and low impact development techniques, and effective mitigation measures. The Draft SMP dated August 2013 employs all of these tools to prevent cumulative adverse impacts on shoreline functions.

Section 2.2: What is the Existing Condition of the County's Shorelines?

The Final Shoreline Inventory and Characterization Report (ICR) (dated June 2009, prepared by ESA Adolfson) is a technical document that describes the existing conditions of shorelines of the state in Pierce County. The ICR is a required first step in the SMP update process.

Pierce County includes portions of five Water Resource Inventory Areas (WRIAs): the White/Puyallup, Chambers/Clover, Nisqually, Cowlitz, and Kitsap Peninsula. These WRIAs include 110 waterbodies in Pierce County that were identified and inventoried as shorelines of the state. These include:

- marine waters along South Puget Sound within the County (otherwise known as nearshore habitats, totaling 181 miles of shoreline),
- 70 rivers and streams (with a mean average annual flow of 20 cubic feet per second or greater, totaling 368 miles of shoreline), and
- 39 lakes (over 20 acres in size, totaling approximately 148 miles of shoreline).

Approximately 697 linear miles of jurisdictional shoreline were identified within the County. Table 2-1 shows the number of water bodies and shoreline miles in Pierce County. These are the resources that would be managed under the Draft SMP.

Table 2-1. Shorelines of the State Identified in Pierce County, Washington.

Type of Shoreline	Number of Shoreline Waterbodies / Analysis Areas ¹	Number of Reaches Inventoried (ESA Adolfson, 2009)	Total Shoreline Miles in Pierce County	% of Total Shoreline Miles
Marine/nearshore	7 marine analysis areas	46	181	26
Freshwater – Rivers and Streams	70 rivers	137	368	53
Freshwater – Lakes and Reservoirs	40 lakes	47	148	21
Grand Total		230	697	100

In addition to studying the waterbodies themselves, adjacent shorelands were studied, which included lands extending landward of the waterbody for 200 feet, floodways and floodplain areas, river deltas, and wetlands considered to be associated with the shoreline. One of the important areas of the marine waterbodies is the “nearshore” environment which includes shallow marine waters, mudflats, tidal areas, and beaches. References to the nearshore throughout this report apply only to marine shorelines.

The ICR (ESA Adolfson, 2009) describes existing conditions within the Pierce County shorelines and provides a map folio based upon Geographic Information System (GIS) data. The report describes existing land uses, such as residential uses, parks, development and water-dependent industries. It also evaluates existing natural shoreline processes, such as areas of sediment transport and woody debris recruitment; and functions, such as the habitat and water quality benefits provided by riparian vegetation and wetlands. The report identifies areas suitable for restoration and additional public access.

The ICR provided a foundation for revising the goals, policies, and regulations in the County’s SMP. It helped the County make informed decisions about incorporating the communities’ vision for the shorelines, accommodating growth, and addressing other shoreline policy objectives like promoting water-dependent uses. It also helped the County explore opportunities for conservation and restoration of natural areas. The report, and its accompanying map folio with 26 maps, can be found on the County’s web page at:

¹ In the 2007 Inventory and Characterization, marine analysis areas were referred to as ‘management units’.

<http://www.co.pierce.wa.us/index.aspx?nid=956>. The ICR evaluated the current conditions in each watershed in Pierce County. These findings are summarized below.

Puyallup - White River Water Resource Inventory Area (WRIA) 10

WRIA 10 encompasses the portions of Pierce County basins draining to the Puyallup River, White River and Hylebos Creek, including the marine shorelines of Dash Point. Tacoma is the major population center, with urban densities extending into surrounding cities of Puyallup, Fife, Sumner, Orting and others, as well as surrounding unincorporated areas of the County. The eastern portion of WRIA 10 is sparsely populated, with the exception of limited development along Highway 410 around the town of Greenwater.

For purposes of this report, WRIA 10 shorelines are assessed as four analysis areas:

- Puyallup River and Tributaries (freshwater shorelines);
- White River and Tributaries (freshwater shorelines);
- Lake Tapps (freshwater shorelines); and
- Dash Point (marine shoreline).

Surface water runoff from the western, northern, and northeastern slopes of Mt. Rainier shapes a number of significant subbasins in the WRIA's eastern reaches, including the Upper Puyallup River, the Upper and Lower Carbon Rivers, South Prairie Creek, and the Upper White River. Generally, these are medium gradient river systems in "U"-shaped, glacially carved valleys. Lakes in this area include Mowich, Kaposwin, and Mud Mountain lakes.

Rivers and tributaries within the mountainous reaches of WRIA 10 drain primarily to the White, Carbon, and Puyallup rivers. The Carbon and White rivers both drain into the Puyallup River – northwest of Orting and at Sumner, respectively – and the Puyallup River flows into Puget Sound at Commencement Bay. Sub-basins within the western (lowland) portion of WRIA 10 include Browns/Dash Point, Tacoma, Hylebos Creek, Clear/Clark's Creek, Mid Puyallup River, Mud Mountain, and Lower White River. Floodplains and terraces characterize much of this area, with meandering rivers and oxbow scars. Lake Tapps is the only major lake within the western portion of WRIA 10 and a shoreline of statewide significance.

The WRIA 10 nearshore extends from Brown's/Dash Point to the north, along Commencement Bay, to near the Thea Foss Waterway. Most of the WRIA 10 nearshore in Pierce County is comprised of the greater Tacoma metropolitan area and has been highly altered by shoreline development, urbanization, and filling of the Puyallup estuary and Commencement Bay. Some areas with unarmored bluff shorelines and riparian vegetation occur along Dash Point and Point Defiance, but otherwise the shoreline is highly altered by armoring, historical fill, presence of contaminated sediments, impervious surfaces, and high rates of stormwater runoff. Loss of estuarine wetlands within the Commencement Bay/Puyallup estuary has been almost complete. The only area of unincorporated WRIA 10 nearshore within Pierce County is at Dash Point.

Even though the mouth of the Puyallup River (which is within the jurisdiction of the City of Tacoma) has a high level of alteration, the nearshore waters still provide habitat and biotic support. Juvenile salmonids move through and use areas of Commencement Bay for physiological transition and feeding, and a variety of shellfish, marine mammals and waterfowl are found in Commencement Bay (Simenstad 2003). Surf smelt spawning occurs at a few locations along Dash Point. Pocket estuaries along the shoreline south of Point Defiance provide opportunities for feeding, migration, and predator refuge for juvenile salmon (Redman et al. 2005).

Nisqually River WRIA 11

WRIA 11 encompasses the portions of Pierce County basins draining to the Nisqually River and its tributaries, including the marine shorelines within the Nisqually estuary. The basin's headwaters begin on Mt. Rainier's Nisqually Glacier, and eventually empty into Puget Sound at the Nisqually Wildlife Refuge. Medium gradient rivers in the upper watershed give way to very low-gradient systems in the lowlands. Elevations range from sea level at the Nisqually River's mouth to over 14,000 feet above sea level at the summit of Mt. Rainier. Population is relatively sparse in WRIA 11, with the highest densities occurring around Yelm, Eatonville, and Roy.

For purposes of this report, WRIA 11 shorelines are assessed as two analysis areas:

- Nisqually River and Tributaries (freshwater shorelines); and
- Nisqually Estuary (Nisqually National Wildlife Refuge; marine shoreline).

The upper portion of WRIA 11 includes the Upper Nisqually River, Mashel River, and Ohop Creek sub-basins. As in WRIA 10, these are medium gradient river systems in "u"-shaped, glacier-carved valleys. Alder Lake is the only major lake within the upper watershed. Sub-basins within the lowland portion of WRIA 11 include the Mid and Lower Nisqually rivers and Muck Creek. Major tributaries to the Nisqually River include: Muck Creek, Ohop Creek, and Tanwax Creek. SMA-regulated lakes in WRIA 11 include: Harts, Tule, Kreger, Silver, RapJohn, Ohop, Clear and Tanwax lakes.

Only a small portion of the WRIA 11 marine nearshore exists within unincorporated Pierce County. This section is located within the Nisqually delta, and includes a portion of the Nisqually Wildlife Refuge. Alterations to the nearshore include the presence of a rail line along the shore and partial constrictions from roads, bridges, and historical fill in tidal wetlands (Redman et al. 2005).

Chambers-Clover Creek WRIA 12

WRIA 12 encompasses the Chambers and Clover Creek drainages, including the marine shorelines along Tacoma Narrows, and extends north to Point Defiance and to the western extent of Commencement Bay. Streams in WRIA 12 are low gradient, with underlying topography consisting of rolling glacial outwash and till plains. Sub-basins within WRIA 12 include Clover

Creek/Steilacoom, American Lake, Chambers Bay, Tacoma West, and portions of Tacoma. Spanaway and American Lakes are the major lakes within the basin.

The nearshore portion of WRIA 12 extends from approximately the Thea Foss waterway, around Point Defiance, south to the edge of the Nisqually Delta. This marine region is characterized by high energy currents through the relatively deep and narrow passes and is somewhat distinct from the rest of the Pierce County nearshore as this area is part of the Central Puget Sound Basin. All areas along the WRIA 12 marine nearshore are outside of Pierce County shoreline jurisdiction (either included within cities limits or part of Joint Base Lewis McCord).

For purposes of this report, WRIA 12 shorelines are assessed as one analysis area:

- Chambers-Clover Creek freshwater.

Although the shoreline reach from the Nisqually Delta to Point Defiance is highly urbanized and constrained by the presence of the rail line along the shore, this area does contain several small pocket estuaries. These estuaries provide support juvenile salmon and water quality functions.

Kitsap Peninsula and Islands WRIA 15

WRIA 15 includes shorelines of the Key Peninsula (otherwise known as Longbranch), the southern tip of the Gig Harbor Peninsula, Fox Island, McNeil Island, Anderson Island, Ketron Island and other smaller islands in the Pierce County portions of southern Puget Sound. The entire basin is located within the central Puget Sound ecoregion. Elevations throughout the basin are at or just above sea level. Sub-basins within WRIA 15 in Pierce County include Gig Harbor, Key Peninsula, and islands. Major lakes found in these sub-basins are Josephine and Florence Lakes on Anderson Island, Bay, Jackson, Minterwood, Stansberry, and Carney Lakes on the Key Peninsula, and Crescent Lake on the Gig Harbor Peninsula.

For purposes of this report, WRIA 15 shorelines are assessed as seven analysis areas:

- Gig Harbor Peninsula/ Raft Island (marine shorelines);
- North Key Peninsula (marine shorelines);
- South Key Peninsula (marine shorelines);
- Anderson Island / Ketron Island (marine shorelines);
- Fox Island (marine shorelines);
- McNeil Island (marine shorelines and Butterworth Reservoir)²; and

² McNeil Island is owned and management by the State of Washington's Department of Corrections; there is no public access to the island and no commercial, residential, or industrial development occurs that is unrelated to Department of Corrections operations. While McNeil Island was described in the 2007 Inventory and Characterization Report, the island was not included in the County's build-out analysis.

- WRIA 15 freshwater shorelines (8 lakes and 1 stream).

The nearshore portion of WRIA 15 includes the eastern portion of Case Inlet, Carr Inlet, both sides of the Key Peninsula, Gig Harbor Peninsula, and Fox, McNeil and Anderson Islands. Although the degree of shoreline development is high in some areas, the upland watersheds have relatively low impervious surface areas, and predominantly forest or mixed forest/pasture land cover. This area lacks the large urban/industrial developments that have altered the Puyallup estuary and Commencement Bay.

Water quality impairments exist in Gig Harbor, Carr Inlet, Henderson Bay, Wollochet Bay, in the area between the Nisqually Delta and Anderson Island, and in isolated spots off Anderson and McNeil Islands. Water quality impairments are associated with areas of greater impervious surfaces, overwater structures, urban areas, agricultural land uses, wastewater treatment plants, and those with inadequate riparian vegetation. Several prohibited or restricted shellfish growing areas occur in Wollochet Bay, Oro Bay, Burley Lagoon, and at scattered locations on the Key Peninsula (e.g., Filucy Bay). Sources of water quality impairments are exacerbated in these areas by the long, narrow and shallow inlets, the lack of flushing, and the long residence times (Albertson et al. 2002). All of these factors increase susceptibility to water quality impairments. Excess inputs of nutrients, pathogens, or toxins in this region of Pierce County are more likely to result in algal blooms and low dissolved oxygen (DO) levels, and an accumulation of these substances in the water, sediments, and ultimately in wildlife, particularly shellfish.

Shoreline conditions in general are relatively unaltered for most of the area. However, significant shoreline modification through armoring and overwater structures and the removal of riparian vegetation occurs locally in Hale Passage, Wollochet Bay, portions of Henderson Bay, and a small area in Case Inlet around Vaughn Bay. Forage fish spawning, eelgrass, marine invertebrates and shellfish beds are relatively abundant, especially around Wollochet Bay, and in Carr Inlet/Henderson Bay and Case Inlets. Numerous marine mammal haulouts, primarily for harbor seal, occur scattered around the islands. Waterfowl concentration areas are associated with most small bays which contain mud or sand flats.

The large stretch of shoreline south of Gig Harbor along the Tacoma Narrows has relatively intact riparian vegetation, provides a source of large woody debris (LWD), and contains documented surf smelt and sand lance spawning, and potential forage fish habitat. This area also has almost no shoreline armoring or overwater structures.

Cowlitz River WRIA 26

Only a small area of the upper watershed of WRIA 26 lies within Pierce County, to the southeast of Mt. Rainier. This portion of the basin includes the headwaters of the Cowlitz River and associated tributaries, all of which lie within the Mount Rainier National Park. Since shorelines of the state within this watershed lie entirely within National Park lands, the provisions of the SMP do not apply and therefore WRIA 26 has not been included as part of this report's analyses.

Section 2.3: What is the Historical Pattern of Development in the County's Shorelines?

There are a total of 13,690 existing lots that extend into the County's marine and freshwater shoreline jurisdiction. The majority of these parcels support residential use (with rural residential the most common existing land use – by both parcel number and area). The large majority of shoreline lots extend outside of shoreline jurisdiction; in fact only 21 percent (2,875 total) of all shoreline lots have 50 percent or more of their total area within shoreline jurisdiction. Almost half of shoreline lots (6,837 total) have existing buildings 500 square feet or larger within the shoreline area, and only 13 percent of shoreline lots (1,746 total) are coded by the County as vacant. Within this predominant pattern of rural residential shoreline use, the historical pattern of development varies by location and is described by watershed area.

The **Puyallup-White River watershed (WRIA 10)** includes the major population centers of Tacoma, Fife, and Puyallup. These population centers and associated residential, commercial, and industrial development at urban densities are primarily located within municipalities and are outside of the County's jurisdiction. Major alterations within the Puyallup/White River watershed include Mud Mountain Dam on the White River (located within national forest lands), levees along the majority of the Puyallup River, water diversions for Lake Tapps, alterations to the landscape due to timber harvest in the upper watershed, agriculture, and urban development with associated infrastructure in the lower watershed. Flow modifications related to the management of Mud Mountain Dam and the Puget Sound Energy flow diversion from the White River to Lake Tapps have impaired in-stream habitats for fish within the river. Sedimentation within the Puyallup River has resulted in an increasing risk of flooding along the river within the county. Historical alterations in the Puyallup River delta have occurred resulting in loss of wetlands and estuarine habitat within Commencement Bay in Tacoma.

Most of the marine nearshore is located within the greater Tacoma metropolitan area and has been highly altered by shoreline development, urbanization, and filling of the Puyallup estuary and Commencement Bay. The only nearshore area within the County's jurisdiction is the Dash / Browns Point shoreline, located at the northern end of Commencement Bay and extending to the border of King County / City of Federal Way.

The headwaters of the **Nisqually River watershed (WRIA 11)** begin on Mt. Rainier's Nisqually Glacier, and eventually empty into Puget Sound at the Nisqually Wildlife Refuge. Population is relatively sparse in WRIA 11, with the highest densities occurring around Yelm, Eatonville, and Roy.

Major alterations and impairments within the Nisqually River watershed include the presence of levees, agricultural land uses along tributaries and lakes in the watershed, and alterations to the landscape due to timber harvest and a high density of forest roads in the upper watershed. The Nisqually River is the least altered of all watersheds within the County.

Only a small portion of the WRIA 11 nearshore is located within Pierce County's boundaries and includes a portion of the Nisqually Wildlife Refuge. Alterations to the nearshore include the presence of a rail line and partial constrictions from roads, bridges, and fill in tidal wetlands. Relatively recent restoration efforts within the Nisqually estuary have restored tidal influence to large areas of the wetlands and floodplains in the Wildlife Refuge and surrounding areas. Like the rest of the Nisqually watershed, the level of alteration within the Nisqually estuary and nearshore is low compared to the County's other watersheds.

Unlike the mountainous eastern part of the County, elevations throughout the **Chambers-Clover Creek watershed (WRIA 12)** are at or just above sea level. Marine shorelines are a mix of highly urbanized and armored areas, along with areas of intact riparian vegetation such as along the Tacoma Narrows shoreline. Alterations to this watershed are related to urban development and stormwater runoff. Freshwater shorelines have been altered for residential development and transportation infrastructure. Alterations include infrastructure such as roads and culverts which has altered the natural hydrology of streams, stormwater runoff affecting water quality and summer low flows, and removal of native vegetation within the riparian zone. Some intact riparian areas exist such as in Chambers Creek Canyon Park. This watershed encompasses the majority of Joint Base Lewis McChord (there are also portions of the base in WRIA 11). The Base is outside of the County's shoreline jurisdiction.

Although the upland watersheds have relatively low impervious surface areas with forest or mixed forest/pasture lands, the degree of shoreline development is high in some parts of the marine shoreline areas in the **Kitsap Peninsula and Islands watershed (WRIA 15)**. This watershed area lacks the large urban/industrial developments that have altered the Puyallup estuary and Commencement Bay (occurring primarily in the cities of Tacoma, Puyallup, and adjacent municipalities, outside of the County's shoreline jurisdiction), although moderate density residential development is common along the marine shoreline, with associated shoreline modification (armoring, overwater structures and lack of riparian vegetation) occurring in some areas. Natural net-shore drift of sediments is interrupted by bulkheads and hardened shorelines. Feeder bluffs that should be a source of sediment, but which are stabilized at the toe, can no longer provide sediment to the nearshore environment. Removal of riparian vegetation results in a reduction of large woody debris to the nearshore environment.

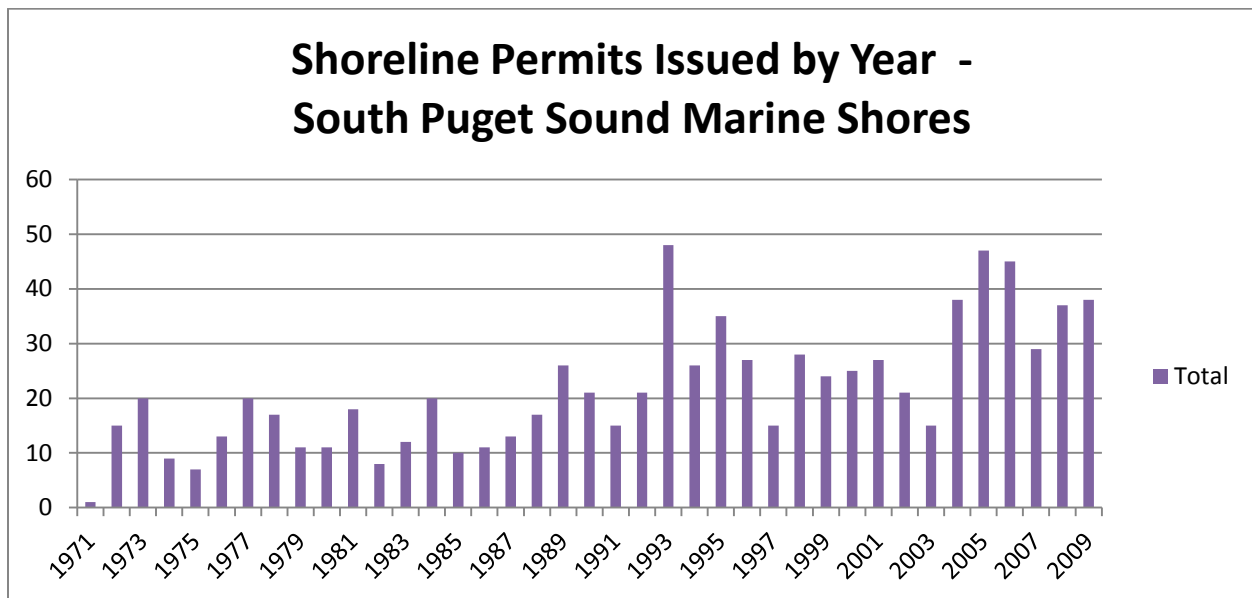
Historical Shoreline Development Permit Data

Historical permit data was provided by County Planning and Land Services staff and was separately obtained from Washington Department of Ecology (Ecology) for all shoreline permits received and reviewed by the State for Pierce County. County records were provided as rolled-up permit information, summarizing the amount of residential, commercial, and land division applications within shoreline jurisdiction over the last two decades (1992 – 2012). The Ecology database, while also based on shoreline development history, extends back to 1971 (ending in 2009) and includes attribute information that allows for determination of whether or not the permit was issued for a marine shoreline versus a freshwater shoreline (river or lake).

County Permit Application and Land Division Records: Between 1992 and 2012, there have been a total of 6,071 residential building permit applications within shoreline area. In the same period, far fewer commercial building permit applications (328) and land division applications (294) have been received. This is consistent with the predominantly rural residential character of the County’s shorelines, and also suggests that there has been little pressure for lot creation within shoreline areas (less than 17 applications for land division per year). When compared to the level of lot creation in the County overall, the amount of shoreline land division is minimal. In the last 10 years, the County has approved creation of 6,879 new lots (2002 – 2012) predominantly in urban unincorporated areas. Only 31 these new lots (less than 0.5 percent) were created within shoreline jurisdiction.

Pierce County Shoreline Permits Received by Ecology: In the marine shoreline, a total of 841 shoreline permits (including Shoreline Substantial Development Permits, Conditional Use Permits and Variances) were received and reviewed by Ecology between 1971 and 2009. The permits issued by year are illustrated in Exhibit 2-1 below:

Exhibit 2-1. Shoreline Permits issued by Ecology in the Marine Shorelines of Pierce County, Washington

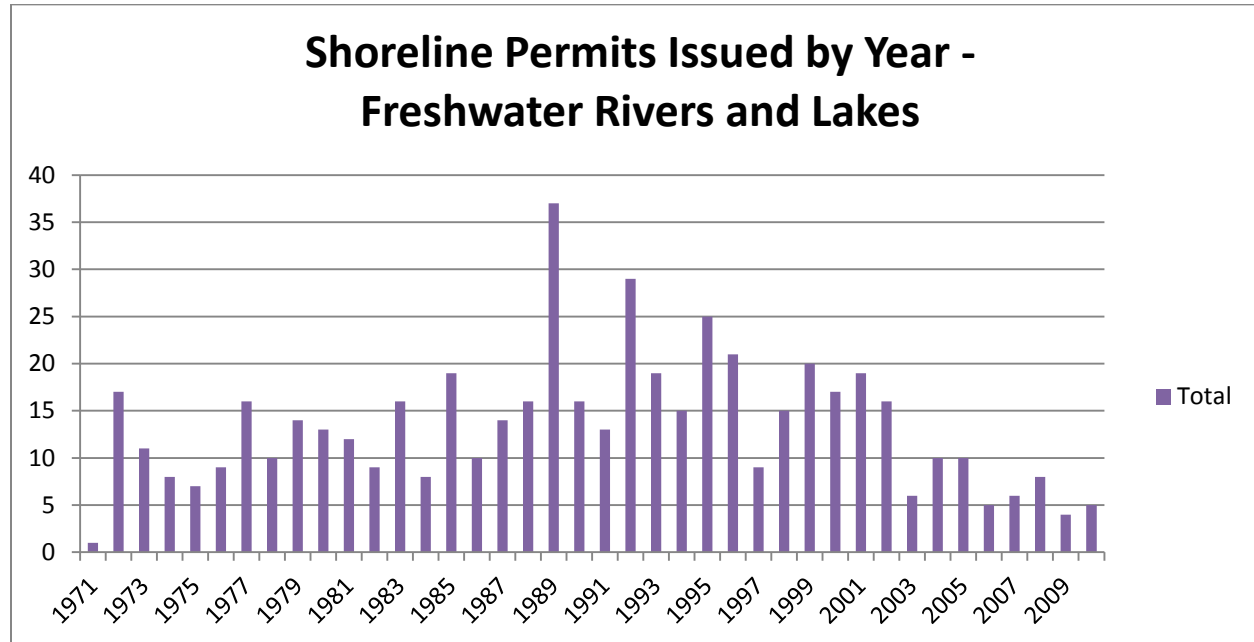


According to the data, generally fewer than 20 permits per year were issued through Ecology until 1993. However, after 1993, development permits for actions within the marine shorelines were issued at an average rate of 31 permits per year or more. The majority of these permits were related to construction of single-family pier/ramp/floats; see section below for more information on pier and dock permit history. Permits were also routinely issued for replacement of bulkheads protecting residential structures. A number of these permits were to construct swimming pools, decks, hot tubs and accessory dwelling units within the shorelines. Although data for permit

history after 2009 is not available from Ecology, it is anticipated that the number of permits has recently dropped due to the economic recession.

Ecology also provided the permit history for shoreline permits near freshwater rivers and lakes in Pierce County. The number of permits issued is illustrated in Exhibit 2-2. A total of 535 permits were received and/reviewed for development activities near shoreline rivers and lakes between 1971 and 2009.

Exhibit 2-2. Shoreline Permits issued by Ecology in the Freshwater Shorelines of Pierce County, Washington



The historical data available from Ecology for freshwater shorelines indicate that generally fewer than 15 permits per year were issued until 1989. After 1989, shoreline permits along rivers and lakes were issued at an average rate of about 20 per year until about 2002. Since 2002, permit activity has been diminishing over time.

The majority of the freshwater shoreline permits were related to: 1) public utilities and infrastructure improvements, 2) residential subdivision and single family development, or 3) public recreational improvements (i.e., trails). Public utilities and infrastructure included road improvement projects, bridge construction, ferry projects, levee setback projects, storm drainage systems and other utility pipelines. Shoreline permits issued for lakes were generally tied to docks, bulkheads and after-the-fact permits for residential development.

Historical Pier and Dock Permit Data

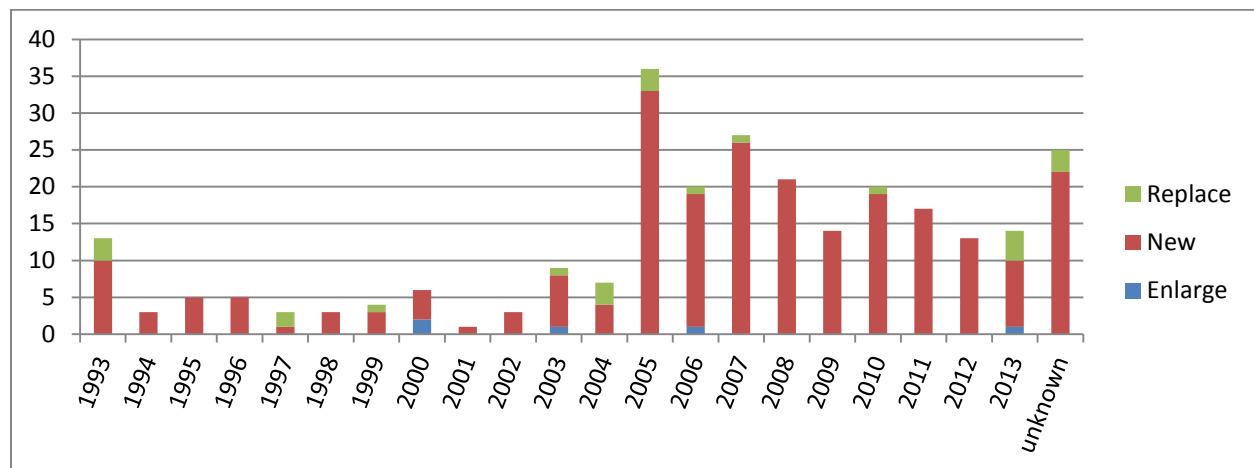
As noted above, County permit history shows that development of new overwater structures has been one of the most common shoreline development activities on the County’s marine shorelines. Dock development has also been reasonably common on Lake Tapps and American Lake. To further understand the locations and trends of pier and dock construction in the recent past, additional permit record data sources were reviewed:

- County permit records for the last 20 years were reviewed to identify the number of new, expanded, and replaced / repaired piers and/or docks; and
- Washington Department of Fish and Wildlife (WDFW) Hydraulic Project Approval (HPA) permit records for the last 12 years were reviewed to verify trends within the County permit record.

County permit records over the last 20 years indicate that the majority of permits for overwater structures have occurred for private residential development on marine shorelines in WRIA 15 (Figure 2), as well as along the high density residential shorelines of Lake Tapps (Figure 3) and American Lake.

Since 2005, an average of 15 permits has been issued each year for overwater structures on the County’s marine shorelines. The majority of permits have been issued for new private and joint-use structures, commonly consisting of a pier, ramp, and float.

Exhibit 2-3. Pierce County permit record for overwater structures on marine and freshwater shorelines, 1993 to 2013



The majority of permits for marine piers and docks have been issued in focused areas around Hale Passage (north shoreline of Fox Island and south facing shoreline of Warren community), Wollochet Bay, Gig Harbor (within County jurisdiction), east shoreline of Henderson Bay, and other small embayments along the Key Peninsula and Anderson Island shorelines (Table 2-2). These areas are further discussed in Chapter 3 of this report.

Table 2-2. Pierce County permit record for overwater structures on marine shorelines by area, 1993 to 2013 (all areas in WRIA 15)

Marine Shoreline Area	County Permits – Piers and Docks			
	New Structures	Expanded Structures	Replacement Structures	Total Permitted Structures
Anderson Island - Oro Bay / East Oro Bay / Anderson Bay	2	0	0	2
East Carr Inlet Embayments	47	1	5	53
Hales Passage	73	0	2	75
North Gig Harbor shoreline	9	1	3	13
Vaughn Bay	2	0	1	3
West Carr Inlet Embayments	3	0	1	4
Wollochet Bay	35	0	0	35
Other marine shorelines	5	0	0	5
Grand Total	176	2	12	190

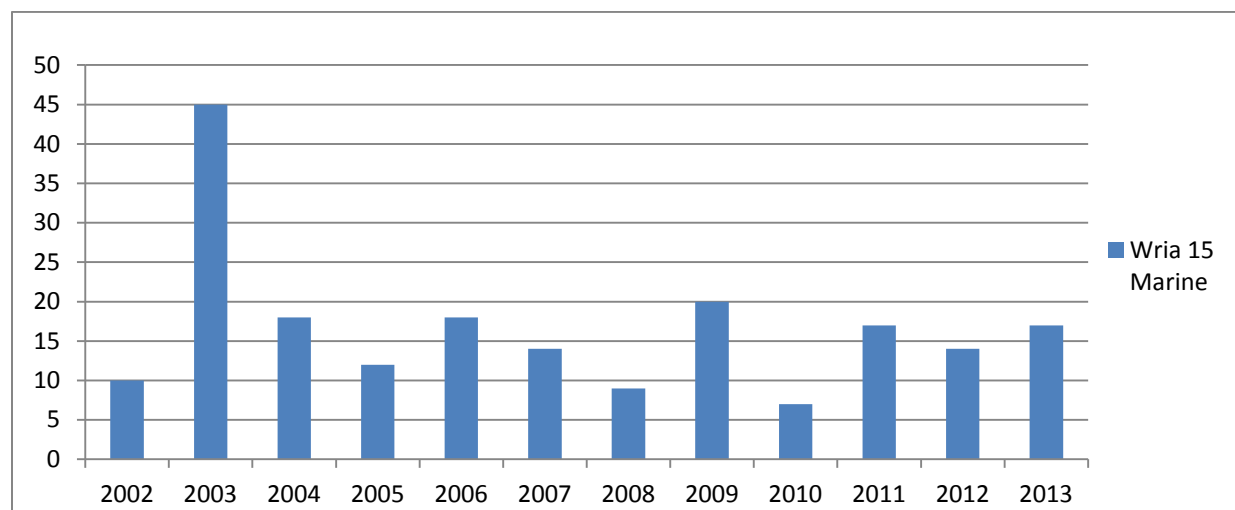
Compared to marine shorelines, there have been relatively few County permits issued for new, expanded, or replaced docks on freshwater shorelines. Those that have been issued are predominantly for Lake Tapps (more than 75 percent of all freshwater overwater structure permits in the County) and American Lake. The remainder of permit history is for other, smaller freshwater lakes – although none of these shorelines has a record exceeding two permits in the last 20 years. No permits for piers or docks have been issued on the County’s rivers and streams.

Table 2-3. Pierce County permit record for overwater structures on freshwater shorelines, 1993 to 2013

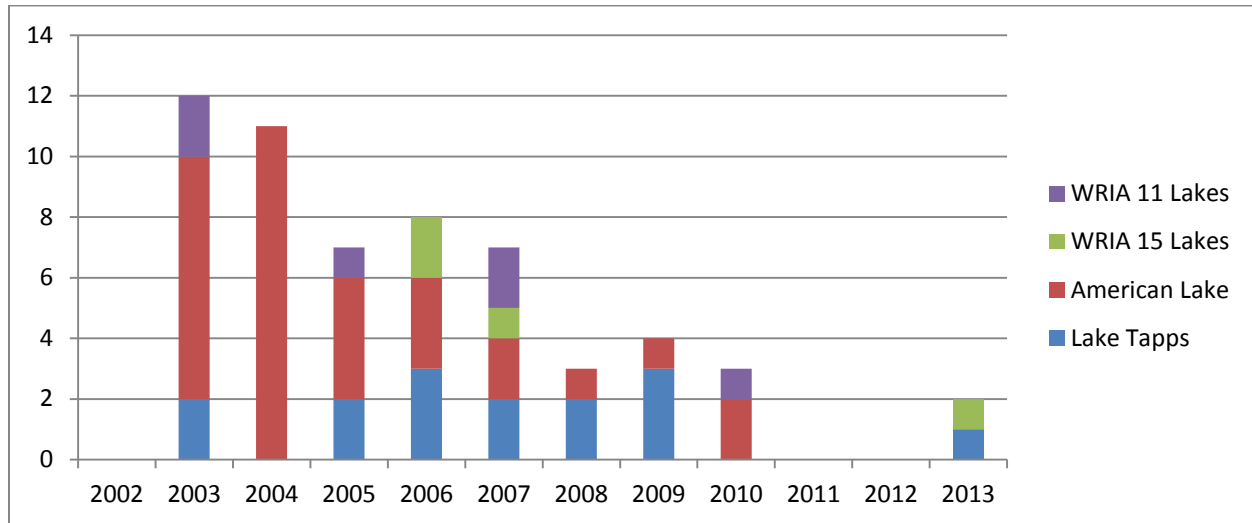
Freshwater Shoreline Area	County Permits – Docks			
	New Structures	Expanded Structures	Replacement Structures	Total Permitted Structures
Lake Tapps	29	2	4	35
American Lake	1	0	1	2
WRIA 15 Lakes	4	0	0	4

WDFW issues HPA permits for any activity that requires in-water construction, including construction of new, expanded, or replacement docks. WDFW provided the County access to the Beta version of the Hydraulic Permit Management System (HPMS) Viewer, an online database tool of past and current HPA permits (WDFW, 2013). The database was queried for HPA permits in Pierce County over the last 12 years (2002 – 2013). Across the County’s shoreline jurisdiction, an average of approximately 29 HPA permits have been issued annually. The majority of these permits have been issued for WRIA 15 marine shorelines (an average of just under 17 permits per year; Exhibit 2-4).

Exhibit 2-4. HPA Permits issued by WDFW along the WRIA 15 marine shorelines of Pierce County



On freshwater shorelines, HPA permits have been issued for lake docks, primarily on Lake Tapps and American Lake (Exhibit 2-5).

Exhibit 2-5. HPA Permits issued by WDFW along the freshwater shorelines of Pierce County

Section 2.4: What is the Existing Level of Shoreline Ecological Functions?

According to WAC 173-26-186, the County is required to review and amend its SMP so that it uses a process that identifies, inventories and ensures meaningful understanding of current and potential ecological functions provided by shorelines. Furthermore, local master programs shall include policies and regulations designed to achieve “no net loss” of those shoreline ecological functions. As per WAC 173-26-201(3)(d)(i), the following are considered shoreline ecological functions:

- **Hydrologic functions:** Transport of water and sediment across the natural range of flow variability; attenuating flow energy in rivers; attenuating wave and tidal energy in marine waters; recruitment and transport of large woody debris and other organic material; removing excessive nutrients and toxic compounds.
- **Shoreline vegetation:** Maintaining temperature; removing excessive nutrients and toxic compound, sediment removal and stabilization; attenuation of flow and wave energy; and provision of large woody debris and other organic matter.
- **Hyporheic functions:** Hyporheic functions are those functions related to water storage and flow adjacent to and beneath streams and rivers where surface and groundwaters mix. Removing excessive nutrients and toxic compound, water storage, support of vegetation, and sediment storage and maintenance of stream base flows.
- **Habitat for native aquatic and shoreline-dependent birds, invertebrates, mammals; amphibians; and anadromous and resident native fish:** Habitat functions may include,

but are not limited to, space or conditions for reproduction; resting, hiding and migration; and food production and delivery.

Based upon information and data summarized in the ICR (ESA Adolfson, 2009), shorelines within Pierce County do provide important ecological functions. Many freshwater bodies in the County still provide a high level of hydrologic functions, with dense forest cover along the shoreline riparian zone, few impediments to sediment transport, and overall good water quality. This is particularly true of streams and rivers in higher elevation areas, such as the upper Carbon, Puyallup, White and Nisqually Rivers, where less development has occurred. Some low-elevation freshwater shorelines also still provide a high level of functions, such as South Prairie Creek, Ohop Creek, and the Mashel River systems. Burley Lagoon and Minter Bay were also noted as having high levels of hydrologic function in the marine environment.

Table 2-2 summarizes the existing status of key ecological processes and functions by shoreline subbasin, including hydrology, water quality and habitat. The status of conditions is only summarized based on available information and data in the ICR (ESA Adolfson, 2009) for those shoreline reaches where there is significant foreseeable future development.

Table 2-4. Summary of Current Ecological Circumstances in Areas of Foreseeable Development

Analysis Area - Shoreline Reaches Under Development Pressure	Ecological Status by Functional Category ³		
	Function 1 Hydrology	Function 2 Water Quality	Function 3 Habitat
FRESHWATER SHORELINES			
White River and Tributaries – Mid White River (east of Lake Tapps) (see Section 4.3.2 of the ICR)	High – historical alterations have changed overall basin hydrology (Mud Mountain Dam, diversion for Lake Tapps). Reach does not include levees or revetment (engages with floodplain and associated wetland areas).	Medium – Washington State 303(d) Category 5 listings for fecal coliform, pH, and temperature in upstream reaches. Sources of impairments include runoff (pasture lands and urban development) and removal of riparian vegetation.	High - Salmonid habitat, including critical habitat for threatened species; large waterfowl concentration areas; agricultural and other wetland habitat; harlequin duck breeding areas; and great blue heron. Braided channel, with side channels extending across significant portion of the floodplain.
White River and Tributaries – Lake Tapps (see Section 4.3.3 of the ICR)	Low – historical alterations (White River diversion) resulted in significant changes to hydrology. Surrounding residential development and urban densities has	Medium – Reported water quality impairments include excessive phosphorus (Ecology 2004)	Low to Medium - Small waterfowl concentration areas; wetland habitats; and bald eagle nests. Habitat impacts associated with impoundment and degraded shoreline vegetation (including listing for invasive species).

³ Ecological status ratings and discussion included in Table 2 are based on analysis in the 2009 ICR, Chapters 3 through 7. See Table 3-4 for thresholds used to assign hydrology and water quality ratings.

Analysis Area - Shoreline Reaches Under Development Pressure	Ecological Status by Functional Category ³		
	Function 1 Hydrology	Function 2 Water Quality	Function 3 Habitat
	changed amount and timing of flows to lake.		
Puyallup River and Tributaries – Mid Puyallup River (see Section 4.3.1 of the ICR)	Medium – Electron Dam and levees have resulted in modified hydrologic processes. Alteration of timing and amount of runoff as a result of surrounding agricultural and residential uses.	Medium – Impairments associated with agricultural and residential uses.	Medium - Salmonid habitat, including critical habitat for threatened species; small and large waterfowl concentration areas; wetland habitat; and bald eagle, heron and goshawk. Confined channel and degraded riparian habitat.
Puyallup River and Tributaries – South Prairie Creek (see Section 4.4.36 of the ICR)	High – Significant areas of associated wetland mapped within floodplain (approximately 14 percent of South Prairie Creek planning area). Land cover conversion from forest to harvested forest, pasture, and limited areas of urban has resulted in some alteration.	Medium – Impairments associated with agricultural uses as well as wastewater discharges; Washington State 303(d) Category 5 listings for fecal coliform and temperature.	High - Spawning and rearing habitat for salmonids, including critical habitat for threatened species; agricultural and other wetlands; elk range; and small waterfowl concentration areas. Anadromous fish blockage and areas of confined channel, but also some excellent spawning habitat and stretches of intact riparian corridor.

Analysis Area - Shoreline Reaches Under Development Pressure	Ecological Status by Functional Category ³		
	Function 1 Hydrology	Function 2 Water Quality	Function 3 Habitat
Nisqually River and Tributaries – Mid-Nisqually River (see Section 5.3.1 of the ICR)	High – No mapped levees within reach; alteration of tributary flow timing and amount within surrounding sub-basins.	High to Medium – Limited water quality impairment associated with agricultural uses and rural residential development, both within and outside of shoreline jurisdiction.	High - Salmonid habitat, including critical habitat for threatened species (populations include hatchery fish); elk winter range; various wetland habitats; deer wintering areas; large waterfowl concentration areas; and harlequin duck breeding areas. Quality of riparian habitat varies in canyon, including spawning habitat and flood control dikes.
Nisqually River and Tributaries – Ohop Creek - Nisqually (see Section 5.4.12 of the ICR)	High – Low gradient stream with high fine sediment concentrations and few alterations. Approximately 70 percent of the Ohop Creek shorelands are mapped as associated wetlands.	Medium – Primary known water quality concerns are associated with agricultural uses within the Creek’s shoreline area (Ecology Category 5 listing for fecal coliform; other parameters of concern include temperature, dissolved oxygen, pH).	High - Salmonid habitat, including habitat for threatened species; small and large waterfowl concentration areas; wetlands; bald eagles and elk winter range. Forested and agricultural riparian corridor with some channelization and a log weir that may inhibit fish migration.

Analysis Area - Shoreline Reaches Under Development Pressure	Ecological Status by Functional Category ³		
	Function 1 Hydrology	Function 2 Water Quality	Function 3 Habitat
Nisqually River and Tributaries – Muck Creek (see Section 5.4.11 of the ICR)	Medium – Riparian and other associated wetlands commonly mapped along Muck Creek and tributaries; primary modification occurs outside of shoreline jurisdiction, associated with forest loss and rural / agricultural uses.	Medium - temperature and bacteria are water quality issues, with State standards for these two parameters commonly exceeded in the past; no Ecology Category 5 listings (Ecology 2004).	Low to Medium - Salmonid habitat, including habitat for threatened species; waterfowl concentration areas; and wetlands. Intermittent stream flow affects fish migration, stream is channelized, and riparian area has been cleared /degraded by exotic plant species.
Chambers-Clover – Clover Creek / Steilacoom Lake and Creek (see Section 6.3.2 of the ICR)	Low to Medium – Functionally important areas of Spanaway Creek and lowest County reach of Clover Creek are moderately intact in shoreline jurisdiction; in other areas modification occurs in- and out-side of shoreline area, associated with moderate to high density residential uses.	Low to Medium – Primary issue is water quality degradation from urban stormwater runoff; Ecology water quality listings include total phosphorus, Dieldrin (pesticide), fecal coliform, copper, pH, temperature, dissolved oxygen and total PCBs.	Low to Medium - Salmonid habitat; large waterfowl concentration areas; and wetlands. Majority of stream reaches have been modified, with armoring, dams and culverts. Nonnative riparian vegetation.

Analysis Area - Shoreline Reaches Under Development Pressure	Ecological Status by Functional Category ³		
	Function 1 Hydrology	Function 2 Water Quality	Function 3 Habitat
MARINE SHORELINES			
Browns/Dash Point (see Section 4.2.1)	Low – No areas of associated wetland or pocket estuaries are currently mapped, though their presence is likely; shoreline armoring fronting urban residential development has reduced functions.	High - Water quality is generally good,	Medium - Salmonid habitat, including critical habitat for threatened species; killer whale; stellar sea lion; harbor seal; purple martin; forage fish; bald eagle; geoduck, Dungeness crabs and other shellfish. Shellfish harvest is closed in the area due to pollution. Patchy eelgrass in intertidal areas.
Fox Island (see Sections 7.2.2 [Reach HP-WB 3] and 7.2.3 [Reach CI-HB 1] of the ICR)	Medium – Wetlands have been mapped along the shoreline, and additional estuarine and non-estuarine wetlands may occur, especially in areas where streams drain to the shoreline. Alterations to hydrology include shoreline armoring and piers common, especially along Hale Passage, impacting drift cells and other nearshore hydrologic functions.	Medium - Marine water quality is generally good (due in part to moderate currents surrounding the island); however, non-point pollution and associated runoff from shoreline residential development.	Medium to High - Forage fish spawning; geoduck and other shellfish habitat, wetlands. Active feeder bluffs on Anderson Island, variable riparian habitat and no contiguous eel grass beds. No streams.

Analysis Area - Shoreline Reaches Under Development Pressure	Ecological Status by Functional Category ³		
	Function 1 Hydrology	Function 2 Water Quality	Function 3 Habitat
Anderson Island (see Section 7.2.4 of the ICR)	High – Drift cells are generally functioning naturally (fill, armoring, or other modifications do not interrupt marine drift); small coastal streams and wetlands generally high functioning.	Medium to High – Water quality is generally good throughout marine areas; most shorelines categorized as approved shellfish growing area (DOH 2007).	
North and South Key Peninsula (see Sections 7.2.3, 7.2.4 and 7.2.5 of the ICR)			
North Key Peninsula – Minter Bay (Reach CI-HB 9)	High – These marine reaches areas include pocket estuaries, tidal flats and associated wetlands, as such are hydrologically important; limited modification to net shore drift, extent of tidal influence, and other hydrologically important areas.	Medium to High – Important area for water quality (significant wetland and tidal flats extent); like other areas of Carr and Case Inlet, these shorelines are sensitive to water quality impairment (long, relatively shallow embayment with slow flushing rates; impairment related to stormwater runoff from developed areas (both within and outside of shoreline jurisdiction).	High - Hardshell clams, geoducks and other shellfish. No marine mammal haul-outs or forage fish spawning presently mapped. Variable riparian vegetation and no eelgrass beds
North Key Peninsula – Dutcher Cove to Rocky Bay (Reaches CI-6 through CI-11)			

Analysis Area - Shoreline Reaches Under Development Pressure	Ecological Status by Functional Category³		
	Function 1 Hydrology	Function 2 Water Quality	Function 3 Habitat
South Key Peninsula - Shoreline south from Whiteman Cove (Reach CI-3)	Medium – Minimal shoreline modification with functioning shoreline drift cells; Mapped areas of wetland are present and additional estuarine and non-estuarine wetlands are likely present. .	High – Marine water quality is generally good.	

Chapter 3: FUTURE DEVELOPMENT AND EFFECT ON SHORELINES

Section 3.1: How Will Future Development be Managed?

Identifying the New Shoreline Jurisdiction Extent

“Shorelines of the state” means all of the water areas of the state, including reservoirs, and their associated shorelands, together with the lands underlying them which meet one of the following criteria:

- Tidal waters and wetlands associated with them waterward to the extreme low tide mark;
- Rivers or streams downstream of a point where the mean annual flow is 20 cubic feet per second (cfs) or greater and the wetlands associated with those streams; and
- Lakes greater than 20 acres in size and wetlands associated with those lakes.

“Shorelines of Statewide Significance” in Pierce County are defined as follows:

- Those areas of Puget Sound lying waterward from the line of extreme low tide;
- Rivers, downstream of the point where the mean annual flow is measured at 1,000 cfs or more and adjacent shorelands; and
- Lakes or reservoirs (whether natural or artificial) with a surface acreage of 1,000 acres or more measured at the ordinary high water mark and adjacent shorelands.

"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; floodways and contiguous floodplain areas landward 200 feet from such floodways; and all wetlands and river deltas associated with the streams, lakes, and tidal waters which are subject to the provisions of this chapter; the same to be designated as to location by the Department of Ecology.

New and more accurate data on stream mean annual flow was used to identify approximately 181 miles of shoreline qualifying as shorelines of the state during completion of the ICR in 2009. While the State’s criteria did not change, the improvements in data “added” 103 miles of shoreline on waterbodies that have been regulated by Pierce County in its SMP and 78 miles of shoreline on waterbodies that not previously been designated as shorelines of the state. The majority of the newly identified waterbodies are within the upper reaches of streams and rivers in WRIA 10 (Puyallup/White River), which currently lie outside of the County’s jurisdiction in the Mt. Baker- Snoqualmie National Forest. These tributaries were included in the 2009 ICR to determine a baseline for shoreline conditions in the National Forest should any of these areas be privatized in the future; National Forest areas are not included in the County’s shoreline jurisdiction.

Consistent with its past approach, the County will regulate all Shorelines of Statewide Significance, shorelines of the state, and shoreland areas included in the minimum shoreline jurisdiction once the SMP is adopted. Ecology allows local jurisdictions to decide whether or not to regulate areas beyond the state minimum jurisdiction.

Proposed Shoreline Environment Designations

The types of future development occurring on County shorelines will vary depending on the Shoreline Environment Designation (SED) assigned to each shore segment once the SMP is adopted. The Pierce County Draft SMP assigned SEDs to shore segments based on three general factors:

1. the existing land use pattern;
2. the biological and physical character of the shoreline; and
3. the goals and aspirations of the community as expressed through the comprehensive plan.

Designations are applied to both the waterbodies themselves and adjacent shorelands. The following shoreline environment designations were developed with input from both the Shoreline Technical Group (STG) and the Shoreline Citizens Advisory Committee (SCAC) from 2008 to 2010 and again in 2012. A set of criteria were developed through these meetings to describe each shoreline environment designation, as follows (see Draft SMP Chapter 18S.20 for a complete description):

Areas designated **Natural** are relatively unaltered and provide high shoreline ecological functions and have the following qualities:

- ecologically intact and therefore currently performing an important, irreplaceable function or ecosystem-wide process that would be damaged by human activity;
- representative of ecosystems and geologic types that are of particular scientific and educational interest; or unable to support new development or uses without significant adverse impacts to ecological functions or risk to human safety; and
- include largely undisturbed portions of shoreline areas such as wetlands, estuaries, unstable bluffs, coastal dunes, spits, and ecologically intact shoreline habitats

Areas designated **Conservancy** are shorelines with one or more of the following qualities:

- existing lesser-intensity resource-based uses, such as agriculture, forestry, or recreational uses, or is designated agricultural or forest lands pursuant to RCW 36.70A.170;
- existing low density residential uses;
- supports human uses but is subject to environmental limitations, such as properties that include or are adjacent to steep banks, feeder bluffs, or floodplains or other flood-prone areas;

- high recreational value (such as County parks, State Parks and park districts) or with unique historic or cultural resources; or
- existing predominantly low-intensity water-dependent uses.

Areas designated **Residential** accommodate residential development in areas that are already developed with, or planned and platted for, residential development (single-family or multifamily). The Residential designation may also include water-oriented commercial and recreation uses.

Areas designated **High Intensity** provide for high intensity water-oriented commercial, transportation, and industry development that foster economic development, while protecting existing shoreline ecological functions and restoring ecological function on previously degraded sites; the designation applies to shoreland areas that currently support these high-intensity uses.

Areas waterward of the ordinary high water mark are proposed to be designated **Aquatic**. The purpose of the aquatic environment is to protect, restore, and manage the unique characteristics and resources of the areas waterward of the ordinary high water mark for marine and fresh waters.

The SEDs are designed so that the uses allowed on each shore segment are appropriate considering the ecological condition and sensitivity of the land and water. As a result, the type and intensity of uses allowed in areas designated Natural and Conservancy are tightly controlled since these areas are the most sensitive to future development and the most vital to protect. Existing and planned development patterns were considered as well to ensure the SEDs and associated policies and regulations are generally compatible with existing and future land uses.

For each SED, the Draft SMP identifies:

- Permitted uses and developments – Allowed uses and developments that are consistent with the SMA. Developments may require a shoreline substantial development permit if they meet certain cost thresholds, interfere with normal public use of the water or are not specifically listed as exempt per WAC 173-27-040 and Section 18S.60.020 of the Draft SMP. Permitted uses must be consistent with the requirements of the Draft SMP and the Shoreline Management Act, whether a shoreline substantial development permit is required or not. Deviations from bulk, dimensional or performance standards may necessitate a Variance permit, which requires Ecology approval. Permitted uses and developments are listed for each SED in Draft SMP 18S.60.030 (Shoreline Permit Table).
- Conditional uses – Uses that may be authorized provided they meet certain criteria. Conditional Use Permits also require Ecology approval. Conditional uses are listed for each SED in Draft SMP 18S.60.030 (Shoreline Permit Table), with specific administrative review and decision criteria provided in Draft SMP 18S.60.060.

- Prohibited uses and developments – These are uses and developments that are inconsistent with the SMA and which cannot be allowed through any permit or variance. Prohibited uses and developments are listed in Draft SMP 18S.60.015.

Section 3.2: What Types of Foreseeable Future Development are Anticipated?

This chapter examines different types of shoreline use, development and modification that are likely to occur along the shorelines of Pierce County and programmatically assesses the potential for ecological impact posed by each use / development type. Chapter 4 describes how the Draft SMP addresses the potential impact.

Much of the foreseeable development along the marine shore, the lakes and the downstream portions of the major rivers will be single-family residential development at rural densities. Lower density single-family residential (rural development and use) is foreseeable on virtually all of the freshwater river and stream shorelines. Publically owned open space is prevalent along many freshwater shorelines, some of which could be developed for additional recreational use and shoreline access. Other types of shoreline use / development are generally considered to have less risk to shoreline functions overall, because they will occur infrequently or be limited to relatively few geographic areas.

Residential Development

Residential development along marine and freshwater shorelines in Pierce County is widespread and expected to continue, primarily as infill development on existing vacant residential lots. Based on shoreline permit history over the last ten years (31 total new lots created within shoreline jurisdiction, less than 0.5 percent of all new lots in the County overall), more land division for residential use is not anticipated. Across all shoreline areas, zoning supporting residential uses makes up almost 60 percent of the shoreland areas (Table 3-1).

Table 3-1. Residential Zoning - Pierce County (Excluding Areas Designated “Aquatic”)

	Multi-family Residential*		Single-family Urban Densities		Single-family Rural Densities	
	Acres	% of Analysis Area	Acres	% of Analysis Area	Acres	% of Analysis Area
Anderson Island / Ketron Island	none		none		791	90
Dash Point	none		64	99	None	
Fox Island	none		None		347	96
Gig Harbor Peninsula / Raft Island	none		89	8	986	84
South Key Peninsula	none		None		1,091	89
North Key Peninsula	none		None		940	93
Nisqually NWR	none		None		81	26
Nisqually	none		161	2	4,724	61
White River and Tributaries	4	<1	46	1.4	1111	34.1
Lake Tapps	2	<1	75	10	633	87
Puyallup River and Tributaries	9	<1	149	2	2,805	33
Chambers-Clover	9	<1	442	82	0.1	<1
Total	24 acres	<1	1,027 acres	4	13,509 acres	53

* Includes Mixed Use Districts (MUD) and Residential / Office-Civic (ROC) zoning classes; no High Density Residential or Moderate-high Density Residential zoning class areas occur within shoreline jurisdiction

Multi-family Residential: There is minimal area zoned for multi-family development (24 total acres across the entire County). Of this, less than 6 acres is underdeveloped or vacant. Very little future multi-family development is anticipated.

Single-family Residential (Urban Densities): Single-family residential occurring at urban densities is most prevalent in the urbanized areas of the County, surrounding the City of Tacoma (Dash Point marine analysis area; Chambers-Clover freshwater analysis area).

Rural Single Family Residential: Single-family residential use and development at rural densities (large lots, generally one dwelling unit per 10 acres or more) occurs over 53 percent of the County’s shorelands. This is the predominant land use in all marine areas except Dash Point and the Nisqually NWR area (predominantly publically owned open space in the Nisqually estuary). Rural -residential is the predominant use for freshwater shorelands in all of the County’s WRIsAs, except for Chambers-Clover shorelines (where urban density residential development occurs).

There is no current, comprehensive inventory of existing piers and docks within Pierce County. The Washington Department of Natural Resources (WDNR) has a database of overwater structures in marine environments; however, it was last updated in 2007 and is not current as compared with actual existing conditions on the County’s marine shorelines (Exhibit 3-1). For example, on Fox Island as depicted below, the WDNR data does not include more recently constructed docks. Docks flagged as part of the WDNR data are shown in red. Note that one existing joint-use dock (green star) and numerous private residential ramps (yellow triangles) are not included in WDNR data.

Exhibit 3-1. Marine shoreline in the Warren Community on Fox Island; WDNR overwater structure coverage inventory (2007).



Despite the lack of comprehensive inventory, development patterns over the last 20 years indicate that construction and re-construction of residential piers and docks will likely continue to be one of the more common shoreline development activities in the County (Figures 2 and 3). Review of overwater structure permit history – including locations of where permits are being issued – shows that existing piers and docks and potential for new structures is focused predominantly on specific marine shoreline areas within WRIA 15 (Figure 4) and along the shores of Lake Tapps and American Lake. More detailed evaluation of these areas is included in Section 3.3.

Common Impacts from Single-Family Residential Development to Shoreline Ecological Functions: Residential properties on both marine and freshwater shorelines are largely developed across the County. Approximately 80 percent of all shoreline parcels are fully built-out within both marine and freshwater areas. In most cases, each fully built lot is developed with a single-family residence and associated structures and uses, and cannot be further subdivided based on underlying zoning. The existing level of build-out for this dominant shoreline use limits the potential scale of cumulative shoreline impacts throughout the County. That said, anticipated urban- and rural- single-family residential development and redevelopment remains the single most significant risk to shoreline ecological functions.

Construction of a single-family residence, when carefully sited and located outside of shoreline buffers, does not typically cause major adverse effects on shoreline functions. Most of the effects are caused by actions commonly associated with (accessory to) residential development, removal of shoreline vegetation for views, use of fertilizers and other chemicals, alteration of natural drainage pathways, construction of docks/piers, and installation of septic systems. These actions typically cause a variety of impacts that affect habitat, water quality and hydrology functions (Table 3-2).

Table 3-2. Impacts Commonly Associated with Residential Development

Development Activity	Potential Impacts to Ecological Functions ⁴
Vegetation clearing	• Simplification of habitat structure due to removal of large wood, overhanging branches, and boulders • Reduced bluff and beach stabilization, and increased erosion • Decreases in terrestrial food supply⁵, shading, and protection from overhead predators due to clearing of riparian vegetation • Increased water temperatures due to loss of shoreline vegetation • Increased marine beach substrate temperatures during low tide in summer • Habitat fragmentation and disruption of wildlife travel corridors • Increased incidence of invasive species due to site disruption
Creation of lawns and impervious surfaces	• Increased pollutant load to lakes and marine waters from non native landscaping requiring use of fertilizers and pesticides
Piers and docks (overwater structures)	• Construction of piers (pile driving) can result in temporary impacts to substrate and aquatic habitat below dock • Potential for water quality impacts if harmful materials are used for in-water construction (prohibited by new SMP and WDFW) • Riparian and shore impacts associated with pier / dock access - common need for bank hardening at pier/dock landing • Over-water structures can shade aquatic environments, disrupt forage fish spawning areas, and negatively affect salmon habitat by removing forage areas (i.e. native eelgrass) • Potential fish use impacts (avoidance and increased predation) <i>Many of the impacts identified above can be mitigated by best practices for pier and dock construction – including use of aquatic-friendly building materials, minimizing piers, and using grating or other materials to maximize light passage and minimize shading. These practices are required by the new SMP and WDFW.</i>

⁴ The list of potential impacts is adapted from Protecting Nearshore Habitat and Functions in Puget Sound: An Interim Guide (EnviroVision et al., 2007)

⁵ Riparian vegetation support terrestrial insects in areas overhanging streams, lakes and marine shorelines; organic input provided by leaf drop and terrestrial insects falling to the surface provides an important food source for aquatic organisms, including juvenile salmon.

Development Activity	Potential Impacts to Ecological Functions ⁴
In-water recreational activity	• Changes to substrate, increased forage fish egg mortality, and fish avoidance from propeller wash and grounding of boats during low tides • Substrate change and fish use impacts (avoidance) during low tides from propeller wash and grounding • Increased injury (lesions, tumors) to salmon and reduced prey and habitat due to water quality degradation from increased stormwater runoff and wastewater discharges • Chemical changes to the water column attributed to terrestrial and aquatic activities – directly affecting shellfish species and plankton (a major shellfish food source) • Introduced predator/parasite species
On-site septic systems	• Eutrophication due to leaky/failing septic systems leading to increased shading from algal growth and a resultant loss of eelgrass cover • Contamination of shellfish harvest areas due to increased nutrients and bacteria • Algal blooms in lakes due to increased nutrients and bacteria
Noise and lighting	• Changes in fish and wildlife behavior patterns

Commercial Development

There are very few areas of commercial development along the County's shorelines and it is unlikely that this will change in the foreseeable future under County zoning and Comprehensive Plan land use designations. The only marine shoreline analysis area with any Urban Center / District zoning designation (representative of commercial uses) is in Burley on the Gig Harbor Peninsula, totaling less than 20 acres (less than 1 percent of the analysis area and less than 0.25 percent of the overall marine shoreline jurisdiction). Rural Center zoning classifications are located on the Anderson Island, Gig Harbor Peninsula, and South Key Peninsula marine analysis areas; however, this zone represents less than 1 percent of the total within each shoreline area .

In freshwater analysis areas, commercial development is slightly more prevalent; however it still represents less than 5 percent of all freshwater shoreline jurisdiction (per zoning). All freshwater analysis areas have some commercial zoning: Puyallup River and Tributaries (135 acres, 1.5 percent of the analysis area), White River and Tributaries (29 acres, 0.6 percent), Nisqually River and Tributaries (22 acres, 0.23 percent), and Chambers-Clover (15 acres, 2.4 percent).

Recreational Development

Recreational areas are scattered throughout the County, including many County-owned and managed areas that intersect marine and freshwater shoreline jurisdiction. As a general rule,

shorelines within park lands are classified as Conservancy shorelines. Of approximately 725 acres zoned for Parks and Recreation uses throughout shoreline jurisdiction (excluding “Aquatic” areas), 54 percent are fully developed according to the build-out analysis completed for this report (Appendix C). Limited amounts of additional recreational development on existing vacant recreational lands (approximately 337 total acres, of which 281 acres is located on freshwater shorelines) is anticipated; however most of the uses and associated development will occur at low intensities.

Industrial Development

As identified based on zoning, there are no areas of industrial development along the County’s shorelines and it is unlikely that this will change in the foreseeable future under County zoning and Comprehensive Plan land use designations.

Resource Uses

Aquaculture: As required by state law, the Draft SMP recognizes that aquaculture is a preferred and water-dependent shoreline use—one that is very important to the regional culture and economy. The SMP classifies all aquaculture uses/development as conditional uses, which means they will receive careful scrutiny and review to ensure that adverse effects can be mitigated. The Draft SMP establishes Aquaculture Application Requirements (18S.70 Appendix C of the Draft SMP). In order to ensure protection of marine spits, aquaculture in Aquatic SEDs abutting these accretion shoreforms is prohibited.

The proposed regulations specifically require that aquaculture operations be located, designed and maintained to avoid adverse effects on ecological functions and processes (see Chapter 4 for additional information). The regulations address such issues as aesthetics and control of debris, conflicts with navigation and recreation, and predator control. In addition, aquaculture facilities / operations must provide a setback from adjacent properties, buffers from critical areas, and undisturbed areas from submerged aquatic vegetation.

The Draft SMP includes other standards to limit the amount of modification to the shoreline environment (mechanized grading is not permitted), and to limit the size, location and scale of structures used in aquaculture operations. For example, upland structures accessory to aquaculture use that do not require a waterside location must be located landward of shoreline buffers consistent with the regulations for Commercial and Industrial Uses and Developments (18S.40.050).

Commercial shellfish aquaculture occurs along the marine shorelines of WRIA 15. Interest in expanding upon the current levels of aquaculture will likely continue. If not properly managed, aquaculture can cause ecological impacts because it can disturb aquatic vegetation and substrates, introduce non-native organisms, and cause other short-term alterations. Aquaculture can also impact the visual and aesthetic qualities of the shoreline and potentially conflict with recreational use. These effects are more likely to occur with large-scale or intensive commercial

operations than with recreational beach culturing or hand-harvest. As a result, the SMP requires a Conditional Use Permit for intensive types of aquaculture use/development so the potential impacts can be analyzed.

Aquaculture can also have beneficial effects on the shoreline. For example, clams and oysters contribute to improved water quality through filter feeding and provide habitat for other marine organisms. The net effect of aquaculture use on shoreline ecology depends on a variety of factors including the location of the aquaculture farm, the best management practices used, and the growing and harvest methods.

Mining: Existing mining activities in Pierce County are for gravel extraction and predominantly are located in upland areas outside of shoreline and floodplain environments. There are few active mines in shoreline jurisdiction and none are currently planned. Mining is regulated in the Draft SMP as a Conditional Use Permit.

Forest Practices: Forest practices include the harvesting of timber and related activities involving the storage and transport of logs from the forest to the mills (road building, yarding, etc.). These activities have the potential to affect shorelines in a variety of ways. As noted in Chapter 3, the removal of forest cover in a watershed can alter hydrologic processes related to infiltration and recharge, increase the volume of surface runoff, and lead to erosion and/or landslides as slopes become destabilized. Timber harvesting also eliminates habitat for forest-dwelling wildlife. The construction of forest roads can exacerbate these effects. When vegetation removal occurs close to the shore it can reduce large woody debris recruitment and decrease other organic inputs which provide important food chain support functions. Shoreline vegetation also plays a role in trapping and removing sediments, nutrients and other pollutants, so loss of vegetation can have adverse effects on water quality. Finally, forests provide cover, perching, nesting, foraging and migratory habitat for many species of birds, amphibians and mammals, which can be adversely affected as a result of timber harvest activities.

The Draft SMP regulates non-harvest related actions such as road building and timber harvest within the County's jurisdiction. Harvest activities, except for Class IV conversions to non-forest uses, are regulated by the state Forest Practices Act (FPA) (RCW 76.09). Conversions of forest land to non-forestry uses must comply with the regulations of the proposed non-forest use and all other general regulations such as buffers (as described below). The Draft SMP requires a Conditional Use Permit for forest roads on slopes exceeding 35 percent.

Effectively this means all forest practices conversions and activities require a shoreline substantial development or Conditional Use Permit from the County. In reviewing the permit application, County staff would assess the non-harvest related actions to ensure they are compliant with the SMP and defer to WDNR to enforce timber harvest rules. The FPA would limit removal of trees within the riparian zone and control impacts related to erosion and sedimentation. Together the SMP and the FPA impose the maximum degree of regulation provided for under state law.

Section 3.3: Where Could Foreseeable Future Development Occur?

New Development

Pierce County prepared a Build-Out Analysis for the new shoreline jurisdictional area. The parcel-based analysis relies on the approach and methodology described in Appendix B. The analysis was completed by the Department of Planning and Land Services using Pierce County parcel data; results are from August 2013, with data queries and detailed analysis completed by ESA for this report. All areas below the ordinary high water mark that would be considered part of the “Aquatic” Environment have been excluded from the analysis.

Table 3-3. Build-out Analysis - Pierce County (Excluding Areas Designated Aquatic)

Property Type	Marine Shorelines		Freshwater Shorelines	
	Acres	Percentage (%) of Total	Acres	Percentage of Total
Not eligible	17	0.4	250	1.2
Vacant Properties	982	21.6	5191	24.6
Developed Residential	3,105	68.2	7490	35.5
Developed Commercial	23	0.5	148	0.7
Developed Parks and Recreation Lands	170	3.7	215	1.0
Developed Agricultural / Forest Resource Lands	258	5.7	7815	37.0
Total	4,555	100	21,110	100

As Table 3-3 shows, a relatively small proportion of the shoreline jurisdiction is likely to develop. Of the total marine shoreland area, 78 percent (3,556 acres) is considered developed, with almost 92 percent of this area considered fully developed (3,261 acres). A similarly large percentage of the area within freshwater shoreline jurisdiction is developed (74 percent, 15,669 acres). The remaining shoreland areas are considered vacant (21.6 percent or 982 acres of the marine shoreline and 24.6 percent or 5,191 acres of the freshwater shoreline); these are areas where some new, primarily single-family residential development could potentially occur.

Given the permit history since the County first passed shoreline regulations, the amount of new development anticipated within the foreseeable future on these vacant lands is low. The County has received a total of 6,071 residential building permit applications within shoreline jurisdiction over the last 20 years – approximately 300 per year. These permits are required for many types of residential construction projects, including exterior or interior construction of, on, or in a home, accessory buildings and detached structures, docks and piers, swimming pools, plumbing, electrical and mechanical projects, site development and property landscaping (rockeries,

retaining walls, and fences). This list includes many interior remodel and improvement projects and other exterior projects with little or no potential to impact shoreline ecological functions. The actual number of residential building permits that represent new development on a vacant lot is likely a small fraction of this total record.

The permit database maintained by Ecology presents useful information as to the probable rate of future residential development. In the last two decades, an average of 31 marine shoreline permits per year have been received for Ecology review; the large majority of these have been for accessory structures associated with single-family homes (docks, piers, bulkhead replacement, decks, hot tubs and accessory dwelling units). Some of these activities may have been associated with development of a vacant property, but the majority occurred as additional development (redevelopment) of lots with existing homes.

In the same period, freshwater shoreline permits received by Ecology have averaged 20 per year, and significantly less (below 10) since 2002. On freshwater shorelines, public utility, infrastructure and park projects were as common as permits for residential development.

In summary, permit records together with the limited area of vacant lands suggest that the amount of new residential development in County shorelands will be low in the foreseeable future.

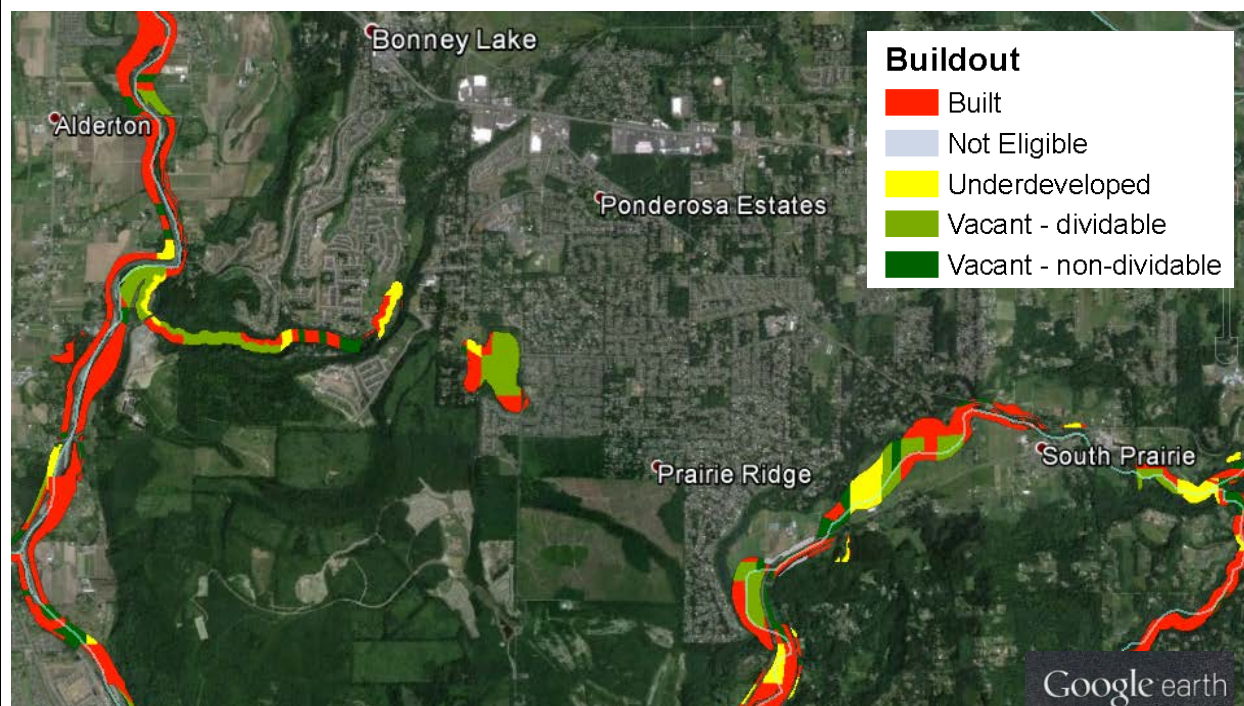
New Residential Development: Build-out analysis suggests the following areas with potential for new residential development within the marine and freshwater analysis areas:

Puyallup River and Tributaries (WRIA 10):

In the **upper reaches** of the Puyallup and its tributaries (predominantly designated Natural), the large majority of shorelands are fully built-out (per zoning and Comprehensive Plan designations) meaning there is minimal development potential. Vacant lands are identified along long reaches of the Carbon River and tributaries upstream of Carbonado; however, these shorelands are zoned as forest resources lands (FR zoning) and open space lands (PR zoning – owned by Pierce County Parks). Similar patterns occur in Puyallup River inventory reaches 9, 10 and 11 (upstream of Electron); much of this area is zoned for low density rural residential development (R20 zoning, requiring 20 acre minimum lot size). Significant portions of these shorelands are currently owned by Puget Sound Energy (the Electron Dam facility is located at the downstream end of Puyallup River Reach 9), further limiting future residential development potential. Other smaller upper watershed pockets with potential for new residential development are similarly publically owned, zoned for very low density development, and/or designated Natural.

Middle reaches: Puyallup River and tributary reaches surrounding the communities of Orting, Prairie Ridge / South Prairie, and Bonney Lake (predominantly designated Conservancy) have moderate potential for new residential development, more than any areas within this analysis area (Exhibit 3-1). These areas are zoned for low density rural development (R10, Rsv5), with some Agriculture Resource Lands zoning.

Exhibit 3-2. Build-out analysis example for Puyallup River and tributaries (reaches CARB_RV_05, FENN_CR_01 and SOPR_CR_01) in the Orting / South Prairie vicinity.



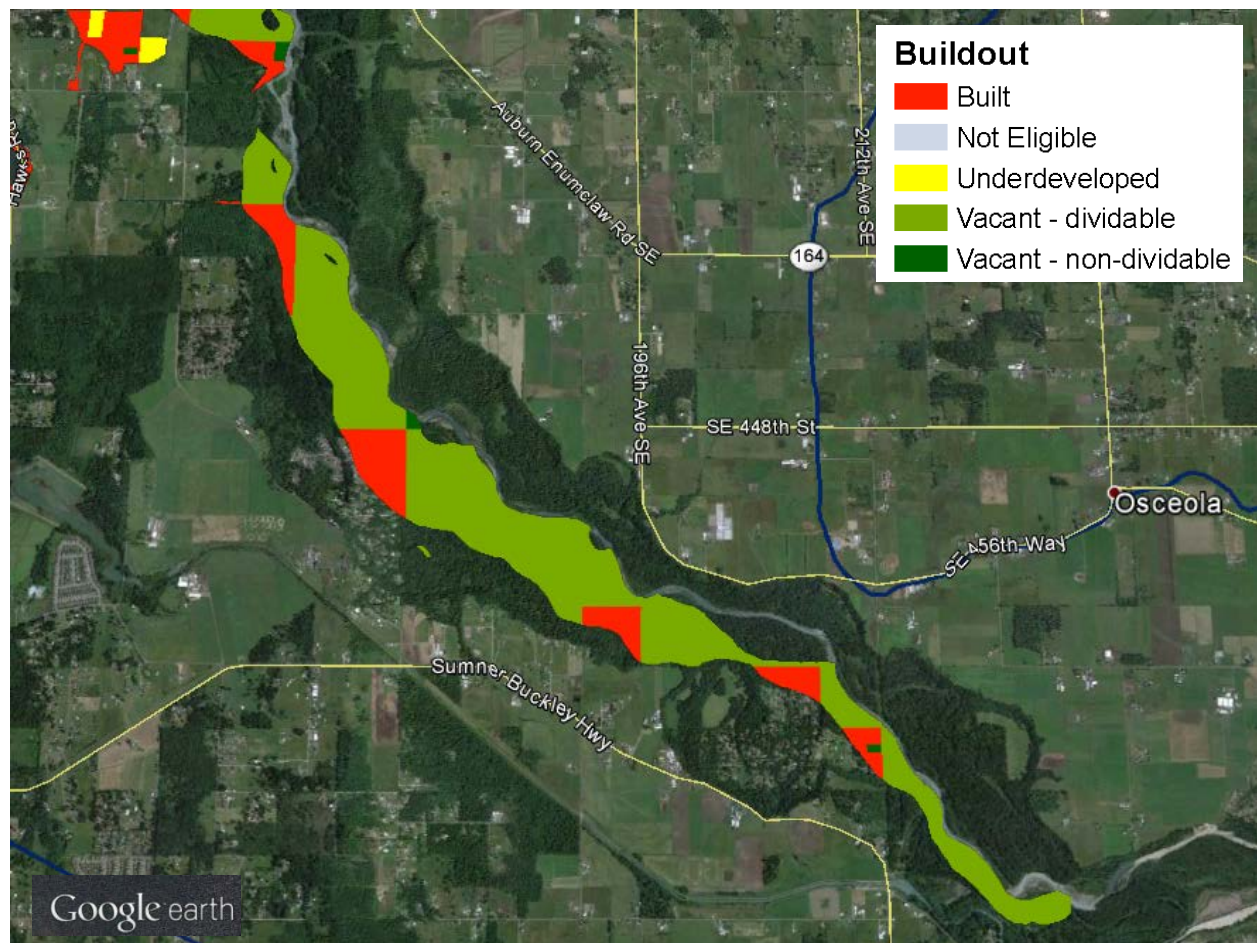
The **lower reaches** of the Puyallup and tributaries (designated Conservancy with some areas of Residential) are fully built out consistent with rural residential zoning.

White River and Tributaries (WRIA 10)

There is very little potential for new residential development or residential land division in any portion of this analysis area.

Upper and middle reaches are predominantly designated Natural and support forestry resource uses (FR zoning, occurring across almost 60 percent of the total White River and Tributaries Analysis Area). White River Reach 3, immediately east of Lake Tapps, shows potential for new development across a large area (significant areas of associated wetland and floodway result in a wide lateral extent); however these areas are owned by Puget Sound Energy or the Cascade Land Conservancy with no sale or residential development anticipated in the foreseeable future (Exhibit 3-2).

Exhibit 3-3. Build-out analysis example for the White River, focused on area coded as vacant within White River Reach 3, east of Lake Tapps; vacant lands in this area are managed as open space by Puget Sound Energy or the Cascade Land Conservancy.



The **lower reaches** of the White River flow through King County and the City of Sumner (before converging with the Puyallup River), outside of Pierce County's shoreline jurisdiction.

Lake Tapps (WRIA 10)

Lake Tapps has uniform existing development patterns with the large majority of shoreline area designated Residential in the Draft SMP. Scattered vacant residential lots with no subdivision potential (primarily R10 zoning) surround Lake Tapps (Exhibit 3-3). Even on vacant lots there is very little intact mature riparian forest cover, and shoreline armoring is common (ESA Adolfson, 2009). New development on these lots is anticipated over time as infill development (building on existing vacant lots), consistent with existing patterns of residential development that already occurs. New development will have to meet new requirements for vegetated shoreline buffers, consistent with the Draft SMP.

Exhibit 3-4. Build-out analysis for Lake Tapps, depicting primarily built-out conditions with scattered non-dividable vacant residential lots.



The Planning Commission has recently changed the proposed Residential shoreline setback on Lake Tapps from 75 feet to 50 feet based upon public input and comment. This change was evaluated as part of this revised CIA. Currently, the County's SMP requires a 50 foot ~~no~~ shoreline setback ~~or buffer~~ from the OHWM of Lake Tapps.

Lake Tapps shoreline is largely developed and built-out in residential homes. According to County data, there are approximately 1,271 parcels within 50 feet of the shore edge (Hyde, personal communication, 2013). Of the total, approximately 93 percent of those parcels are already developed with a single-family house. Less than 100 parcels adjacent to the OHWM are

considered vacant properties. Most of the vegetation within 75 feet of Lake Tapps is residential lawn and landscaping, with the exception of public parks, open space and specific sections of shoreline along some of the larger islands. For example, Island B and Snag Island provide greater numbers of existing trees and riparian vegetation than other portions of Lake Tapps shoreline in unincorporated Pierce County. Also, some large trees have been retained in side yards and open spaces along limited areas of Lake Tapps shorelines.

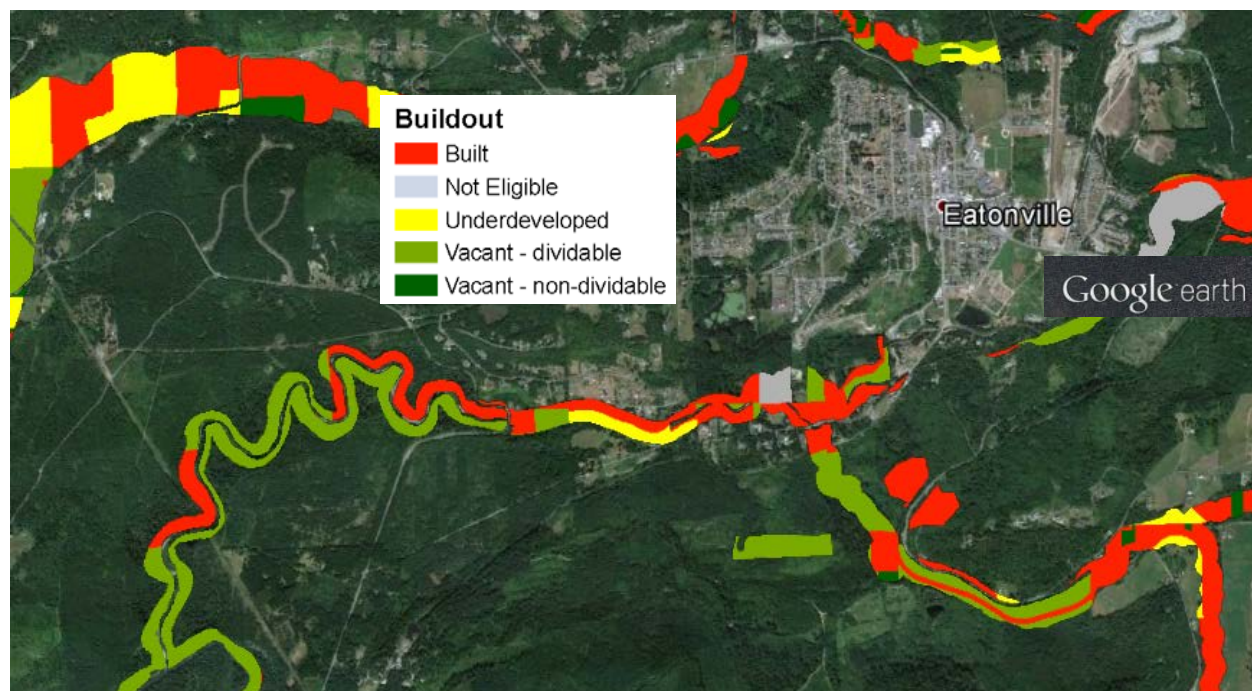
Due to the level of build-out on Lake Tapps, the reduction in proposed shoreline buffer from 75 feet to 50 feet does not appear likely to cause cumulative impacts to shoreline ecological functions when looking at Lake Tapps as a whole. Retention of vegetation and trees within a 50-foot wide buffer will continue to provide ecological benefit to the fish and wildlife in Lake Tapps. The only areas where existing vegetation is generally greater than 50 feet is on Island B and other small islands connected by Snag Island Drive. Also, smaller open spaces and public lands appear to be well vegetated such as North Lake Tapps Park, Banker's Island Park, lands owned by Tapps Island Association and other small undeveloped islands.

Nisqually River and Tributaries (WRIA 11)

In the **upper reaches** of the Nisqually and its tributaries (predominantly designated Natural), (approximately 70 percent of shorelands are fully built-out consistent with zoning and Comprehensive Plan designations; these areas are not heavily developed, alternative build-out analysis results show there is minimal future development potential). Vacant lands are identified along long reaches of the Nisqually River and tributaries upstream of Elbe and on Mashel River tributaries (well upstream of Eatonville); however, these shorelands are zoned as forest resources lands (FR zoning) or very low density rural (R40), and the large majority are owned by Tacoma Power or the State Department of Natural Resources.

In the **middle reaches** of the Nisqually (predominantly designated Conservancy), the mainstem river and tributary reaches surrounding the City of Eatonville (Ohop Creek, Mashel River, Little Mashel River) have moderate potential for new residential development, more than any other areas within this analysis area (Exhibit 3-4). These areas are zoned for low density rural development (R10), with some higher density residential (Moderate Density Single-Family zoning) close in to Eatonville and Agriculture Resource Lands zoning along Ohop Creek.

Exhibit 3-5. Build-out analysis for Mashel River, Ohop Creek and tributaries to the Nisqually in the Eatonville vicinity.



Further downstream along **lower reaches** of the Nisqually (Conservancy designations), there is some potential for infill residential development along Nisqually River Reach 01, with similar patterns occurring along reach HORN_CR_01, a short tributary of the Nisqually near Harts Lake. Zoning in these areas is R10; the majority of vacant lots are non-dividable.

Chambers-Clover Creek (WRIA 12)

Existing land use and development patterns are **generally consistent throughout** the Chambers-Clover freshwater jurisdiction (73 percent of area designated Residential). Areas of Conservancy designation (24 percent) are focused around publically owned open space lands (PR zoning) and largely undeveloped areas of Rural Resource zoning (immediately east of Joint Base Lewis McChord). New residential development in this analysis area will occur at higher, urban densities and will primarily be infill development on vacant, non-dividable lots along the Spanaway Lake shoreline, as well as the Spanaway Creek and Clover Creek corridors. Many of the larger lots identified with potential for new development (largely designated Conservancy) appears to be significantly encumbered with shoreline associated wetlands / critical areas buffers.

[No exhibit included for this analysis area.]

Nisqually Estuary (Nisqually National Wildlife Refuge; WRIA 11 marine shoreline)

The Nisqually estuary nearshore areas are included within the Nisqually National Wildlife Refuge and are designated 100 percent Natural by the Draft SMP; residential development is not anticipated.

[No exhibit included for this analysis area.]

Dash Point (WRIA 10 marine shoreline)

The Dash Point marine shoreline (predominantly designated Residential) is more than 92 percent built-out with single-family residential development at urban densities. There is limited potential for infill residential development on existing, non-dividable lots; these lots are scattered across the length of the generally developed shoreline. Even on vacant lots there is very little intact mature riparian forest cover, and shoreline armoring is common (ESA Adolfson, 2009).

[No exhibit included for this analysis area.]

Gig Harbor Peninsula/ Raft Island (WRIA 15 marine shoreline)

The Gig Harbor marine shoreline is predominantly designated Residential (64 percent) by the Draft SMP; areas of Conservancy (24 percent) and Natural (12 percent) designations are primarily focused around public park lands and open space conservancy lands. Across all marine shorelines, 84 percent is built-out with single-family residential development at moderate densities (R10 and Rsv5 rural classifications and some areas of Single-Family urban residential zoning), with open space areas with minimal potential for future development in the foreseeable future (due to zoning and land use designation) are also coded as “built”.

There is potential for infill residential development on existing, non-dividable lots; these lots are scattered across the analysis area. Many of the vacant lots contain some mature riparian vegetation which could be at risk with infill development. Environment designations assigned throughout the Peninsula and Raft Island are, however, generally consistent with existing development patterns and shoreline riparian condition. As such, designation-specific buffers (100 feet for Conservancy and 75 feet for Residential) should help to ensure that adequate riparian buffers are maintained and minimize impacts as development occurs.

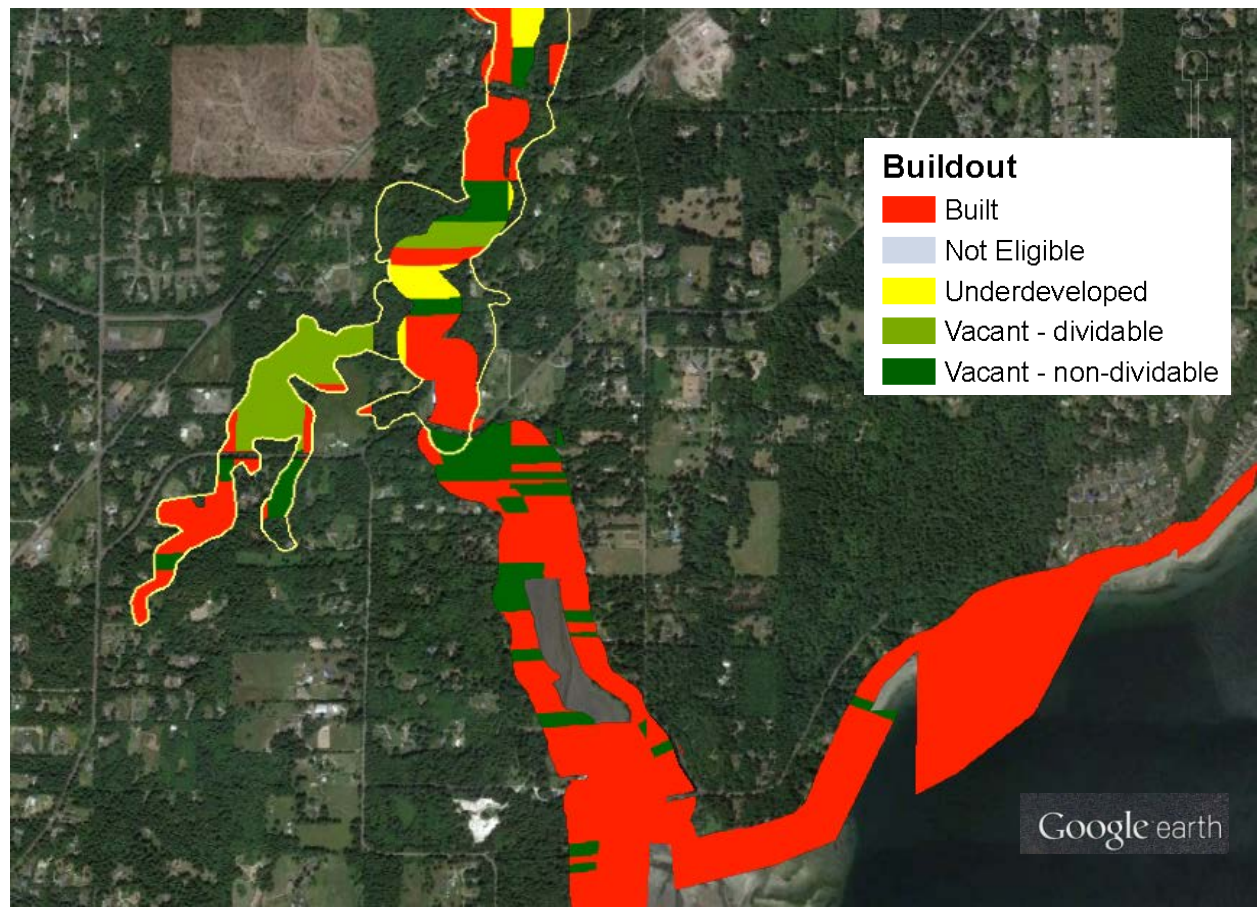
[No exhibit included for this analysis area.]

North Key Peninsula (WRIA 15 marine shoreline)

The North Key Peninsula marine shoreline is designated a mix of Conservancy (48 percent) and Residential (43 percent) by the Draft SMP; limited areas of Natural (7 percent) designation are primarily focused around open space conservancy lands. Across all marine shorelines, 74 percent of the area is built-out with single-family residential development at low densities (largely R10 rural residential zoning), with open space areas with minimal potential for future development (due to zoning and land use designation) also coded as “built”. Like the other marine shorelines of WRIA 15, there is potential for infill residential development on existing, non-dividable lots; these lots are scattered across the analysis area. Concentrations of vacant lots occur around Minter Bay, extending up into the Minter Creek freshwater reach (Exhibit 3-5), and along the western shoreline from Dutcher Cove through Vaughn Bay up to Rocky Bay.

Many of the vacant lots, as well as built-out lots, contain mature riparian vegetation which could be at risk with infill development. Shoreline environment designation-specific buffers applied in these areas should help to ensure that adequate riparian buffers are maintained and minimize impacts as infill development occurs (100 feet for Conservancy and 75 feet for Residential).

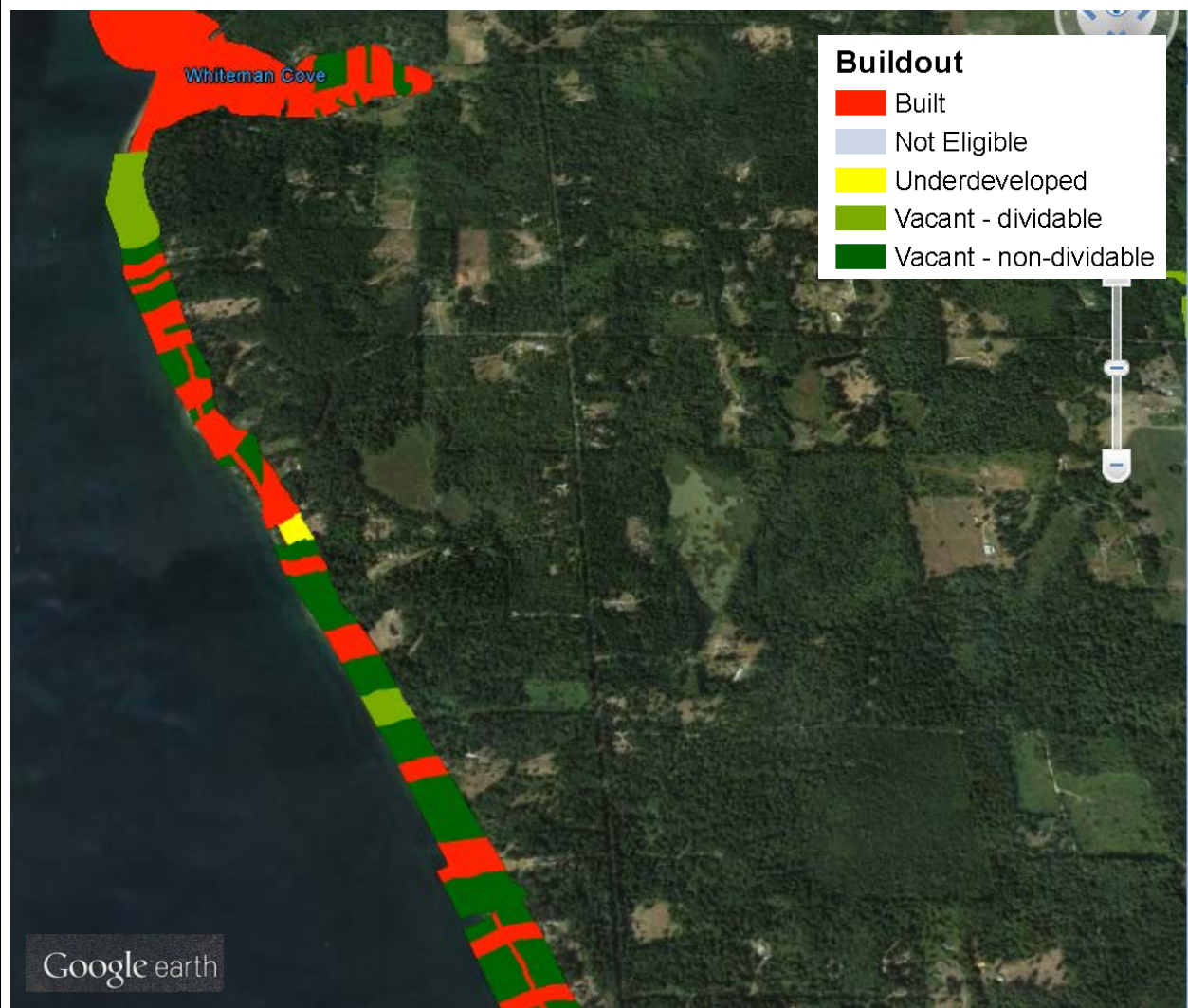
Exhibit 3-6. Build-out analysis example for Minter Bay marine shoreline and the adjoining Minter Creek freshwater shoreline area.



South Key Peninsula (WRIA 15 marine shoreline)

The South Key Peninsula marine shoreline (almost 60 percent Conservancy, with significant areas of Residential 30 percent] and Natural [10 percent] designations) is 73.5 percent built-out with single-family residential development at low densities, very similar to patterns further north along the Peninsula's marine shoreline (largely R10 rural residential zoning). There is potential for infill residential development on existing, non-dividable lots; these lots are scattered across the analysis area. The highest concentration of vacant lots occurs along the western shoreline extending south from Whiteman Cove (Exhibit 3-6). In this area, vacant and underdeveloped rural residential lots make up the majority of the shoreline, extending across areas that are unarmored and densely vegetated with riparian forest. This area is designated Conservancy by the Draft SMP. As such, designation-specific buffers should help to ensure that adequate riparian buffers are maintained and minimize impacts as development occurs.

Exhibit 3-7. Build-out analysis for the marine shoreline extending south from Whiteman Cove on South Key Peninsula.



Anderson Island / Ketron Island (WRIA 15 marine shoreline)

The Anderson Island / Ketron Island marine shorelines are less developed than all other nearshore areas within WRIA 15 (outside of McNeil Island). Proposed shoreline environment designations are predominantly Natural (41 percent) with significant areas of Conservancy (30 percent) and Residential (27 percent) 58.5 percent of the shoreline area is built-out with single-family residential development at low densities (largely R10 rural residential zoning). There is moderate potential for infill rural residential development on existing, non-dividable lots; and limited potential for subdivision on underdeveloped and vacant, dividable lots. Lots with potential for new rural residential development are generally scattered across the analysis area. These areas are primarily designated Conservancy by the draft SMP.

The largest marine shorelands highlighted with development potential by the build-out analysis are owned by the Anderson Island Parks District (including the head between Oro and East Oro Bays), with no residential development expected in the foreseeable future.

There are significant areas of wetland indicators on Anderson Island (211.4 acres, or 24 percent of the overall shoreline jurisdiction) which may be within shoreline jurisdiction; while many of these areas have some potential for new development, existing conditions (agricultural zoning; wetlands and critical areas buffers) and the proposed Natural environment designation (applied to 75.5 acres of the 88 acres within development potential) highly limit the potential for significant new residential development.

[See Figure 2, Appendix A]

Fox Island (WRIA 15 marine shoreline)

Fox Island (68 percent Residential and 25 percent Conservancy, with a single reach of Natural (6.5 percent) applied to conserved open space along the SW shoreline) is linked to the Gig Harbor Peninsula by the Fox Island Bridge, and marine shorelines are 89 percent developed at similar densities to the Peninsula with existing low density single-family residential (primarily R10 zoning). There is potential for infill residential development on existing, non-dividable lots; these lots are scattered across the analysis area. Even on vacant lots there is very little intact riparian forest cover, and shoreline armoring is common (ESA Adolfson, 2009).

[No exhibit included for this analysis area.]

Summary: Development on vacant parcels can be expected to occur over time depending on demand for housing, job availability, and other factors. As discussed earlier in this section, historical permit records suggest that new residential development on existing vacant lots will occur at a relatively low pace (estimated at 20 or less per year across the entire County). The SMP provides a full range of policy and regulatory provisions to protect ecological functions as

shorelines develop. These provisions include shoreline environment designations, buffer and setback requirements, restrictions on shoreline armoring and overwater structures, and other measures as described in this chapter. The role of environment designations will be important, as significant portions of underdeveloped and vacant lands occur within the Natural and Conservancy environments (Table 3-4). Use restrictions, shoreline buffer standards, and allowances for shoreline modification are more restrictive in these areas, minimizing potential ecological effects from potential future development.

Table 3-4. Build-out Analysis Results for each Shoreline Environment Designation.⁶

Proposed SED	Total Acres	Percent of Marine /Percent of Freshwater	Built / Minimal Development Potential ⁷		Underdeveloped		Vacant - dividable		Vacant - non-dividable	
			acres	% of row	acres	% of row	Acres	% of row	acres	% of row
Natural	1,038	21	582	56	106	10	216	21	122	12
Conservancy	1,851	37	1,223	66	116	6	161	9	344	18
Residential	2,095	42	1,741	83	73	4	35	2	246	12
High Intensity	46	1	43	93	0.8	2	0	0.1	2	5
Marine Totals	5,030	100	3,590	72	297	6	412	8	714	14
Natural	10,820	52	7,414	69	42	1	2,934	27	226	2
Conservancy	7,144	35	4,749	67	855	12	867	12	630	9
High Intensity	180	1	150	83	5	3	6	3	19	11
Residential	2,526	12	2,074	82	87	3	66	3	299	12
Freshwater Totals	20,670	100	14,386	70	989	5	3,873	19	1,174	6

⁶ Acreage totals presented in this table are slightly different than those presented in Table 3-3; in this table, freshwater shorelines within WRIA 15 (several lake shorelines, as well as Minter Creek) have been included in respective marine analysis areas.

⁷ The build-out analysis coded parcels with existing structures with no land division potential as “built.” Forest lands meeting certain State use designation criteria, open space lands meeting specific State conservation criteria. County parks lands were also coded as built, even when supporting no or little existing development, which were most common within Natural designated shorelines, but also occurred in Conservancy shorelines, analysis is representative of lands with minimal development potential (existing use as forest or open space is expected to continue; rural residential development and land division are not anticipated within the foreseeable future).

As required by Ecology Guidelines, unless specifically exempted by State statute, all development, including developments exempt from the requirement to obtain a shoreline substantial development permit must comply with these provisions. Developments exempt from the requirement to obtain a shoreline substantial development permit must still obtain letters of exemptions from the County which can include conditions to ensure consistency with SMP standards. Regulating exempt developments in this manner ensures consistent application of SMP standards.

New Commercial Development: There are very few areas of commercial zoning classifications anywhere in the County’s shoreline jurisdiction. Those areas that are zoned for commercial use are largely developed. There is very little potential for commercial development within the foreseeable future. Historical shoreline permit application records would indicate that approximately 15 commercial building permit applications (required for commercial development, multifamily construction, and many projects on existing commercial properties) should be expected per year. Build-out analysis indicates that most of these applications would not be for new commercial uses: approximately 5 acres of underdeveloped and vacant commercial property is all that exists in the entire marine environment. The underdeveloped and vacant lands are located in the Gig Harbor Peninsula / Raft Island analysis area, and concentrated primarily around Purdy with small pockets in the Rosedale and Wollochet areas. Approximately 50 acres of underdeveloped and vacant commercial property occurs in freshwater shorelands located predominantly along the White River and Lake Tapps analysis areas (39 acres). The identified areas are concentrated in just a few distinct spots, including a 20 acre area mapped as wetland immediately north of Sumner city limits along the White River. Some limited development may occur on this parcel; however, development would be substantially limited by critical areas (wetland and floodplain) mapped on the property.

Redevelopment

The build-out analysis completed for this report did not attempt to identify or otherwise quantify potential for redevelopment along Pierce County’s marine and freshwater shorelines. Redevelopment of older homes in existing shoreline residential communities has occurred and is expected to continue into the future, predominantly on marine and lake shorelines. As with new residential development, the SMP contains a full range of policy and regulatory provisions to protect ecological functions as shorelines develop; provisions for buffers and setbacks, restrictions on shoreline armoring and overwater structures, and other measures applicable to redevelopment as well as new development. Many marine and freshwater lake shoreline lots contain relatively small homes built decades ago that are potential candidates for rebuilding, especially in the face of increased land values associated with the properties.

Allowances for Non Conforming Uses and Structures: The Draft SMP includes provisions providing “Recognition of Legally Established Development” 18S.10.055. This section specifies that residential structures and appurtenant structures that were legally established and used for a conforming use, but that do not meet setback or buffer standards, can be considered “conforming

structures” by the County; and further allows that redevelopment, expansion, or replacement of such structures is allowed (provided requirements for no net loss of shoreline ecological functions still apply) (see provision #B.3) as long as it does not result in further encroachment into buffer areas (provision C.1). While stopping further encroachment should help minimize potential ongoing effects from continued use of nonconforming structures, allowing expanded structures could result in potential impacts and increased risk to ecological functions.

Restricting conforming structure status in this manner should help minimize potential ongoing effects from continued use of nonconforming structures. However, allowances in the draft SMP for expansion of structures could result in potential impacts and increased risk to ecological functions.

Land Division along the Shoreline

It is difficult to predict how many existing parcels would be subdivided but estimates and past trends suggest that subdivision of land is not expected to create large numbers of new parcels (across the County, a total of 31 new lots were created in shoreline jurisdiction in the last 10 years). Subdividable lands include the dividable vacant lands, underdeveloped residential lands, and underdeveloped commercial and industrial lands identified earlier in this section. Table 3-5 shows acreage information for just those lands.

Table 3-5. Dividable Lands Acreage⁸

	Total Acres	Underdeveloped – with potential for land division ⁹		Vacant - dividable	
		acres	% of total	acres	% of total
Puyallup River and Tribs	9,304	170	2	1,684	18
White River and Tribs / Lake Tapps	4,913	32	1	1,178	24
Chambers-Clover	622	38	6	95	15
Nisqually	9,901	805	8	1,497	15
Freshwater Subtotals	24,739	1,045	4	4,453	18
Nisqually NWR	416	69	17	114	27
Dash Point	132	0	0	0	0
Gig Harbor Peninsula / Raft Island	1,897	30	2	28	1
North Key Peninsula	2,313	78	3	59	3
South Key Peninsula	1,991	84	4	142	7
Anderson Island / Ketron Island	1,325	148	11	167	13
Fox Island	619	7	1	3	1
Marine Subtotals	8,692	416	5	513	6
Grand Total	33,431	1,461	4	4,966	15

New and Expanded Residential Piers and Docks – Marine Shorelines

To identify areas where there is moderate to high potential for new piers and docks on the County's marine shorelines, a qualitative approach was used based on existing shoreline data (sources and maps included in the Inventory and Characterization Report), the patterns of overwater structure permitting in the last 20 years, and existing pier and dock distribution (as from WDNR data and interpretation of aerial photography). The results of this qualitative approach are shown on Figure 4, and described below.

Low Potential for New Piers and Docks: Marine areas with low potential for new pier and dock construction include those areas of the County's shoreline that currently do not support overwater structures, and are unlikely to support such structures in the future. Areas with low potential make up the large majority of the marine shoreline. The following criteria were used to identify marine shorelines with low potential:

⁸ Acreage totals presented in this table are slightly different than those presented in Table 3-3; in this table, freshwater shorelines within WRIA 15 (several lake shorelines, as well as Minter Creek) have been included in respective marine analysis areas.

⁹ The build-out analysis identified "Underdeveloped" properties as those where there is an existing structure, yet based on lot size and zoning-based land division allowances some amount of land division could occur. See Appendix B for more details.

- Shoreline geomorphology – shorelines mapped with high bank / feeder bluffs with little to no existing modification, mudflats with very shallow runout, and / or very shallow lagoon embayments;
- Areas that experience high wind and wave energy (exposure), making pier / dock construction challenging;
- One or both of the above criteria supported by permit history (no dock permits issued in the past 20 years) and existing conditions (no docks or only public / community facilities identified on aerial maps).

These areas are identified on Figure 4 with a **green dashed line** along the shoreline, and include the following areas:

- WRIA 10: Browns Point / Dash Point – record of one permit near Browns Point (appears to be for very short “pier” extending from bulkhead); no other existing overwater structures; high bank and high-energy marine environment likely highly limit any potential for residential piers / docks;
- WRIA 11: Nisqually estuary (all marine areas within the County’s jurisdiction);
- WRIA 12: There is no marine shoreline within the County’s jurisdiction;
- WRIA 15 (starting in northwest corner of jurisdictional extent and preceding around shoreline to the east, followed by Ketron, McNeil, and Anderson Islands):
 1. Large majority of Key Peninsula shoreline (outside of Vaughn, Filucy, Lakebay, Von Geldern, Glen, and Minterbrook embayments)
 2. Heron Island (only structures are community piers / docks – ferry landing and community pier)
 3. Burley Lagoon
 4. Outer shorelines of Raft Island and Henderson Bay / Carr Inlet shorelines to the north and south
 5. Outer shoreline of Horsehead
 6. Southwest and southeast (outer) shoreline of Fox Island
 7. Narrows and Colvos Passage shorelines
 8. Ketron Island (only structures are community piers / docks – ferry landing and community pier)
 9. Anderson Island (large majority of shoreline outside of embayments)

Moderate Potential for New Piers and Docks: Marine areas with moderate potential for new pier and dock construction include those areas of the County’s shoreline that currently support overwater structures, but there are some residential parcels without existing docks where they could be constructed.

These areas are identified on Figure 4 with an **orange dashed line** along the shoreline, and include the following areas (all within WRIA 15):

1. Embayments on Key Peninsula – Vaughn Bay, Filucy Bay, vicinity of LakeBay Marina, short reach of Von Geldern Cove (south shore, in vicinity of two existing residential docks);
2. Henderson Bay – northeast shoreline immediately south of Purdy (no existing docks; however residential lot pattern and private docks to south suggest some potential for new docks in this area; may be challenges associated with shallow tidal mud flats fronting residential properties);
3. Wollochet Bay, west shoreline and inner bay – largely built-out with existing docks. Some potential for new docks on the occasional residential property without an existing structure;
4. Some north facing shorelines of Fox Island – potential varies from one reach of this shoreline to the next (see map for indication of variation); many areas appear to have moderate potential due to existing high level of build-out. Some areas are fully built-out, with very little potential for new docks (headlands to the east of bridge); and
5. Majority of Oro Bay, East Oro Bay, and Anderson Bay – southern extent of Oro Bay is largely built-out with existing community / marina piers. Within other areas, there are many existing parcels where it appears that docks could be built.

Higher Potential for New Piers and Docks: Marine areas with higher potential for new pier and dock construction include those shorelines that currently support overwater structures, but where there are a number of residential parcels without existing docks where they could be constructed.

These areas are identified on Figure 4 with a **red solid line** along the shoreline, and include the following areas (all within WRIA 15):

1. Some north and northeast facing shorelines of Fox Island – high permit numbers and some properties could still build docks;
2. Warren Shoreline – mainland facing south toward Fox Island (see Exhibit 3-1 for an example of existing conditions along this shoreline). Quite a few existing docks and lots of permit history; however, many more residential properties without docks. In some areas, private ramps seem common (west end of the shoreline reach);
3. Wollochet Bay SE shoreline - many existing docks; however many more neighboring residential properties without existing docks.

Areas highlighted as built-out: these areas are nearly fully built-out with residential piers and docks, with very limited potential for construction of new docks / piers in the future:

1. Rosedale / Lay Inlet Shoreline
2. Horsehead Bay shoreline
3. North shoreline of Gig Harbor Bay (within the County's jurisdiction)

Based on this qualitative analysis and the County and WDFW permit records, the potential for new docks to result in cumulative impacts in the future is not expected. Areas where future docks are expected are limited to more developed residential shorelines, where many new docks already exist. In these areas, the potential for additional docks in the foreseeable future is tempered by how many docks have been permitted annually in the last 10 to 20 years (generally less than 15 per year across the County's marine shorelines).

In areas where there are no existing piers and docks, shoreline geomorphology and other factors suggest that there is little potential for docks in the future.

Lake Tapps and American Lake – Future Dock Potential

There appears to be little potential for new docks on Lake Tapps and American Lake, as County shorelines for both appear to be almost entirely built-out with existing docks. Based on permit records, there is moderate potential for repair and replacement of docks on these two lakes in the future. Replacement docks and repair activities are required to meet current best practices to minimize construction and ongoing impacts on the aquatic and shoreline environment. As docks undergo significant repairs or are replaced there is some potential for improved localized water quality within the lakes.

Chapter 4: PROTECTIVE PROVISIONS OF THE SMP

Section 4.1: How do Shoreline Environment Designations Protect Ecological Functions?

The Pierce County Draft SMP proposes SEDs that reflect the shoreline ecology and are consistent with the SMP Guidelines (WAC 173-26-211). As such, these designations will help protect ecological functions and values and accommodate preferred and water-dependent shoreline uses. The proposed SEDs are appropriately tied to the characteristics found within the County's shoreline as documented in the findings of the 2009 ICR. Areas of ecologically intact shoreline (i.e., natural and undisturbed), including those in the upper watershed and the most intact areas of the County's South Puget Sound shorelines, were revised to be consistent with their existing condition and considered Natural or Conservancy. Moderately developed areas were designated as Residential and areas that currently support high intensity uses or are proposed for those uses were designated High Intensity.

The following table summarizes the changes in shoreline designations from existing to proposed by percentage of shoreland acres.

Table 4-1. Existing and Proposed Designations for Pierce County Shorelines¹²

Existing Designation 1992 SMP in Effect	Percent of Shoreline	Proposed Designation 2012 Draft SMP Title 18S	Percent of Shoreline
Marine Shorelines			
Natural	16	Natural	21
Conservancy	34	Conservancy	37
Rural	19	Residential	42
Rural Residential	28		
Urban	3	High Intensity	0.9
Freshwater Shorelines (Rivers, Streams, Lakes)			
Natural	5	Natural	53
Conservancy	56	Conservancy	35
Rural	18	Residential	12
Rural Residential	13		
Urban	8	High Intensity	0.9

¹ The waterbody is not included in the acreage values. These reflect only shorelands (upland areas and associated wetlands). All water areas below the ordinary high water mark are proposed to be designated Aquatic. Associated wetland areas were approximated using existing data and GIS layers indicating potential wetland areas.

² Calculated by taking the acres in one designation, dividing it by the total acres in shoreline jurisdiction and multiplying by 100 to get the percentage value.

Section 4.2: How do Requirements for Mitigation Sequencing Support No Net Loss of Ecological Functions?

Mitigation sequencing is one of the main mechanisms for achieving no net loss. Mitigation sequencing is a common hierarchical protocol for avoiding and minimizing impacts associated with individual development proposals and actions¹⁰. Mitigation sequencing directs all proposed uses and developments to avoid adverse impacts, include measures to minimize impacts and compensate for any impacts that cannot be avoided or minimized. The Draft SMP (Section 18S.10.020 – Purpose) specifies mitigation sequencing as a means to ensure protection of ecological functions:

The protection of ecological functions, and the aquatic and terrestrial life associated with shorelines, shall be integral in the consideration of all development in the shorelines. New land alterations, and development shall not result in any net loss to ecological functions, as implemented by the concept of mitigation sequencing.

This purpose statement is carried into the SMP policies and regulations throughout the Draft program, including clear regulations to ensure that mitigation sequencing is used for all shoreline uses and developments in Draft SMP 18S.30.030 Ecological Protection, Section C (Regulations – General).

Provisions for mitigation sequencing will provide the County authority to ensure, in instances where impacts to ecological functions have the potential to occur, all reasonable efforts must be taken to avoid, and where unavoidable, minimize and mitigate impacts such that no net loss of shoreline ecological functions is achieved.

We note that the Draft SMP identifies the components of mitigation sequencing as a prioritized list, where avoidance is the highest priority and monitoring of impacts and mitigation provided is the lowest priority. The intent of the WAC is to follow the mitigation sequence steps in order and demonstrate first avoidance and minimization through site design prior to offering compensation for project impacts.

- **Recommendation:** Draft SMP Section 18S.30.030.C.1 should be revised to indicate the components as a series of consecutive steps, beginning with avoidance and minimization and ending with monitoring and taking appropriate corrective measures.

¹⁰ Per WAC 173-26-201(2)(e)

Section 4.3: How are Critical Areas within the Shoreline Protected?

The Pierce County SMP integrates the County’s Critical Areas Ordinance, which includes regulations to protect wetlands, fish and wildlife habitat conservation areas, erosion hazard areas, and other critical areas¹¹. Critical Areas regulations establish buffer standards for wetlands, landslide hazard areas and fish and wildlife habitat conservation areas (FWHCA). If buffers for critical areas are contiguous or overlapping, the greatest buffers and/or setbacks shall apply.

¹¹Pierce County Code Title 18E – Critical Areas Ordinance

Table 4-2. Summary of Critical Area Regulations and Ecological Impacts Addressed

Critical Areas	Code Section	Summary of Regulations	Ecological Impacts Addressed
Wetlands	Chapter 18E.30	The base buffer widths provided for wetlands range from 25 feet (Category IV) to 150 feet (Category I). Consistent with State guidance, these base widths are modified depending on the wetland category, intensity of land use (high, moderate, low), habitat score, water quality score and wetland characteristics (e.g., bog, forested, estuarine) These modifications may result in increased buffer widths, especially for "High" and "Moderate" intensity development activities; however some decreases are allowed for "Low" intensity development adjacent to high value wetlands. (18E.30.070 – Appendix F) Wetland buffers, mitigation ratios, and monitoring requirements are generally consistent with Ecology recommendations. Buffers must be maintained in their natural condition. When buffer disturbance has occurred during construction, revegetation of the buffer with native plant species may be required. Critical Areas regulations allow some activities within certain portions of wetland buffers provided mitigation for impacts are provided. Allowances for permitted development and exempt development within critical areas buffers are further discussed following this table.	Water quality; Habitat; Shoreline vegetation; Hydrology (wetlands help to maintain the natural delivery (timing and volume) of water to streams and other water bodies)
Erosion Hazard Areas	Chapter 18E.110	Shoreline erosion hazard areas include riverine erosion hazard areas (channel migration zones) and soil erosion hazard areas (landslide hazard areas and steep slopes). At the minimum, 50 foot buffer of undisturbed, natural vegetation is required around the limits of "shoreline erosion hazard areas". This buffer may be expanded to include additional area for activities above or below the erosion hazard area (based on a factor of the hazard area's height), or based on the minimum distance recommended by a geotechnical professional (18E.110.050)	Sediment transport; Net shore drift; Shoreline vegetation and habitat.
Flood Hazard Areas	Chapter 18E.70	Critical areas regulations for flood hazard areas are integrated into the SMP. These regulations integrate minimum National Flood Insurance Program and Washington State requirements for flood hazard management and floodplain development; and provide higher standards that	Water quality; Habitat; Large woody debris recruitment; Hydrology (wetlands

Critical Areas	Code Section	Summary of Regulations	Ecological Impacts Addressed
		will help protect shoreline functions. 18E.70.030.E requires zero rise analysis to ensure new floodplain development does not result in increased base flood elevation or reduction of flood conveyance. Floodway development is generally prohibited (18E.70.040.B).	support stream base flows)
Fish and Wildlife Habitat Conservation Areas (FWHCA)	Chapter 18E.40	FWHCA buffers for surface waters range from 35 feet to 150 feet depending on the water type (Table 18E.40.060-1). The buffer extends landward in all horizontal directions from the ordinary high water mark. Buffers must be maintained in a predominately natural, undisturbed, undeveloped and vegetated condition. Buffer requirements for FWHCAs require that buffers be “adequately vegetated”, with “variety of species and growth forms... at a density and variety sufficient to protect the functions and values of the regulated area from impacts associated with the regulated activities” (18E.40.060.G). For non-surface water FWHCA's (including habitats associated with Federally and State-Listed Species, as well as species and habitats of local importance listed by PCC Chapter 18E.40), the County requires buffers, or other protective mechanisms, to be established on a case-by-case basis.	Riparian zones; Fish and wildlife habitat; Water quality Hydrology

Detailed review of the critical areas standards (18E CDC 2nd Version – Draft dated July 30, 2013) proposed for integration into the County’s SMP identified several areas where allowances could result in impacts to wetlands, streams, fish and wildlife habitats, and erosion hazard areas associated with marine and freshwater shorelines.

The following allowances could result in loss of shoreline ecological functions if integrated into the adopted SMP; where possible, recommendations for additional exemption criteria are provided that could avoid or minimize potential for ecological impacts.

Exemptions from Critical Areas standards (as listed in 18E.20.030) provide allowances for existing and new uses / developments. Several of these exemptions could result in loss of shoreline ecological functions, especially when exempted actions occur in areas where ecological functions are more intact.

Exemption A.2 would allow one time expansion of any structure’s footprint by up to 25 percent, with criteria provided to minimize further encroachment toward a critical area.

- **RECOMMENDATION::** Limit exemption allowance to primary single-family residential structures, and ensure that no loss of significant trees would occur as a result of allowed expansion.

Exemptions A.17 and A.22 would allow maintenance or reconstruction of existing private roads, driveways, on-site sewage systems, and maintenance or reconstruction of existing, lawfully established public facilities including roads, paths, trails, bridges, sewer facilities, storm drainage facilities, and flood control improvements. Maintenance is a reasonable exemption without any additional criteria; however, reconstruction has more potential for short term ecological impacts and further encroachment into critical areas.

- **RECOMMENDATION:** The County should require mitigation sequencing for temporary impacts that could result from exempt reconstruction, and should require appropriate construction best management practices be used for any maintenance or reconstruction when these activities are to occur.

“Habitat Assessment Review Waiver Allowances” provided by 18E.40.030.B include waiver allowances for projects that would repair or replace existing shoreline stabilization features. These allowances would waive any applicable County fish and wildlife review requirements. State guidelines require that wherever reconstruction of shoreline stabilization is allowed, that it should be “should be designed, located, sized, and constructed to assure no net loss of ecological functions” (WAC 173-26-231(3)). Our review suggests that the habitat assessment that may be required by critical areas standards would be a key tool through which the County could ensure no net loss for each proposal for repair or replacement.

- **RECOMMENDATION:** The proposed waiver allowance for repair or replacement of shoreline stabilization should not be allowed within shoreline jurisdiction. At a minimum, the allowance should be limited to replacement where hard structural shoreline stabilization would be replaced with nonstructural measures and/or soft armoring techniques (actions with clear ecological benefit) and should clearly state that in shoreline jurisdiction the requirements of the Draft SMP, especially 18S.30.070 would still apply.

Proposed revisions to buffer reduction allowances (18E.40.060.D.2.c.(2)) would apparently allow for wetland and associated stream buffer reduction without enhancement of the remaining buffer area.

- **RECOMMENDATION:** This section should be revised to require that where buffer reduction is allowed, remaining areas of buffer are to be enhanced (native tree and shrub plantings; habitat features; and/or improved stormwater treatment using LID as mitigation) sufficiently to provide mitigation for ecological functions lost as a result of reduced buffer area.

Proposed critical areas regulations would allow for critical areas buffers with “well established non-native vegetation” to be considered adequately vegetated (18E.40.060.G.1). While mature non-native tree canopy may be beneficial to critical area ecological functions, we suggest that

this provision provides too broad of an allowance and could result in protection of invasive or noxious non-native vegetation.

- **RECOMMENDATION:** This section should be revised to exclude non-native invasive and noxious weedy vegetation.

Section 4.4: How do Shoreline Use and General Development Regulations Protect Ecological Functions?

As described in Chapter 3, reasonably foreseeable development within Pierce County shorelines is anticipated to be predominately residential development on vacant lands and redevelopment of residential properties. Residential development would likely involve new residential construction, expansion / reconstruction, vegetation clearing, site development (impervious surfaces and landscaping), on-site septic system development, and development of appurtenant structures. The Pierce County Draft SMP establishes regulations that address the residential use and associated development, as well as general regulations that would apply to residential development along with other, less common development types. Residential development also commonly involves proposals and development of new shoreline modifications, including bank hardening and overwater structures (especially on marine and freshwater lake shorelines); Draft SMP regulations for shoreline modifications are detailed in Section 4.5 of this report. Table 4-3 summarizes use regulations for residential development, and key components of the Draft SMP's general regulations that are important for protection of shoreline functions.

Table 4-3. Shoreline Use and Development Regulations

Shoreline Use / General Regulations	Code Section	Summary of Regulations	Ecological Impacts Addressed
Residential Development	Draft SMP section 18S.40.100 Chapter 18E.30, Wetlands Table 18E.40.060-1, Fish and Wildlife Habitat Conservation Area Buffer Requirements Chapter 18E.110 PCC, Erosion Hazard Areas	Use regulations: Residential development is prohibited waterward of the ordinary high water mark. New floating homes are also prohibited. Single-family residential development and accessory uses/structures, as well as land divisions for detached single-family uses, are allowed in all shoreline environment designations except for High Intensity (and Aquatic); a shoreline administrative Conditional Use Permit is required in the Natural environment. Other housing types (multi-family, etc.) and their accessory uses/structures are allowed in the Residential and Conservancy environments, and are prohibited in the Natural and High Intensity environments. Non single-family land divisions are allowed in all environments except Natural. New waterfront land division of two or more adjoining dwelling units within shoreline jurisdiction shall provide for joint use water access, unless determined infeasible due to topographic constraints. Provision should limit riparian disturbance and shoreline modification when residential land division occurs. Use allowances for existing nonconforming residential structures: Existing legally established residential structures that are conforming uses but that do not conform to buffers, setbacks, or other dimensional standards are considered conforming. Land division regulations: New residential development and subdivisions must be designed and built in a manner that avoids the need for future shoreline stabilization. Demand for stabilization in the future would be limited to existing structures that are threatened by erosion and new development on existing lots. Minimum lot widths along OHWM are required per SED, as follows: <i>Natural = 100 feet Conservancy = 75 feet Residential = 50 feet</i> Within Natural designated shorelines, subdivision cannot exceed base density (bonus density provisions in PCC 18A do not apply); use of LID techniques also required for land division in Natural shorelines. Land divisions that exceed base density in all shoreline environments other than Natural must use LID techniques. Division of land creating 5 or more dwelling units: commonly owned shoreline frontage required (shoreline buffer and common shoreline access).	Shoreline vegetation; Water quality; Sediment input and movement, water movement and organic input.

Shoreline Use / General Regulations	Code Section	Summary of Regulations	Ecological Impacts Addressed																
Buffers and setbacks	Draft SMP 18S.30.030 Ecological Protection, Section E Table 18S.30.030-2, Standard Shoreline Buffers Chapter 18E.30, Wetlands Table 18E.40.060-1, Fish and Wildlife Habitat Conservation Area Buffer Requirements	Buffers and setbacks: The Draft SMP requires shoreline buffers, to be measured from OHWM of each shoreline¹². Buffers are specific to environment designations, as follows: <table><tr><th colspan="2">Table 18S.30.030-2 Standard Shoreline Buffers</th></tr><tr><th>Shoreline Environment Designation (SED)</th><th>Standard Buffer</th></tr><tr><td>Natural</td><td>150 feet</td></tr><tr><td>Conservancy</td><td>100 feet</td></tr><tr><td>Residential</td><td>75 feet</td></tr><tr><td>Residential – Lake Tapps</td><td>50 feet</td></tr><tr><td>High Intensity - non water-dependent use, or those portions of a use that are not water-dependent</td><td>50 feet</td></tr><tr><td>High Intensity – water-dependent use, or those portions of a use that are water-dependent</td><td>0 feet</td></tr></table> Allowances for shoreline buffer modification and use: Shoreline variance review is required for any shoreline buffer modification that exceeds 25 percent of standard buffer. Allowances for averaging and reduction are provided for shoreline buffers (25 percent maximum reduction); this approach is not common within other Puget Sound SMPs, as unlike critical areas buffers many uses and development allowances are provided for	Table 18S.30.030-2 Standard Shoreline Buffers		Shoreline Environment Designation (SED)	Standard Buffer	Natural	150 feet	Conservancy	100 feet	Residential	75 feet	Residential – Lake Tapps	50 feet	High Intensity - non water-dependent use, or those portions of a use that are not water-dependent	50 feet	High Intensity – water-dependent use, or those portions of a use that are water-dependent	0 feet	Riparian zones; Saltwater and freshwater habitats; Shoreline vegetation; Water quality; Sediment input and movement, water movement and organic input.
Table 18S.30.030-2 Standard Shoreline Buffers																			
Shoreline Environment Designation (SED)	Standard Buffer																		
Natural	150 feet																		
Conservancy	100 feet																		
Residential	75 feet																		
Residential – Lake Tapps	50 feet																		
High Intensity - non water-dependent use, or those portions of a use that are not water-dependent	50 feet																		
High Intensity – water-dependent use, or those portions of a use that are water-dependent	0 feet																		

¹² The shoreline buffer on Lake Tapps is to be measured from the water-side property line which is the contour line of elevation 545, as determined and established in 1954.

Shoreline Use / General Regulations	Code Section	Summary of Regulations	Ecological Impacts Addressed
		shoreline buffers (to enhance shoreline access, view corridors, and water enjoyment). The Draft SMP also provides allowance for “Adjacent Development Standard Buffer Reduction”, in an approach commonly referred to as a “stringline setback” or “common line setback”. Detailed restrictions are provided to limit use and reduction through a stringline setback approach. The ability to reduce buffers under a stringline setback is not expected to cause cumulative impacts, largely because it is most likely to be applied on small closely spaced lots in the Residential environment; in these areas, the marginal impacts from existing condition would be minimal. Application of the stringline approach will be further limited in application by Draft SMP criteria, which require the adjacent development to occur within 100’ of the vacant lot, limit reduction to 25 percent of the standard width, and prohibit use on lots occurring adjacent to development where a reduced buffer was already allowed. Allowances are also provided for the following types of activities within shoreline buffers: • Water dependent uses and public shoreline access; • Unpaved residential access pathways (limited to 4 feet wide; no trees can be removed); • Small area of shoreline riparian clearing allowed for shoreline access, landscaping, and/or minor construction associated with water dependent use • Expansion of existing development within the shoreline buffer– allowances limit expansion to areas landward of existing development “where the existing development would eliminate the impact of the proposed development upon the shoreline” and to areas no closer than existing development where occurring on existing impervious surface. See additional discussion and recommendations following this table.	
Impervious surface limits	Draft SMP 18S.30.030 Ecological Protection, Section F	Not more than one third of the parcel within shoreline jurisdiction is to be covered by impervious areas; further limited to 10 percent effective impervious surfaces for new lots in a Natural or Conservancy SED. Impervious surface limits apply to parking areas but exclude a maximum 12-foot- wide driveway. This restriction applies to both principal and accessory uses and structures.	Water quality; Sediment input and movement, water movement and organic input.

Shoreline Use / General Regulations	Code Section	Summary of Regulations	Ecological Impacts Addressed
Vegetation conservation	Draft SMP 18S.30.030 Ecological Protection, Section G	Vegetation conservation regulations require the retention of vegetation within shoreline buffers as well as mitigation for alterations to vegetation within buffers. They also require that removal of existing trees throughout shoreline jurisdiction be avoided whenever possible, and that selective limbing and tree topping be preferred alternatives to tree removal. Avoidance of tree removal is important, and selective limbing is a valid alternative that should be a first alternative to removal whenever feasible. Tree topping, however, can be detrimental to the health of mature trees; tree topping should be avoided and reserved as a last alternative to tree removal within shoreline jurisdiction (especially within the required shoreline buffer). The focus of these provisions is to limit vegetation clearing to the minimum necessary to accommodate approved shoreline development. Section provides minimum requirements for addressing and mitigating allowed shoreline buffer impacts, including replacing vegetation at a minimum 1 to 1 ratio. The section does not provide specific provisions for tree removal or replacement. Given previously detailed allowances for shoreline buffer reduction and use, the Draft SMP should provide standards that ensure protection and mitigation for impacts to mature riparian trees. See recommendations below this table.	Marine and freshwater riparian zones.

General regulations, as summarized in the above table, provide significant protection of shoreline ecological functions – including protections to ensure that anticipated new single family residential development and redevelopment will avoid, minimize, and mitigate for impacts to these functions. For the specific areas identified above where potential for cumulative impacts could occur, the following recommendations would strengthen protections in the SMP

Buffers and Setbacks: Buffers and setbacks provided in the proposed Pierce County SMP lie generally within the range of best available science for riparian buffer widths known to protect riparian vegetation and shoreline ecological functions. However, reduction or averaging of the 50-foot shoreline buffer for Residential Designations on Lake Tapps has the potential to adversely affect ecological functions over time as houses redevelop and potentially move closer to the ordinary high water mark.

RECOMMENDATION:

- Retain a minimum 50-foot shoreline buffer on Lake Tapps Residential shorelines and consider disallowing buffer reduction and/or averaging on this shoreline of statewide significance.

Allowance for Expansion of Existing Development: Despite the criteria provided by this allowance to limit application and potential ecological impacts, there are several concerns to shoreline functions. Proposed allowances would apply to any existing structure / development within a shoreline buffer, and may potentially degrade existing shoreline ecological functions. Build-out analysis did not quantify the number of existing residential structures and associated development that could be nonconforming to shoreline buffer requirements. Based on review of shoreline development permit history, there have been few applications for expansion of existing non-conforming structures, suggesting limited implications for cumulative effects in the future. New shoreline buffers, however, could create more instances of non-conforming development.

RECOMMENDATIONS :

- Apply a maximum size limit for the expansion allowance;
- Specify that expansion would be a one-time allowance;
- Require mitigation (buffer enhancement) wherever allowed expansion results in impacts to riparian vegetation (if it is the intention of the Code to require a Vegetation Planting Plan and buffer enhancement [consistent with 18S.30.030.G] whenever any allowance for shoreline buffer use is granted, then SMP section 18S.30.030.E subsections 5 and 6 should be revised to clearly state the requirement); and
- Limit allowance to existing, legally established primary residential structures.

The following recommendations apply to Vegetation Conservation Standards:

RECOMMENDATIONS :

- While Vegetation Conservation regulations do require mitigation for impacts to riparian vegetation, standards should be revised to include mitigation requirements specifically for allowed impacts to significant trees within the shoreline buffer. Impacts to significant trees in the buffer should be avoided whenever feasible – the Draft SMP should require documented consideration of design alternative that would minimize impacts, and require a minimum number of significant trees be retained. Tree replacement ratios required for shoreline vegetation conservation could be based off of the existing standards in PCC 18J.15.030 (Tree Conservation) with heightened expectations for replacement of significant shoreline buffer trees.
- Tree topping should not be encouraged within the Draft SMP. The reference to tree topping in 18S.30.030.G.1. (Vegetation Conservation) should be revised to discourage tree topping, and reserved as a last alternative to tree removal within shoreline jurisdiction.

Section 4.5: How do Shoreline Modification Regulations Protect Ecological Functions?

As described in Chapter 3, reasonably foreseeable development within Pierce County shorelines is anticipated to be predominately residential development on vacant lands and redevelopment of residential properties. Consistent with shoreline development that has occurred over the last several decades, residential development and redevelopment that does occur will likely commonly involve new piers, ramps and floats, primarily on marine and freshwater lake shorelines. The Pierce County Draft SMP establishes regulations that address shoreline modifications and associated construction activities. Table 4-4 summarizes the modification regulations established in the Draft SMP and the ecological impacts that would be addressed.

Table 4-4. Shoreline Modification Regulations

Shoreline Modification	Code Section	Summary of Regulations	Ecological Impacts Addressed
Overwater Structures and Other Water Access Facilities (mooring buoy, mooring piling, float, lift, railway, launching ramp, dock [pier, ramp, and/or float], water access stairs)	18S.40.140 – Water Access Facilities (use regulations for overwater structures)	New piers and docks are allowed only for water-dependent uses or public access and must be the minimum size necessary to meet the needs of the proposed use. As used here, a dock associated with a single-family residence is a water-dependent use provided that it is designed and intended as a facility for access to watercraft or the water. Floating facilities (including anchor lines) and vessels moored to all facilities must not ground/ or beach on the substrate. Flotation material shall be fully enclosed and contained. Facilities must be stable against the elements and maintained in safe and sound condition. Facilities waterward of the OHWM must consist of an open framework (e.g., pilings, grated surfaces, cable railings, floating facilities held in place with anchors) as opposed to solid surfaces with no openings, to the maximum extent feasible. In- and over-water facilities must be visible under normal day and nighttime conditions. Visual aids may include reflectors and warning lights. In a constricted body of water, docks, except for residential docks, are allowed only where there is one surface acre of water within the constricted body, measured at mean low water, for each boat moorage (including buoys) within said constricted body. Maximum intrusion into the water is only so long as to obtain a depth of 8-feet of water as measured at mean lower low water (MLLW) on saltwater shorelines, or as measured at ordinary high water in freshwater shorelines, except that the intrusion into the water of any pier or dock shall not exceed the lesser of 15 percent of the fetch or the maximum allowed length. New waterfront developments of two or more dwelling units and land divisions containing two or more dwelling units within shoreline jurisdiction shall provide for joint use water access, unless determined during the review of the project that such joint use water access is infeasible due to topographic constraints. Water access facilities are subject to Chapter 18E.110 PCC, Erosion Hazard Areas.	Aquatic habitats Fish and wildlife habitats

Shoreline Modification	Code Section	Summary of Regulations	Ecological Impacts Addressed
Shoreline Stabilization	18S.30.070 (shoreline stabilization)	Measures to protect development in or near shoreline erosion hazard area include, in order of priority: 1) locating development so it does not require shoreline stabilization, 2) soft stabilization methods, and then 3) hard stabilization methods. New shoreline stabilization structures are only allowed under the following circumstances: • Where they are demonstrated to be necessary to support or protect an existing primary structure that is in danger of loss or substantial damage or are necessary for reconfiguration of the shoreline for mitigation or enhancement purposes • Shoreline stabilization measures are allowed only after the applicant has demonstrated that locating development a sufficient distance from the shoreline, including a location outside shorelines, to prevent shoreline erosion impacts to the development is not feasible. • If relocation of development is not feasible, the use of soft armoring techniques is the preferred method for shoreline protection. • Hard armoring shoreline erosion control measures are allowed only when the need to protect primary structures from damage due to erosion is demonstrated through a geological assessment indicating the following: - o Nonstructural measures, such as placing the development further from the shoreline, planting vegetation, or installing on-site drainage improvements, are not feasible or not sufficient; - o The use of beach nourishment alone or in combination with soft armoring techniques is not adequate to protect the property - o The property contains an existing structure(s) that will be threatened within the next 10 years; and - o The erosion is not being caused by upland conditions, such as the loss of vegetation and drainage. Erosion is caused by natural processes, such as tidal action, currents, and waves. Repair and replacement of existing shoreline stabilization structures are only allowed under the following circumstances: Use the same, similar, or less invasive materials as the existing structure; encompass less than 60 percent of the structure over a ten year period; and not expand the area to	Sediment input and movement, water movement and organic input.

Shoreline Modification	Code Section	Summary of Regulations	Ecological Impacts Addressed
		be protected. Existing structures can be replaced provided there is a demonstrated need to protect principal structures from erosion caused by currents or waves. Replacement of a failed bulkhead is permitted in the same location and dimension if it is commenced within 5 years of failure. Replacement bulkheads must not encroach waterward of the OHWM unless it is the only feasible way to address overriding safety or environmental concerns (as documented in a Geotechnical Assessment). The replacement must be landward of the existing structure. If placed waterward, mitigation is required. Soft shoreline stabilization measures that provide restoration of shoreline ecological functions may be permitted waterward of the OHWM.	

- RECOMMENDATION:** The shoreline stabilization section appears to be consistent with WAC language, except that WAC 173-26-231 states that “hard armoring solutions should not be authorized except when a report confirms that there is a significant possibility that such a structure will be damaged within **three years** as a result of shoreline erosion in the absence of such hard armoring measures, or where waiting until the need is that immediate, would foreclose the opportunity to use measures that avoid impacts on ecological functions.” Strict consistency with the WAC requirements is generally required during state review of the Draft SMP. Revision of shoreline stabilization regulations to maintain consistency with the WAC’s three year threshold is recommended.

Chapter 5: OTHER EXISTING PROGRAMS

Section 5.1: What Other County Programs Protect Shorelines?

Several other County regulatory programs, plans, and policies work in concert with the SMP to protect shoreline resources and regulate development near the shoreline. Various sections of the Pierce County Code (PCC) are relevant to shoreline management:

PCC Title 8 – Health and Welfare, On-site Sewage Disposal System Regulations (PCC Chapter 8.36): The purpose of PCC Chapter 8.36 is to assure protection of public health by: minimizing the public health effects of on-site sewage systems on surface water and groundwater; establishing design, installation, and management requirements for on-site sewage systems to accommodate effective treatment and disposal of sewage on a long-term basis; and enhancing protection of environmentally sensitive areas within Pierce County.

PCC Title 17A – Construction and Infrastructure Regulations – Site Development and Stormwater Drainage: These regulations, along with the Pierce County Stormwater Management and Site Development Manual (last update in 2012) which is adopted and required by the regulations, are intended to ensure management of stormwater runoff from developed sites, and apply to all development and land division actions occurring in the County.

PCC Title 18A – Zoning: The purpose of Title 18A is to provide a framework for the development of land in Pierce County; and to assure that such development occurs in such a way that it protects private property rights and existing land uses while also protecting natural resources, promoting economic growth and assuring the compatibility of proposed land uses with existing ones. The Pierce County zoning code regulates land uses through the establishment of 49 zoning classifications. Each zoning district includes requirements on minimum lot sizes, maximum densities and performance standards.

PCC Title 18D – Environmental Policy: Some projects requiring a shoreline permit must also demonstrate compliance with the State Environmental Policy Act (SEPA). The SEPA process is used to discuss environmental impacts. They are identified, minimized, and mitigated, where possible.

PCC Title 18F – Land Divisions and Boundary Changes: The purpose of Title 18F is to regulate the division of land and make appropriate provisions for public health, safety and general welfare, for open spaces, drainage ways, potable water supplies, sanitary wastes, parks and recreation areas and other public requirements. Land divisions must be consistent with the County's Comprehensive Plan and must be served with adequate means of access, fire protection, drainage, water supplies, and means of sanitary sewage disposal.

PCC Title 18J - Development Regulations – Design Standards and Guidelines: Countywide standards and guidelines are provided by Chapter 18J.15, with the following provisions most applicable to protection of shoreline ecological functions (both as they apply within shoreline jurisdiction, and within the rest of the County as tributary to shorelines):

- 18J.15.015 (Site Design) and 18J.15.020 (Site Clearing) - these sections both ensure that when development occurs, it is completed in a way that minimizes modifications to natural topography, “persevering land, water and soil relationships” and overlying vegetation.
- 18J.15.030 (Tree Conservation) – the purpose of tree conservation regulations “is to retain and/or restore the overall tree canopy in the County”. The section establishes minimum tree density requirements for new or expanding uses occurring in the County, and details “significant tree” size thresholds for a variety of tree species.
- 18J.15.140 (Low Impact Development [LID]) – LID standards for site development and stormwater management/design are required for certain rural and urban “sensitive resource” zones within the County. The Draft SMP also requires use of LID standards to authorize certain land divisions (any land division in Natural designated shorelines, as well as any division exceeding base density in other shoreline designations). LID standards are included in the Pierce County Stormwater Management and Site Development Manual, Volume VI.

Section 5.2: What Other Federal and State Regulations Protect Shorelines?

In addition to local regulations and non-regulatory organizations and agencies, a number of state and federal agencies have regulatory jurisdiction over resources in the County’s shoreline jurisdiction. As with local requirements, state and federal regulations apply throughout the County and significantly reduce the potential for cumulative impacts to shorelines. The major state and federal regulations affecting shoreline-related resources include but are not limited to the following.

Endangered Species Act (ESA): The federal ESA addresses the protection and recovery of federally listed species and critical habitats. The ESA is jointly administered by the National Oceanic and Atmospheric Administration (NOAA) Fisheries (formerly referred to as the National Marine Fisheries Service), 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 fill, excavation, and dredging in waters of the U.S., including wetlands. Certain activities affecting wetlands in shoreline jurisdiction or work in waters of the US may require a permit from the U.S. Army Corps of Engineers and/or Washington State Department of Ecology under Section 404 and Section 401 of the CWA,

respectively. Further, permits regulating aquaculture in marine waters are also within the purview of the CWA and the Corps of Engineers.

Federal Emergency Management Agency (FEMA) National Flood Insurance Program: Communities that participate in the National Flood Insurance Program receive federally backed flood insurance. In order to participate, a community must adopt and enforce floodplain management regulations to reduce future flood damage. The Federal Emergency Management Agency is responsible for mapping the country's flood hazard areas.

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 which may affect fish habitat. Projects in the shoreline jurisdiction requiring construction below the ordinary high water mark 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.

Rivers and Harbors Act: Any work or project that may affect or obstruct navigable waters requires a Section 10 permit under the Rivers and Harbors Appropriation Act of 1899. The U.S. Army Corps of Engineers reviews and authorizes projects with either a standard individual permit, letter-of-permission, nationwide permit, or regional permit.

National Pollutant Discharge 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 census-defined Urbanized Areas (more than 50,000 people and population densities greater than 1,000 per square mile).

Washington State Forest Practices Act: The Act governs activities related to the growing, harvesting, or processing of timber on non-federal lands. There are four classifications of forest practice: Classes I-IV. All forest practices are regulated by the Department of Natural Resources with the exception of Class IV which is administered by Pierce County. Rules under the act are designed to protect public resources such as water quality and fish habitat while maintaining a viable timber industry. A forest practice permit is required whenever more than 5,000 board feet of merchantable timber is harvested from an area or property greater than two acres in size.

Section 5.3: What is the Role of the Restoration Plan and other Non-regulatory Programs?

During the SMP update process, the County developed a shoreline restoration plan that provides recommendations for restoring the County's shorelines as well as a framework under which shoreline restoration can be successfully achieved (ESA, 2011). The Restoration Plan outlines voluntary actions to improve and enhance shorelines and builds upon information from the Shoreline Inventory and Characterization Report (ESA Adolfson, 2009) and other ongoing local and regional efforts to understand and manage the County's diverse shorelines. As required by the state guidelines established in WAC 173-26-201, the Restoration Plan includes the following key elements of the shoreline restoration planning process:

- Identification of degraded areas, impaired ecological functions, and sites with potential for ecological restoration;
- Identification of existing and ongoing projects and programs that are currently being implemented which are designed to contribute to local restoration goals;
- Identification of additional projects and programs needed to achieve local restoration goals, and implementation strategies including identifying prospective funding sources for those projects and programs;
- Establishment of overall goals and priorities for restoration of degraded areas and impaired ecological functions;
- Identification of timelines and benchmarks for implementing restoration projects and programs and achieving local restoration goals; and
- Establishment of mechanisms or strategies to ensure that restoration projects and programs will be implemented according to plans and to appropriately review the effectiveness of the projects and programs in meeting the overall restoration goals (e.g., monitoring of restoration project sites).

The Restoration Plan identifies shorelines that are high priorities for restoration, shorelines that have good restoration potential, and specific actions that can be taken throughout the County to improve shoreline conditions. In marine nearshore areas, recommended restoration actions include removal of intertidal fill, contaminated sediments, creosote contaminated logs, pilings and debris; bulkhead removal or softening; levee removal or setbacks; restoration of stream estuaries; and riparian enhancement to improve large woody debris (LWD) recruitment and habitat conditions. Freshwater restoration opportunities identified in the plan include re-vegetation of riparian areas and floodplains, control of invasive vegetation, stormwater retrofit projects, property acquisition, installation of LWD in stream channels, levee setbacks and removals, culvert replacement, road decommissioning, and removal or softening of bulkheads.

As components of the restoration plan are implemented voluntarily or as mitigation for development impacts, the County expects to see a gain in shoreline ecological functions, which

will counteract some of the effects of past and expected future development to improve conditions over time.

The Puget Sound Partnership is also charged with restoring shorelines and related habitats in Puget Sound. The Partnership's Action Agenda lays out a program for restoring ecological functions, processes, and habitats through capital improvements, education and outreach, land acquisition and other means. This program is very high on the state's list of priorities and when implemented is likely to have a very positive effect on the Puget Sound ecosystem over time.

Table 5-1 describes other non-regulatory programs/organizations that are currently active in restoring, protecting, and educating the public about Pierce County shorelines¹³. The organizations and agencies carrying out these programs have all previously implemented projects that have enhanced the shoreline environment or that have taken initial steps towards enhancement and protection of resources.

¹³ Additional non-regulatory programs/organizations that are active in restoring, protecting, and educating the public about Pierce County shorelines are detailed in Table 6-1 of the Restoration Plan (ESA, 2011).

Table 5-1. Role of Non-regulatory Programs/Organizations in Protecting Shorelines

Program/Organization	Mission and Scope	Role in Restoration and Protection of County Shorelines
Salmon Recovery Funding Board (SRFB)	The Salmon Recovery Funding Board administers two grant programs for protection and restoration of salmon habitat. The board also supports feasibility assessments for future projects and other activities. Depending on the grant program, eligible applicants may include municipal subdivisions (cities, towns, counties, and special districts such as port, conservation, utility, park and recreation, and school), tribal governments, state agencies, nonprofit organizations, regional fisheries enhancement groups, and private landowners. To be considered for funding, acquisition projects must be operated and maintained in perpetuity, and restoration projects must be operated and maintained for ten years after construction is completed. All projects require lead entity approval and must be a high priority in the lead entity strategy or regional recovery plan. Grants are awarded by the Salmon Recovery Funding Board based on a public, competitive process that weighs the merits of proposed projects against established program criteria.	The Salmon Recovery Funding Board provides grant funds for protection and restoration of salmon habitat to: • Municipal subdivisions (cities, towns, counties, and special districts such as port, park and recreation, conservation, and school) • Tribal governments • Private landowners • State agencies • Nonprofit organizations
Pierce County Public Works Surface Water Management Division:	The mission of the Surface Water Management Division is to “be a responsive service organization that efficiently addresses flood control, water quality and the preservation of natural drainage systems”. As part of this mission, the Division is active in identifying, planning for, and implementing projects that improve watershed and shoreline ecological functions.	The Surface Water Management Division identifies projects that have multiple benefits, so that efforts to control flood risks to existing development also improve natural hydrology, water quality, and shoreline habitat. Once recent project occurred along the Puyallup River near Orting, featured on Pierce County TV News (http://www.youtube.com/watch?v=C4cnmRxWT_w). More information on Surface Water Management Division efforts are available at the County website (http://www.co.pierce.wa.us/index.aspx?NID=1879).

Program/Organization	Mission and Scope	Role in Restoration and Protection of County Shorelines
Pierce County Habitat Protection and Restoration Program	The Habitat Protection and Restoration program was established in 1999 to coordinate our response to the listing of the Chinook salmon as an endangered species. It quickly became apparent that a single focus for habitat protection and restoration was not effective or efficient. The County has incorporated habitat protection and restoration into the work programs of the various departments and Special Projects helps coordinate that objective.	Pierce County incorporates habitat protection and restoration into the projects of many County departments.
Pierce County Water Program's Basin Plans	Pierce County Surface Water Management is developing 10 basin plans that cover all 26 Pierce County basins. The basin plans are being developed to update the County's 1991 surface water management plan. That plan was developed prior to passage of the state's Growth Management Act, adoption of the County's Comprehensive Land Use Plan, issuance of the state's National Pollutant Discharge Elimination System (NPDES) municipal stormwater permit to Pierce County, and listing of Chinook salmon and bull trout under the Endangered Species Act (ESA). These events and others, including designations of numerous Pierce County water bodies on the state's polluted waters list (303d list) and status under the federal Community Rating System (CRS) for flood hazard reduction, have necessitated Surface Water Management integrated basin approach.	Issues Addressed in Basin Plans • Flooding • Water Quality • Fish Habitat • Natural Resources • Relationship of Water to Land Use The basin plans ensure financial accountability of the program by directing expenditures collected within individual basins to the surface water management priorities in those basins.
Puget Sound Nearshore Partnership	The Puget Sound Nearshore Ecosystem Restoration Project/Puget Sound Nearshore Partnership is a cooperative effort among U.S. Corps of Engineers (Corps) and local sponsors that include state and other federal government organizations, tribes, industries, and environmental organizations. The Washington Department of Fish and Wildlife represents the local sponsors of the project.	Nearshore Partnership project goals are to: • identify significant ecosystem problems, • evaluate potential solutions, and • restore and preserve critical nearshore habitat.

Program/Organization	Mission and Scope	Role in Restoration and Protection of County Shorelines
South Puget Sound Salmon Enhancement Group (SPSSEG)	One of 14 Regional Enhancement Groups in the state, SPSSEG was formed by the Washington State Legislature in 1990 as a means of directly involving communities, citizen volunteers, and landowners in salmon recovery .The South Puget Sound Salmon Enhancement Group is a 501(c)(3) non-profit organization committed to protecting and restoring salmon populations and aquatic habitat with an emphasis on ecosystem function through scientifically informed projects, community education, and volunteer involvement.	Projects are focused in a variety of areas, including • restoring spawning/rearing habitat; • streambank riparian restoration; • nearshore restoration and monitoring, and • culvert/dam replacements or modifications to improve fish passage.
Cascade Land Conservancy (now called Forterra)	The mission of the Cascade Land Conservancy is to act with immediacy to protect and steward our region’s most precious resource. Cascade Land Conservancy (CLC) is Washington’s largest independent land conservation and stewardship organization. CLC’s goal is to maximize the ecological value of land while meeting the needs of landowners. Over the past decade, CLC has led the conservation of more than 150,000 acres ranging broadly from the recent expansion of Tacoma’s popular Snake Lake park to conserving vast forested areas in the Snoqualmie Forest. CLC is uniquely positioned in the conservation community, known for far-reaching programs, savvy thinking and ability to partner with diverse groups.	• Promotes use of mitigation banking and In-Lieu Fee programs to ensure that required mitigation for impacts to critical areas including shorelines results in real benefits • CLC’s strategies range from land purchases and donations, to conservation easements and ownership agreements.

Program/Organization	Mission and Scope	Role in Restoration and Protection of County Shorelines
Watershed Councils (Puyallup River Watershed Council; Nisqually River Council; Chambers - Clover Watershed Council; West Sound Watersheds Council)	Watershed councils are forums which promote and implement programs that restore, maintain, and enhance the respective watersheds in order to protect environmental, economic, and cultural health. Watershed forums are usually partnerships between jurisdictions within a watershed, Native American tribes, involved citizens, and related non-profit groups.	• Working to implement watershed action plans, recovery plans, and restoration plans • Works with stakeholders to provide education about the watershed through public forums, newsletters, and a resource center for watershed information • Sponsors citizen outreach programs that encourage schools, businesses, governments, and volunteers to get involved in the protection of their watershed • Commonly publish watershed assessment reports (“State of the Watershed” reports)
Citizens for a Healthy Bay (CHB)	CHB matches the commitment of the community to clean-up, restore and protect Commencement Bay and surrounding watersheds by being “at the table” actively working for sound-science based regulations to protect our marine resources. Our advocacy work encompasses South and South Central Puget Sound as well as the entire Puyallup River Watershed.	Citizens for a Healthy Bay: • Has led the mission to restore contaminated parcels of land along both sides of Commencement Bay. CHB’s Adopt-A-Wildlife-Area (AAWA) program was established as the organizational hub for a diverse band of volunteers dedicated to enhancing the expanding corridor of • Has restored sites that provide valuable wildlife habitat but are too small to be self-sustaining. CHB and its volunteers remove all kinds of invasive weeds, plant native trees and shrubs, clean up litter and debris and monitor the ongoing recovery and health of the land. • Represents and involves the people of Tacoma in protecting the bay and its surrounding waters and habitat from further pollution.

Program/Organization	Mission and Scope	Role in Restoration and Protection of County Shorelines
The Nisqually Land Trust	The mission of the Nisqually Land Trust is to conserve and restore natural areas and wildlife habitat throughout the Nisqually River watershed and to protect those lands in perpetuity.	The Nisqually Land Trust currently protects 2,741 acres of superior wildlife habitat--from threatened old-growth forest near the Nisqually River's source at Mount Rainier National Park, to critical salmon habitat near its delta at the Nisqually National Wildlife Refuge. These lands have been donated or acquired with monies provided by grants, mitigation funds, donations and funds raised by special events. The Trust owns most of the protected lands and protect a small number of acres through conservation easement.
Pierce Conservation District Stream Team	The Pierce Conservation District Stream Team is a countywide, multi-activity program that has worked with thousands of volunteers to improve local water quality and stream habitat.	• Through hands-on activities and educational efforts, Stream Team helps individuals achieve a sense of stewardship for local streams, forests, and wildlife. • Volunteers and public participation are the backbone of the Stream Team organization, and people of all ages can get involved in a variety of ways, from water quality monitoring to planting native vegetation along streams.
Pierce County Open Space-Public Benefit Rating System-Tax Program	This program, administered by the Pierce County Assessor's office provides a tax benefit to landowners who set aside portions of their land as protected open space. A greater tax benefit is provided to landowners who set aside high priority open space	Results in the protection of the following high-priority open space types: critical salmon habitat, fish & wildlife habitat, marine waters, streams, wetlands, estuaries, and tidal marshes, flood hazard areas, and lakes.
Washington State University Cooperative Extension	Among its many public services, Washington State Cooperative Extension Program sponsors the Pierce County Watershed Stewards Program.	Projects sponsored by the Watershed Stewards Program include: Clarks Creek Riparian Project, in which a 2,000 square foot site located on Cooperative Extension property, will be planted with native plants that enhance stream riparian areas. This will serve as a demonstration and education area for streamside landowners, classroom and community group presentations on environmental subjects such as salmon, wetlands, and storm water runoff.

Chapter 6: ASSESSMENT OF NO NET LOSS

Section 6.1: Summary of Potential for Cumulative Impacts

ESA has reviewed the Pierce County Draft SMP (dated August 2013) according to the requirements in the shoreline guidelines to determine the potential for cumulative impacts. The Pierce County Draft SMP (August 2013) provides a comprehensive update to the existing SMP goals, policies and regulations and establishes appropriate standards for the management of the County's shorelines consistent with the updated Ecology guidelines. For example, the new shoreline environment designation system is consistent with the Ecology recommended system and derives conclusions from the Pierce County Shoreline Inventory and Characterization Report (ICR) (ESA Adolfson, 2009).

Further, the Pierce County Shoreline Restoration Plan (ESA, 2011) identifies opportunities to improve or restore ecological functions that have been impaired as a result of past development activities. Together, these reports document the existing conditions within the County's shorelines at the time of this SMP Update.

This analysis was guided by the three factors identified in the Ecology guidelines for evaluating cumulative impacts and no net loss:

- Current circumstances affecting the shorelines and relevant natural processes;
- Reasonably foreseeable future development and use of the shoreline; and
- Beneficial effects of any established regulatory programs under other local, state, and federal laws.

Based on review of the Draft SMP policies and regulations and our analysis of past shoreline development trends, and potential areas where future foreseeable development is anticipated, we contend that – with integration of some or all of the recommended changes provided in Section 6.3 below – the Draft SMP will be effective in preventing cumulative impacts on habitat, hydrology and water quality functions within the County's shoreline jurisdiction.

The primary Draft SMP provisions supporting protection of cumulative impacts are listed in Section 6.2. These provisions, when considered next to potential impacts that could result from reasonably foreseeable future development, provide Pierce County the tools to protect shoreline ecological functions. Recommendations provided in Section 6.3 will strengthen protections and ensure a conclusion of “no net loss.”

Section 6.2: Major Provisions Protecting Ecological Functions

The combination of the following provisions in the Draft SMP has been identified to contribute positively towards a conclusion of no net loss for Pierce County:

- Reclassification of shorelands using the new proposed shoreline environment designation (SED) system that is tied to the existing land use, as well as the biological and physical nature of the shoreline.
- New standards for mitigation sequencing including avoidance, minimization and mitigation for impacts within the shoreline jurisdiction (note recommendation for mitigation sequencing provisions below).
- Incorporation of many of the protective standards in the Critical Areas Ordinance (please note recommendations included in Section 6.3 below for critical areas incorporation into the SMP).
- Developing a strong system of vegetated shoreline buffers tied to shoreline environment designations.
- New standards for construction of piers and docks and other water access structures.
- New standards limiting where hard shoreline stabilization can be used, and design and siting requirements for new, expanded, and replacement shoreline stabilization, whenever permitted.

Section 6.3: Recommended Actions

ESA recommends the following actions and revisions to the SMP be considered by the County to ensure a conclusion of no net loss:

1. Shoreline Jurisdiction Mapping: Shoreline Environment Designation Maps (Draft SMP Appendix F) show a less than expected area within the County's shoreline jurisdiction by not including associated wetlands (as identified in the ICR and included in the build-out analysis of this report). Although the County has separate wetland inventory information readily available to the public, wetlands that are considered associated with the shoreline have not been identified clearly on the SED Maps. This could lead to confusion over shoreline jurisdiction and critical areas management expectations. This creates unnecessary potential for development to occur adjacent to likely associated wetlands without compliance with County SMP requirements.

RECOMMENDATION: Shoreline Environment Designation Maps should be revised to accurately show the shoreline jurisdiction (with associated wetlands) based on available inventory data, or provide some other method to flag parcels where wetlands are likely to be considered “associated” and therefore part of the minimum shoreline jurisdiction.

General SMP Regulations

2. Mitigation Sequencing: The Draft SMP inaccurately identifies the components of mitigation sequencing as a prioritized list, where avoidance is the highest priority and monitoring of impacts and mitigation provided is the lowest priority.

RECOMMENDATION: Draft SMP 18S.30.030.C.1 should be revised to indicate the components as a series of consecutive steps, beginning with avoidance and minimization and ending with monitoring and taking appropriate corrective measures. To be consistent with the WAC, avoidance and minimization of impacts during project design must be demonstrated by the project applicant prior to offering mitigation to compensate for impacts.

3. Exemptions from Integrated Critical Areas Standards: Exemptions from Critical Areas standards (as listed in 18E.20.030) provide allowances for existing and new uses / developments. Several of these exemptions could result in loss of shoreline ecological functions, especially where exempted actions were to occur in areas where existing ecological functions are more intact.

Exemption A.2 would allow one time expansion of any structure's footprint by up to 25 percent, with criteria provided to minimize further encroachment toward a critical area.

RECOMMENDATION: When in Shoreline jurisdiction, limit expansion allowance to primary single-family residential structures, and ensure that no loss of significant trees would occur as a result of allowed expansion.

Exemptions A.17 and A.22 would allow maintenance or reconstruction of existing private roads, driveways, on-site sewage systems, and maintenance or reconstruction of existing, lawfully established public facilities including roads, paths, trails, bridges, sewer facilities, storm drainage facilities, and flood control improvements. Maintenance is a reasonable exemption without any additional criteria; however, reconstruction has more potential for short term ecological impacts and further encroachment into critical areas.

RECOMMENDATION: When in Shoreline jurisdiction, the County should require mitigation sequencing for temporary impacts that could result from exempt reconstruction, and should require appropriate construction best management practices be used for any maintenance or reconstruction when these activities are to occur.

4. Integrated Critical Areas Standards - "Habitat Assessment Review Waiver Allowances": Waiver allowances provided by 18E.40.030.B include waiver allowances for projects that would repair or replace existing shoreline stabilization. These allowances would waive

County review requirements for fish and wildlife habitats that may apply within a parcel. State guidelines require that wherever reconstruction of shoreline stabilization is allowed, that it “should be designed, located, sized, and constructed to assure no net loss of ecological functions” (WAC 173-26-231(3)). Review suggests that habitat assessment required by critical areas standards would be a key tool through which the County could ensure no net loss for each proposal for repair or replacement.

RECOMMENDATION: The proposed waiver allowance for repair or replacement of shoreline stabilization should be revised or eliminated. At a minimum, the allowance should be limited to replacements where hard structural shoreline stabilization would be replaced with nonstructural measures and/or soft armoring techniques (actions with clear ecological benefit) and should clearly state that in shoreline jurisdiction the requirements of the Draft SMP, especially 18S.30.070 would still apply.

5. **Integrated Critical Areas Standards – Buffer Allowances:** Proposed revisions to buffer reduction allowances (18E.40.060.D.2.c.(2)) would apparently allow for wetland and associated stream buffer reduction without enhancement of the remaining buffer area.

RECOMMENDATION: This section should be revised to require that where buffer reduction is allowed when in shoreline jurisdiction, remaining areas of buffer are to be enhanced (native tree and shrub plantings; habitat features; and/or improved stormwater treatment using LID as mitigation) sufficiently to provide mitigation for ecological functions lost as a result of reduced buffer area.

6. **Integrated Critical Areas Standards – Buffer Allowances:** Proposed critical areas regulations would allow for critical areas buffers with “well established non-native vegetation” to be considered adequately vegetated (18E.40.060.G.1). While mature non-native tree canopy may be beneficial to critical area ecological functions, we suggest that this provision provides too broad of an allowance and could result in protection of invasive or noxious non-native vegetation.

RECOMMENDATION: This section should be revised to exclude non-native invasive and noxious vegetation.

7. **Shoreline Buffer Allowances:** Allowance for expansion of existing development within the shoreline buffer: Despite the criteria provided by this allowance to limit application and potential ecological impacts, there are several concerns regarding impacts to shoreline functions. Proposed allowances would apply to any existing structure / development within a shoreline buffer, and provide opportunity for additional degradation in instances where existing shoreline ecological functions may already be at low levels. Build-out analysis did not quantify the number of existing residential structures and associated development that could be nonconforming to shoreline buffer

requirements. Additionally, new shoreline buffers may create more instances of non-conforming development than existed under the previous SMP.

RECOMMENDATIONS: Limit allowance to existing, legally established primary residential structures;

- o Apply a maximum size limit for the expansion allowance;
- o Specify that expansion would be a one-time allowance;
- o Require mitigation (buffer enhancement) wherever allowed expansion results in impacts to native riparian vegetation and significant trees (if it is the intention of the Code to require a Vegetation Planting Plan and buffer enhancement (consistent with 18S.30.030.G) whenever any allowance for shoreline buffer use is granted, then SMP section 18S.30.030.E subsections 5 and 6 should be revised to clearly state the requirement).

8. **Vegetation Conservation:**

RECOMMENDATIONS: Vegetation Conservation regulations should be revised to include mitigation requirements specifically for allowed impacts to significant trees within the shoreline buffer. Impacts to significant trees in the buffer should be avoided whenever feasible – the Draft SMP should require documented consideration of design alternative that would minimize impacts. Tree replacement ratios required for shoreline vegetation conservation could be based off of the existing standards in PCC 18J.15.030 (Tree Conservation) with heightened expectations for replacement of significant shoreline buffer trees.

9. **Shoreline Stabilization:** The shoreline stabilization section of the Draft SMP appears to be consistent with WAC language, except that WAC 173-26-231 states that “hard armoring solutions should not be authorized except when a report confirms that there is a significant possibility that such a structure will be damaged within three years as a result of shoreline erosion in the absence of such hard armoring measures, or where waiting until the need is that immediate, would foreclose the opportunity to use measures that avoid impacts on ecological functions.” Strict consistency with the WAC requirements is generally required during state review of the Draft SMP.

RECOMMENDATIONS: the Draft SMP should be revised to be consistent with the three year threshold required by the WAC.

Chapter 7: REFERENCES

- Albertson et al. 2002. South Puget Sound Water Quality Study. Washington State Department of Ecology Environmental Assessment Program, Olympia, Washington, Publication #02-03-021, Available: <http://www.ecy.wa.gov/biblio/0203021.html>
- Bolton, Susan and Jeff Shellberg. 2001. *White Paper - Ecological Issues in Floodplains and Riparian Corridors*. Washington Department of Fish and Wildlife, Washington Department of Ecology, Washington Department of Transportation, Olympia, WA.
- Brennan, Jim, Culverwell, Hilary, Gregg, Rachel, Granger, Pete. 2009. *Protection of Marine Riparian Functions in Puget Sound, Washington*. Washington Department of Fish and Wildlife, Olympia, Washington.
- EnviroVision, Herrera Environmental and Aquatic Habitat Guidelines Program. 2007, revised 2010. *Protecting Nearshore Habitat and Functions in Puget Sound*.
- ESA Adolfson. 2009. Final Shoreline Inventory and Characterization Report and Map Folio (June 2009). Prepared for Pierce County Planning and Land Services Department.
- ESA. 2011. Pierce County SMP Update Shoreline Restoration Plan (June 2011).
- Knutson, K.C. and V.L. Naef. 1997. *Management Recommendations for Washington's Priority Habitats: Riparian*. Washington Department of Fish and Wildlife, Olympia, Washington.
- Pierce County Department of Community Development. 2013. Draft Pierce County SMP Title 17.50. Dated January 17, 2013.
- Pierce County. Pierce County Resource Ordinance. Revised June 16, 2009.
- Simenstad, C.A. 2003. Commencement Bay aquatic ecosystem assessment: ecosystem-scale restoration for juvenile salmon recovery. University of Washington, School of Fisheries, Sof-UW-2003, Seattle, Washington. 25pp.
- Redman, S., D. Myers, and D. Averill, eds. (2005). Regional Nearshore and Marine Aspects of Salmon Recovery in Puget Sound. Shared Strategy for Puget Sound. June 28, 2005.
- Washington State Department of Ecology (Ecology). 2012. Shoreline Master Program Update Handbook. Revised 2012.
- Washington State Department of Ecology (Ecology). 2004. Water Quality Assessment for Washington: 2002/2004 Candidate List. Available: <http://www.ecy.wa.gov/Programs/wq/303d/2002/2002-index.html>
- Washington State Department of Health (DOH). 2007. Washington State Department of Health 2007 Early Warning System Summary for Shellfish Growing Areas in Pierce County. May 2007. Available: <http://www.doh.wa.gov/ehp/sf/growreports.htm>

Washington State Department of Fish and Wildlife (WDFW). 2013. HPA Permit Database – Beta version. Accessed December 2013.

FIGURES

PIERCE COUNTY SHORELINE MASTER PROGRAM UPDATE CUMULATIVE IMPACTS ANALYSIS WRIAS AND BASINS

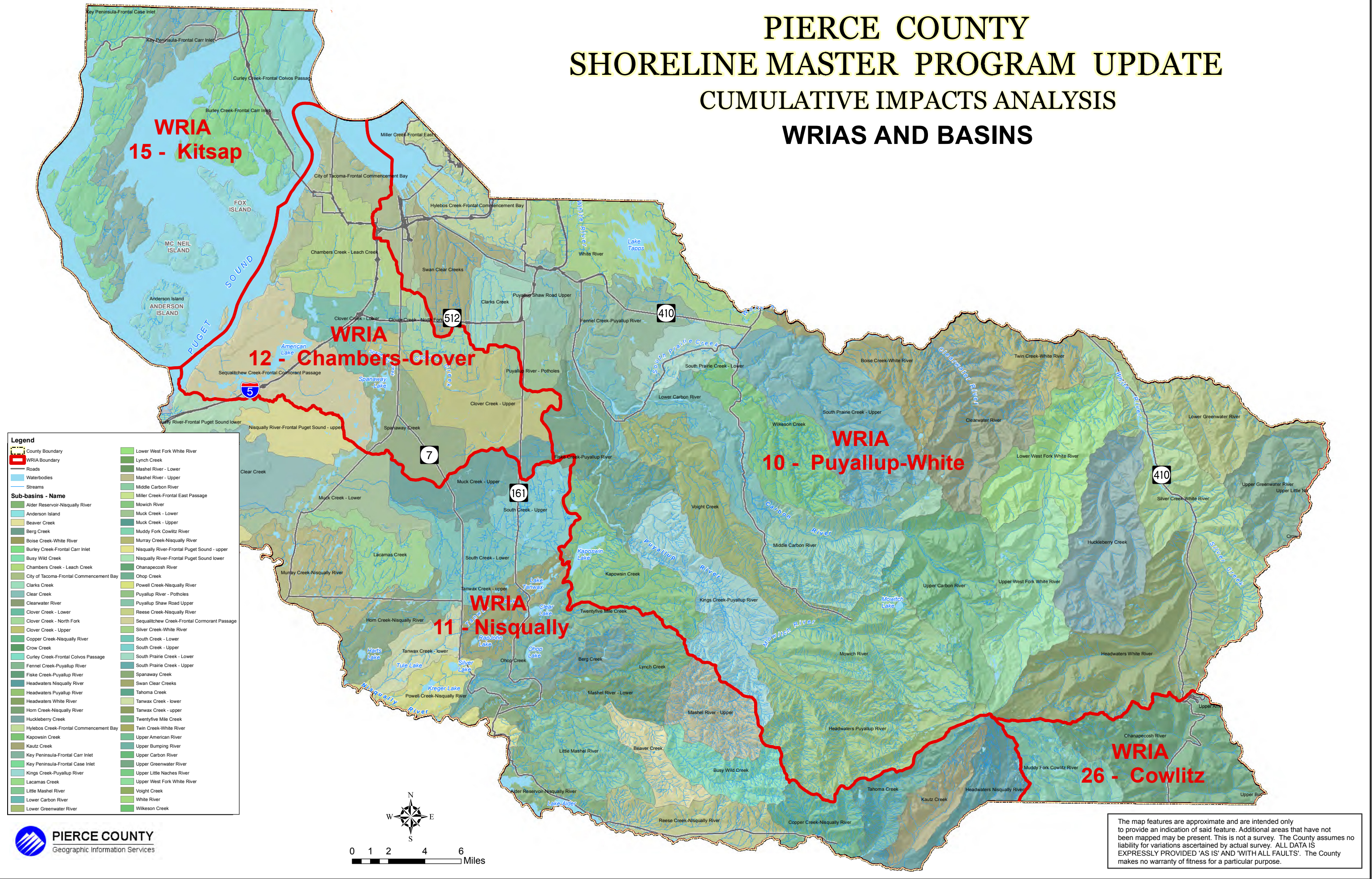
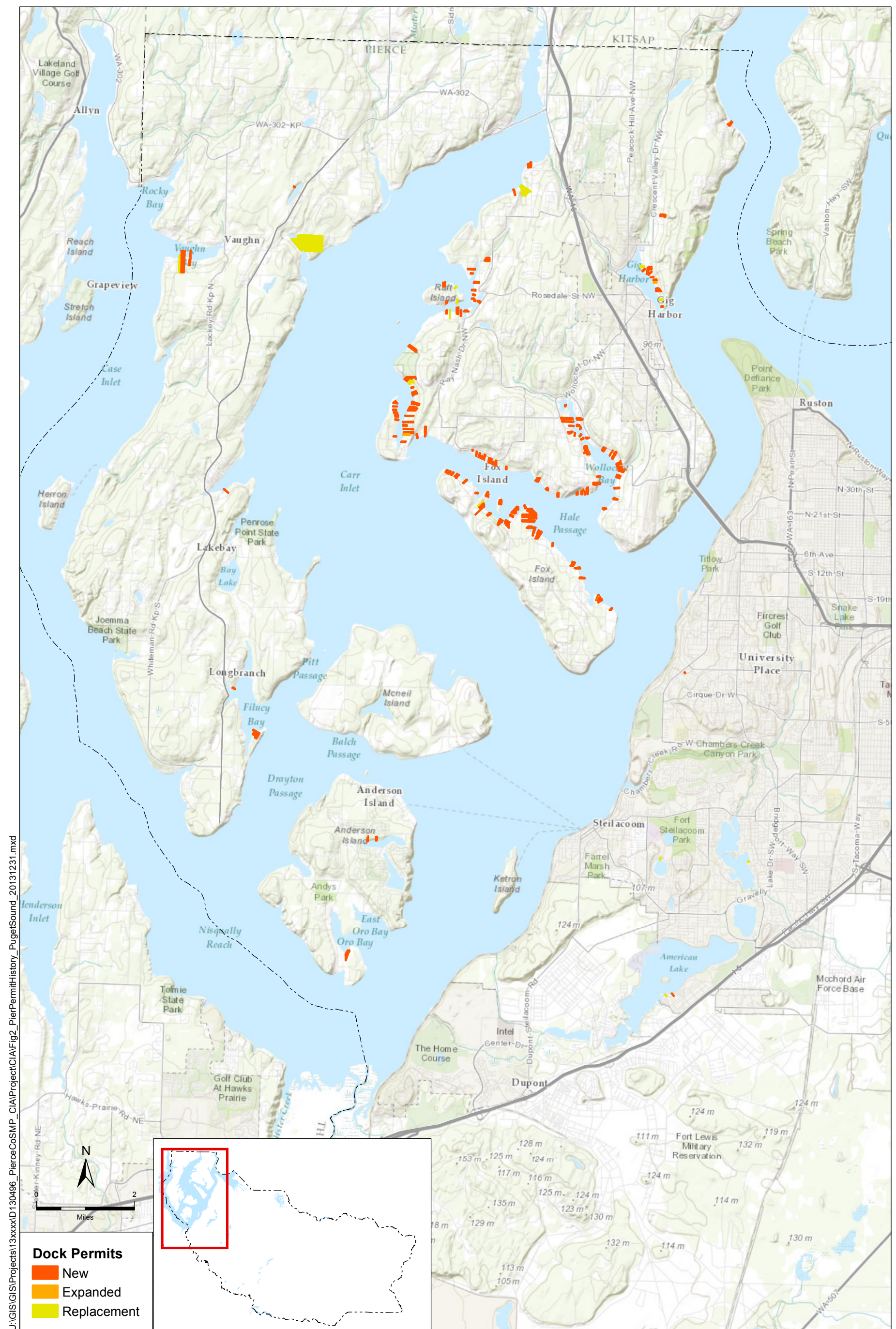
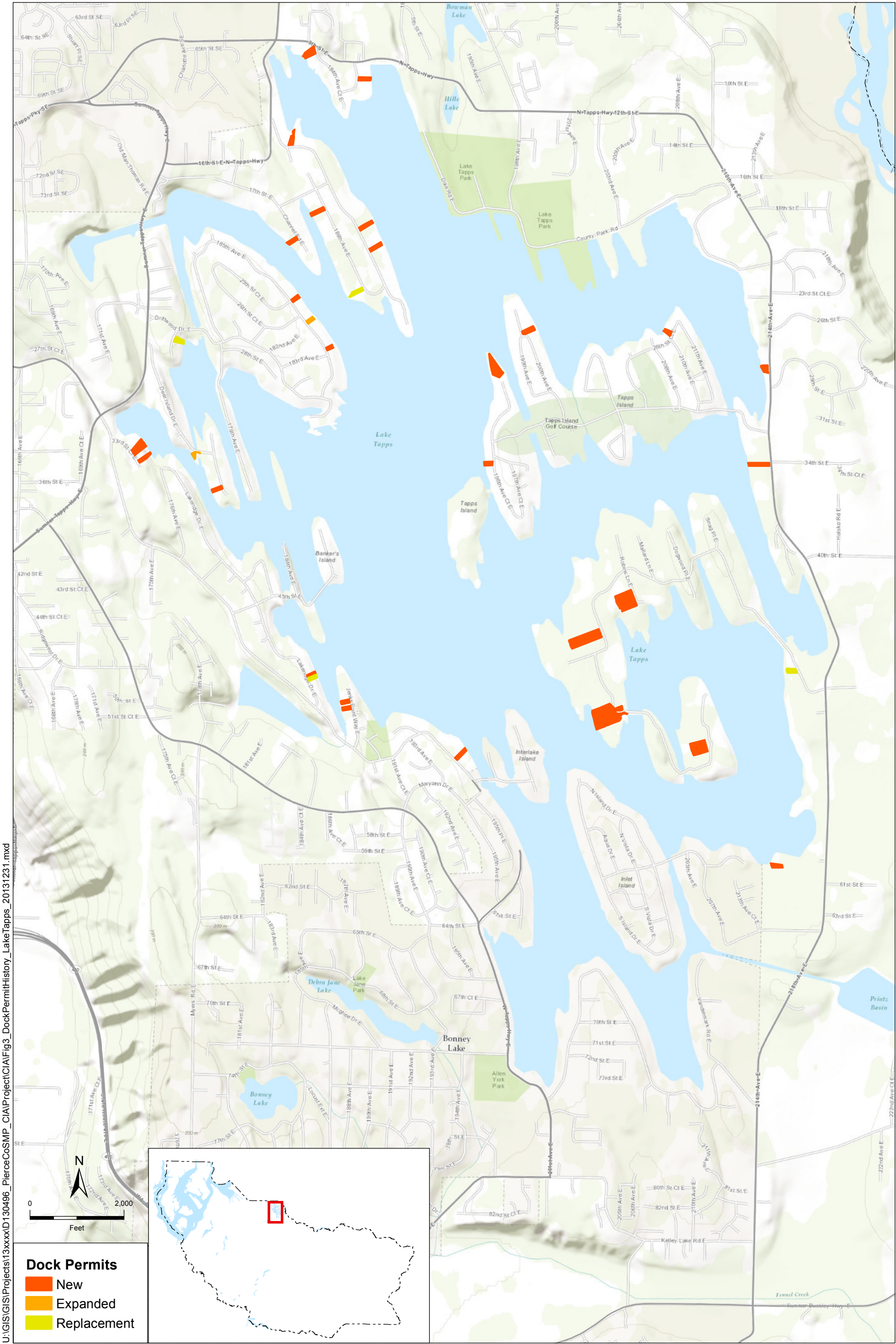


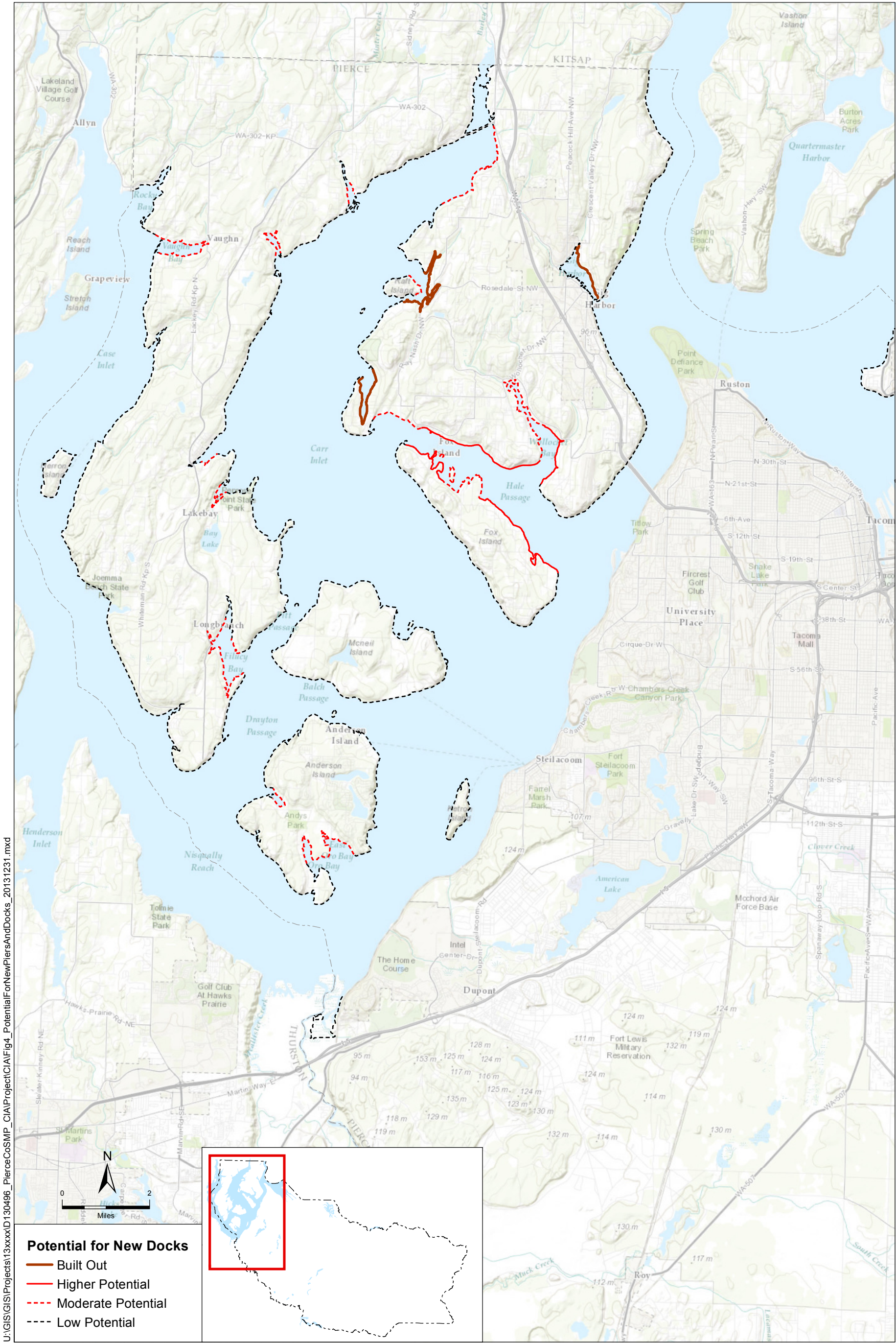
Figure 1 - WRIA and Basins Map
Pierce County, Washington





SOURCE: Pierce County, 2013; ESRI, 2013

Pierce County SMP . 130496
Figure 3
Dock Permit History - Lake Tapps



SOURCE: Pierce County, 2013; ESRI, 2013; WA Dept. of Ecology, 2001

Pierce County SMP . 130496
Figure 4
Potential for New Piers and Docks

Appendix A

Pierce County Shoreline Master Program

Build-out Analysis

Puyallup and Tributaries

Zoning classifications for proposed environment designations:

	Totals acres	% of Analysis Area	ZONING CLASSIFICATION											
			Urban Residential		Rural Residential		Urban Centers / Districts		Park and Recreation		Resource Lands - Agriculture		Resource Lands - Forest	
			acres	% of row	acres	% of row	acres	% of row	acres	% of row	acres	% of row	acres	% of row
Natural	5241.3	62.2%	0.0	0.0%	967.4	18.5%	49.7	0.9%	199.7	3.8%	9.4	0.2%	4015.1	76.6%
Conservancy	2621.3	31.1%	41.2	1.6%	1489.7	56.8%	41.7	1.6%	168.8	6.4%	626.9	23.9%	253.0	9.7%
Residential	452.3	5.4%	85.9	19.0%	290.5	64.2%	2.3	0.5%	4.1	0.9%	63.5	14.0%	6.0	1.3%
High Intensity	117.3	1.4%	21.9	18.6%	57.7	49.2%	6.3	5.4%	0.1	0.1%	5.0	4.3%	26.3	22.4%
Totals	8432.1	100.0%	149.0	1.8%	2805.2	33.3%	100.0	1.2%	372.7	4.4%	704.8	8.4%	4300.4	51.0%

Results of build-out analysis for proposed environment designations:

	Totals acres	BUILDOUT ANALYSIS									
		Built / Minimal Development Potential		Underdeveloped		Vacant - non- dividable		Vacant - dividable		Not Eligible	
		acres	% of row	acres	% of row	acres	% of row	acres	% of row	acres	% of row
Natural	5241.3	3735.5	71.3%	4.5	0.1%	69.8	1.3%	1232.1	23.5%	199.4	3.8%
Conservancy	2621.3	1823.6	69.6%	140.2	5.3%	321.9	12.3%	319.7	12.2%	16.0	0.6%
Residential	452.3	386.7	85.5%	11.7	2.6%	50.2	11.1%	3.7	0.8%	0.0	0.0%
High Intensity	117.3	113.8	97.0%	0.4	0.4%	0.5	0.4%	2.6	2.2%	0.0	0.0%
Totals	8432.1	6059.5	71.9%	156.8	1.9%	442.4	5.2%	1558.1	18.5%	215.4	2.6%

Areas of associated wetland within the analysis area.

	Totals acres	ASSOCIATED WETLANDS		
		Acres	% of Analysis Area	With Development Potential - Acres
Natural	5241.3	7.5	0.1%	0.0
Conservancy	2621.3	50.4	1.9%	8.9
Residential	452.3	16.5	3.7%	5.4
High Intensity	117.3	0.0	0.0%	0.0
Totals	8432.1	74.4	0.9%	14.2

Anderson Island / Ketron Island

Zoning classifications for proposed environment designations:

	Totals acres % of Analysis Area		ZONING CLASSIFICATION									
			Urban Residential		Rural Residential		Rural Centers		Park and Recreation		Resource Lands - Agriculture	
			% of		% of		% of		% of		% of	
			acres	row	acres	row	acres	row	acres	row	acres	row
Natural	361.6	41.1%	NONE	340.7	94.2%	0.0	0.0%	NONE	19.9	5.5%		
Conservancy	266.9	30.3%		209.7	78.6%	0.0	0.0%		50.5	18.9%		
Residential	239.2	27.1%		231.3	96.7%	0.0	0.0%		7.6	3.2%		
High Intensity	12.1	1.4%		9.4	77.7%	2.7	22.3%		0.0	0.0%		
Totals	879.8	100.0%	NONE	791.1	89.9%	2.7	0.3%	NONE	78.1	8.9%		

Results of build-out analysis for proposed environment designations:

	Totals acres	BUILDOUT ANALYSIS									
		Built / Minimal Development Potential		Underdeveloped		Vacant - non- dividable		Vacant - dividable		Not Eligible	
		acres	% of row	acres	% of row	acres	% of row	acres	% of row	acres	% of row
Natural	361.6	192.0	53.1%	29.7	8.2%	47.6	13.2%	81.4	22.5%	11.0	3.0%
Conservancy	266.9	95.3	35.7%	33.4	12.5%	81.8	30.7%	50.9	19.1%	5.5	2.1%
Residential	239.2	171.5	71.7%	22.9	9.6%	37.4	15.6%	7.5	3.1%	0.0	0.0%
High Intensity	12.1	10.7	89.0%	0.0	0.0%	1.3	11.0%	0.0	0.0%	0.0	0.0%
Totals	879.8	469.5	53.4%	85.9	9.8%	168.1	19.1%	139.8	15.9%	16.5	1.9%

Areas of associated wetland within the analysis area.

	Totals acres	ASSOCIATED WETLANDS		
		Acres	% of Analysis Area	With Development Potential - Acres
Natural	361.6	194.8	53.9%	75.5
Conservancy	266.9	10.2	3.8%	6.0
Residential	239.2	6.4	2.7%	6.4
High Intensity	12.1	0.0	0.0%	0.0
Totals	879.8	74.4	24.0%	87.9

White River and Tributaries

Zoning classifications for proposed environment designations:

	Totals acres	% of Analysis Area	ZONING CLASSIFICATION											
			Urban Residential		Rural Residential		Urban & Rural Centers / Districts		Park and Recreation		Resource Lands - Agriculture		Resource Lands - Forest	
			% of		% of		% of		% of		% of		% of	
			acres	row	acres	row	acres	row	acres	row	acres	row	acres	row
Natural	2369.6	72.8%	0	0.0%	917.9	38.7%	0	0.0%	23.4	1.0%	49	2.1%	1379.3	58.2%
Conservancy	667.3	20.5%	24.8	3.7%	56.8	8.5%	16.5	2.5%	0	0.0%	38.9	5.8%	530.3	79.5%
Residential	193.5	5.8%	21.4	11.1%	136.4	70.5%	31.1	16.1%	0	0.0%	3.5	1.8%	1.1	0.6%
High Intensity	26.6	0.8%	0	0.0%	0	0.0%	4.4	16.5%	0	0.0%	0	0.0%	22.2	83.5%
Totals	3257	100.0%	46.2	1.4%	1111.1	34.1%	52	1.6%	23.4	0.7%	91.3	2.8%	1933	59.3%

Results of build-out analysis for proposed environment designations:

	Totals acres	BUILDOUT ANALYSIS									
		Built / Minimal Development Potential		Underdeveloped		Vacant - non- dividable		Vacant - dividable		Not Eligible	
		acres	% of row	acres	% of row	acres	% of row	acres	% of row	acres	% of row
Natural	2369.6	1386.0	58.5%	0.0	0.0%	39.9	1.7%	943.8	39.8%	0.0	0.0%
Conservancy	667.3	529.9	79.4%	27.4	4.1%	48.5	7.3%	61.4	9.2%	0.0	0.0%
Residential	193.5	150.3	79.1%	0.0	0.0%	23.3	12.3%	18.4	8.7%	0.0	0.0%
High Intensity	26.6	8.5	31.8%	0.0	0.0%	18.1	68.2%	0.0	0.0%	0.0	0.0%
Totals	3257	2074.6	63.8%	27.4	0.8%	129.8	4.0%	1021.7	31.4%	0.0	0.0%

Areas of associated wetland within the analysis area.

	Totals acres	ASSOCIATED WETLANDS		
		Acres	% of Analysis Area	With Development Potential - Acres
Natural	2369.6	1.4	0.05%	0.8
Conservancy	667.3	65.3	9.8%	26.2
Residential	193.5	0.0	0.0%	0.0
High Intensity	26.6	0.0	0.0%	0.0
Totals	3257	74.4	0.9%	14.2

Lake Tapps

Zoning classifications for proposed environment designations:

	Totals acres	% of Analysis Area	ZONING CLASSIFICATION													
			Urban Residential				Rural Residential		Urban Centers / Districts		Park and Recreation		Resource Lands		Resource Lands - Forest	
			% of		% of		% of		% of		% of		% of			
			acres	row	acres	row	acres	row	acres	row	acres	row	acres	row		
Natural	none		No Natural designated shorelines on Lake Tapps													
Conservancy	6.4	0.9%	6.4	100.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%						
Residential	721.0	99.0%	69.2	9.6%	632.4	87.7%	1.8	0.2%	14.2	2.0%						
High Intensity	0.6	0.1%	0.3	57.2%	0.2	42.8%	0.0	0.0%	0.0	0.0%						
Totals	728.0	100.0%	75.9	10.4%	632.6	86.9%	1.8	0.2%	14.2	1.9%						

Results of build-out analysis for proposed environment designations:

	Totals acres	BUILDOUT ANALYSIS									
		Built / Minimal Development Potential		Underdeveloped		Vacant - non- dividable		Vacant - dividable		Not Eligible	
		acres	% of row	acres	% of row	acres	% of row	acres	% of row	acres	% of row
Natural	None	No Natural designated shorelines on Lake Tapps									
Conservancy	6.4	0.0	0.0%	0.0	0.0%	0.0	0.0%	6.4	100.0%	0.0	0.0%
Residential	721.0	672.9	93.3%	1.3	0.2%	44.9	6.2%	1.9	0.3%	0.0	0.0%
High Intensity	0.6	0.6	95.4%	0.0	0.0%	0.0	4.6%	0.0	0.0%	0.0	0.0%
Totals	728.0	673.4	92.5%	1.3	0.2%	44.9	6.2%	8.3	1.1%	0.0	0.0%

Areas of associated wetland within the analysis area.

	Totals acres	ASSOCIATED WETLANDS		
		Acres	% of Analysis Area	With Development Potential - Acres
Natural	none	No Natural designated shorelines on Lake Tapps		
Conservancy	6.4	0.0	0.0%	0.0
Residential	721.0	10.8	1.5%	0.25
High Intensity	0.6	0.0	0.0%	0.0
Totals	728.0	10.8	1.5%	0.25

Nisqually River and Tributaries

Zoning classifications for proposed environment designations:

	Totals acres	% of Analysis Area	ZONING CLASSIFICATION									
			Urban Residential		Rural Residential		Urban Centers / Districts		Rural Centers		Resource Lands - Agriculture	
			% of		% of		% of		% of		% of	
			acres	row	acres	row	acres	row	acres	row	acres	row
Natural	3209.5	41.6%	32.5	1.0%	1689.8	52.7%	0.0	0.0%	0.0	0.00%	41.5	1.3%
Conservancy	3721.4	48.2%	60.7	1.6%	2340.1	62.9%	8.7	0.2%	2.7	0.07%	1262.1	33.9%
Residential	771.9	10.0%	67.3	8.7%	677.5	87.8%	0.0	0.0%	10.1	1.31%	16.9	2.2%
High Intensity	17.9	0.2%	0.0	0.0%	16.5	92.1%	0.0	0.0%	0.1	0.54%	1.3	7.4%
Totals	7720.7	100.0%	160.6	2.1%	4724.0	61.2%	8.7	0.1%	12.9	0.17%	1321.8	17.1%

Results of build-out analysis for proposed environment designations:

	Totals acres	BUILDOUT ANALYSIS									
		Built / Minimal		Underdeveloped		Vacant - non-		Vacant - dividable		Not Eligible	
		Development Potential	acres			dividable	acres				
		acres	% of row	acres	% of row	acres	% of row	acres	% of row	acres	% of row
Natural	3209.5	2292.1	71.4%	37.3	1.2%	115.8	3.6%	758.1	23.6%	6.1	0.2%
Conservancy	3721.4	2339.9	62.9%	683.1	18.4%	256.9	6.9%	414.4	11.1%	27.1	0.7%
Residential	771.9	561.7	72.8%	40.1	5.2%	149.1	19.3%	21.0	2.7%	0.0	0.0%
High Intensity	17.9	13.2	73.6%	4.6	25.5%	0.1	0.7%	0.0	0.2%	0.0	0.0%
Totals	7720.7	5206.9	67.4%	765.1	9.9%	522.0	6.8%	1193.5	15.5%	33.2	0.4%

Areas of associated wetland within the analysis area.

	Totals acres	ASSOCIATED WETLANDS	
		Acres	% of Analysis Area
Natural	3209.5	128.3	4.00%
Conservancy	3721.4	513.1	13.79%
Residential	771.9	37.9	4.91%
High Intensity	17.9		0.00%
Totals	7720.7	679.4	8.80%

Chambers – Clover

Zoning classifications for proposed environment designations:

	Totals acres		% of Analysis Area		ZONING CLASSIFICATION									
					Urban Residential		Rural Residential		Urban Centers / Districts		Park and Recreation		Military Lands	
					acres	% of row	acres	% of row	acres	% of row	acres	% of row	acres	% of row
Natural	0.0	0.0%			0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
Conservancy	127.8	23.8%			81.6	63.8%	0.1	0.1%	0.9	0.7%	30.5	23.8%	14.8	11.6%
Residential	391.0	72.9%			357.9	91.5%	0.0	0.0%	0.0	0.0%	27.3	7.0%	5.3	1.4%
High Intensity	17.2	3.2%			2.7	15.6%	0.0	0.0%	14.0	81.4%	0.5	3.0%	0.0	0.0%
Totals	536.1	100.0%			442.2	82.5%	0.1	0.0%	14.9	2.8%	58.3	10.9%	20.1	3.8%

Results of build-out analysis for proposed environment designations:

	Totals acres	BUILDOUT ANALYSIS									
		Built / Minimal Development Potential		Underdeveloped		Vacant - non- dividable		Vacant - dividable		Not Eligible	
		acres	% of row	acres	% of row	acres	% of row	acres	% of row	acres	% of row
Natural	0.0	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
Conservancy	127.8	55.6	43.47%	3.9	3.03%	3.1	2.41%	65.3	51.10%	16.0	0.6%
Residential	391.0	302.6	77.39%	34.4	8.80%	31.5	8.05%	22.5	5.77%	0.0	0.0%
High Intensity	17.2	13.8	79.85%	0.0	0.00%	0.4	2.21%	3.1	17.94%	0.0	0.0%
Totals	536.1	371.9	69.38%	38.3	7.14%	34.9	6.51%	91.0	16.97%	0.0	0.0%

Areas of associated wetland within the analysis area.

	Totals acres	ASSOCIATED WETLANDS	
		Acres	% of Analysis Area
Natural	0.0	0.0	0.0%
Conservancy	127.8	16.1	12.61%
Residential	391.0	46.0	11.76%
High Intensity	17.2		0.00%
Totals	536.1	62.1	11.59%

Fox Island

Zoning classifications for proposed environment designations:

	Totals acres	% of Analysis Area	ZONING CLASSIFICATION									
			Urban Residential		Rural Residential		Park and Recreation		Rural Centers		Resource Lands - Agriculture	
			% of		% of		% of		% of		% of	
			acres	row	acres	row	acres	row	acres	row	acres	row
Natural	23.0	6.36%	NONE		17.6	76.7%	0.5	2.1%	NONE		4.8	21.1%
Conservancy	93.3	25.84%			87.1	93.3%	3.0	3.2%			3.2	3.4%
Residential	244.5	67.72%			242.3	99.1%	1.6	0.7%			0.5	0.2%
High Intensity	0.3	0.08%			0.3	100.0%	0.0	0.0%			0.0	0.0%
Totals	361.1	100.00%	NONE		347.3	96.2%	5.1	1.4%	NONE		8.6	2.4%

Results of build-out analysis for proposed environment designations:

	Totals acres	BUILDOUT ANALYSIS									
		Built / Minimal Development Potential		Underdeveloped		Vacant - non-dividable		Vacant - dividable		Not Eligible	
		acres	% of row	acres	% of row	acres	% of row	acres	% of row	acres	% of row
Natural	23.0	21.9	95.33%	0.0	0.00%	1.1	4.67%	0.0	0.00%	0.0	0.0%
Conservancy	93.3	70.9	76.01%	2.3	2.51%	17.6	18.81%	2.5	2.67%	0.0	0.0%
Residential	244.5	224.3	91.72%	2.6	1.07%	17.6	7.21%	0.0	0.00%	0.0	0.0%
High Intensity	0.3	0.3	100.00%	0.0	0.00%	0.0	0.00%	0.0	0.00%	0.0	0.0%
Totals	361.1	317.4	87.90%	4.9	1.37%	36.3	10.04%	2.5	0.69%	0.0	0.0%

Areas of associated wetland within the analysis area.

	Totals acres	ASSOCIATED WETLANDS		
		Acres	% of Analysis Area	
Natural	23.0		0.00%	
Conservancy	93.3	3.0	3.20%	
Residential	244.5	0.2	0.10%	
High Intensity	0.3		0.00%	
Totals	361.1	3.2	0.89%	

Gig Harbor Peninsula / Raft Island

Zoning classifications for proposed environment designations:

	Totals acres	% of Analysis Area	ZONING CLASSIFICATION											
			Urban Residential		Rural Residential		Urban Centers / Districts		Park and Recreation		Resource Lands - Agriculture		Rural Centers	
			% of		% of		% of		% of		% of		% of	
			acres	row	acres	row	acres	row	acres	row	acres	row	acres	row
Natural	142.2	12.10%	24.7	17.3%	92.0	64.7%		0.0%	12.3	8.7%	4.3	3.0%	8.0	5.6%
Conservancy	278.3	23.68%	18.2	6.5%	220.4	79.2%	1.7	0.6%	34.3	12.3%	3.1	1.1%		0.0%
Residential	747.9	63.63%	45.2	6.0%	672.2	89.9%	5.4	0.7%	1.5	0.2%	22.8	3.1%	0.1	0.0%
High Intensity	6.8	0.58%	0.7	9.7%	0.9	13.6%	4.4	64.0%	0.6	8.9%	0.0	0.0%		0.0%
Totals	1175.3	100.00%	88.7	7.5%	985.5	83.9%	11.4	1.0%	48.7	4.1%	30.2	2.6%	8.2	0.7%

Results of build-out analysis for proposed environment designations:

	Totals acres	BUILDOUT ANALYSIS									
		Built / Minimal Development Potential		Underdeveloped		Vacant - non- dividable		Vacant - dividable		Not Eligible	
		% of row		% of row		% of row		% of row		% of row	
		acres	% of row	acres	% of row	acres	% of row	acres	% of row	acres	% of row
Natural	142.2	102.8	72.3%	1.2	0.8%	25.0	17.6%	13.2	9.3%	0.0	0.0%
Conservancy	278.3	219.2	78.8%	6.3	2.3%	45.3	16.3%	7.5	2.7%	0.0	0.0%
Residential	747.9	654.7	87.5%	20.5	2.7%	72.1	9.6%	0.5	0.1%	0.0	0.0%
High Intensity	6.8	6.0	87.5%	0.0	0.0%	0.8	12.3%	0.0	0.2%	0.0	0.0%
Totals	1175.3	982.8	83.6%	28.0	2.4%	143.3	12.2%	21.2	1.8%	0.0	0.0%

Areas of associated wetland within the analysis area.

	Totals acres	ASSOCIATED WETLANDS	
		Acres	% of Analysis Area
Natural	142.2		0.0%
Conservancy	278.3	9.1	3.3%
Residential	747.9	54.8	7.3%
High Intensity	6.8		0.0%
Totals	1175.3	63.8	5.4%

North Key Peninsula

Zoning classifications for proposed environment designations:

	Totals acres	% of Analysis Area	ZONING CLASSIFICATION									
			Urban Residential		Rural Residential		Rural Centers		Park and Recreation		Resource Lands - Agriculture	
			% of		% of		% of		% of		% of	
			acres	row	acres	row	acres	row	acres	row	acres	row
Natural	69.7	6.9%	NONE		64.9	93.1%	0.0	0.0%	1.0	1.5%	0.0	0.0%
Conservancy	484.7	48.0%			430.1	88.7%	0.1	0.0%	40.4	8.3%	9.2	1.9%
Residential	435.5	43.1%			428.0	98.3%	0.0	0.0%	6.6	1.5%	0.0	0.0%
High Intensity	20.4	2.0%			16.7	82.1%	0.0	22.3%	3.6	17.9%	0.0	0.0%
Totals	1010.3	100.0%	NONE		939.6	93.0%	0.1	0.3%	51.8	5.1%	9.2	0.9%

Results of build-out analysis for proposed environment designations:

	Totals acres	BUILDOUT ANALYSIS									
		Built / Minimal Development Potential		Underdeveloped		Vacant - non-dividable		Vacant - dividable		Not Eligible	
		acres	% of row	acres	% of row	acres	% of row	acres	% of row	acres	% of row
Natural	69.7	36.1	51.9%	1.6	2.3%	18.3	26.3%	13.6	19.5%	0.0	0.0%
Conservancy	484.7	339.9	70.1%	42.1	8.7%	76.3	15.7%	26.3	5.4%	0.0	0.0%
Residential	435.5	352.2	80.9%	9.7	2.2%	62.2	14.3%	11.4	2.6%	0.0	0.0%
High Intensity	20.4	19.5	95.8%	0.8	4.2%	0.0	0.0%	0.0	0.0%	0.0	0.0%
Totals	1010.3	747.8	74.0%	54.3	5.4%	156.8	15.5%	51.4	5.1%	0.0	0.0%

Areas of associated wetland within the analysis area.

	Totals acres	ASSOCIATED WETLANDS		
		Acres	% of Analysis Area	With Development Potential - Acres
Natural	69.7	20.9	29.9%	75.5
Conservancy	484.7	61.0	12.6%	6.0
Residential	435.5	40.3	9.2%	6.4
High Intensity	20.4		0.0%	0.0
Totals	1010.3	122.1	12.1%	87.9

South Key Peninsula

Zoning classifications for proposed environment designations:

	Totals acres	% of Analysis Area	ZONING CLASSIFICATION									
			Urban Residential		Rural Residential		Rural Centers		Park and Recreation		Resource Lands - Agriculture	
			% of		% of		% of		% of		% of	
			acres	row	acres	row	acres	row	acres	row	acres	row
Natural	135.2	11.0%	NONE		134.3	99.3%	0.0	0.0%	0.4	0.3%	0.0	0.0%
Conservancy	718.4	58.3%			586.6	81.7%	0.5	0.1%	117.5	16.4%	13.7	1.9%
Residential	374.1	30.3%			368.6	98.5%	0.0	0.0%	5.0	1.3%	0.0	0.0%
High Intensity	4.9	0.4%			1.5	31.2%	3.3	68.3%	0.0	0.0%	0.0	0.0%
Totals	1232.6	100.0%	NONE		1091.0	88.5%	3.9	0.3%	122.9	10.0%	13.7	1.1%

Results of build-out analysis for proposed environment designations:

	Totals acres	BUILDOUT ANALYSIS									
		Built / Minimal Development Potential		Underdeveloped		Vacant - non-dividable		Vacant - dividable		Not Eligible	
		acres	% of row	acres	% of row	acres	% of row	acres	% of row	acres	% of row
Natural	135.2	71.9	53.2%	21.8	16.1%	20.4	15.1%	21.1	15.6%	0.0	0.0%
Conservancy	718.4	490.6	68.3%	32.0	4.5%	121.7	16.9%	74.2	10.3%	0.0	0.0%
Residential	374.1	288.0	77.0%	17.7	4.7%	53.0	14.2%	15.3	4.1%	0.0	0.0%
High Intensity	4.9	4.6	94.1%	0.0	0.0%	0.3	5.5%	0.0	0.4%	0.0	0.0%
Totals	1232.6	855.1	69.4%	71.5	5.8%	195.5	15.9%	110.6	9.0%	0.0	0.0%

Areas of associated wetland within the analysis area.

	Totals acres	ASSOCIATED WETLANDS		
		Acres	% of Analysis Area	With Development Potential - Acres
Natural	135.2	50.1	37.1%	
Conservancy	718.4	189.9	26.4%	
Residential	374.1	36.4	9.7%	
High Intensity	4.9		0.0%	
Totals	1232.6	276.4	22.4%	

Nisqually Estuary (National Wildlife Refuge)

Zoning classifications for proposed environment designations:

	Totals acres	% of Analysis Area	Zoning Classification			
			Rural Residential		Resource Lands - Agriculture	
			acres	% of row	acres	% of row
Natural	305.8	100.0%	81.0	26.5%	224.8	73.5%
Totals	305.8	100.0%	81.0	26.5%	224.8	73.5%

Results of build-out analysis for proposed environment designations:

	Totals acres	BUILDOUT ANALYSIS									
		Built / Minimal Development Potential		Underdeveloped		Vacant - non- dividable		Vacant - dividable		Not Eligible	
		acres	% of row	acres	% of row	acres	% of row	acres	% of row	acres	% of row
Natural	305.8	157.9	51.6%	51.9	17.0%	9.4	3.1%	86.6	28.3%	0.0	0.0%
Totals	305.8	157.9	51.6%	51.9	17.0%	9.4	3.1%	86.6	28.3%	0.0	0.0%

Areas of associated wetland within the analysis area.

	Totals acres	ASSOCIATED WETLANDS	
		Acres	% of Analysis Area
Natural	305.8	18.8	6.2%
Totals	305.8	18.8	6.2%

Dash Point

Zoning classifications for proposed environment designations:

	Totals acres	% of Analysis Area	ZONING CLASSIFICATION		Remaining areas don not have zoning (N/A)
			Urban Residential acres	% of row	
Natural	0.0	0.0%	0.0	0.0%	
Conservancy	9.2	13.7%	8.8	95.9%	
Residential	54.2	84.0%	54.1	99.8%	
High Intensity	1.5	2.3%	1.5	99.5%	
Totals	64.9	100.0%	64.4	99.5%	

Results of build-out analysis for proposed environment designations:

	Totals acres	BUILDOUT ANALYSIS									
		Built / Minimal Development Potential		Underdeveloped		Vacant - non- dividable		Vacant - dividable		Not Eligible	
		acres	% of row	acres	% of row	acres	% of row	acres	% of row	acres	% of row
Natural	0.0	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
Conservancy	9.2	7.9	70.1%	0.0	0.0%	1.3	15.7%	0.0	0.0%	0.0	0.0%
Residential	54.2	50.6	80.9%	0.0	0.0%	3.6	14.3%	0.0	0.0%	0.0	0.0%
High Intensity	1.5	1.5	95.8%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
Totals	64.9	59.9	74.0%	0.0	0.0%	5.0	15.5%	0.0	0.0%	0.0	0.0%

Areas of associated wetland within the analysis area.

- No areas of inventoried associated wetland.

Appendix B

Methodology for Assessing Cumulative Impacts



Build-out Analysis Methodology

For the Pierce County SMP Update – Cumulative Impacts Analysis

Pierce County parcel data was used to develop a build-out analysis data layer for completion of the SMP Update Cumulative Impacts Analysis. The build-out analysis was completed as an important tool to help estimate and describe the amount and the location of future development that may be allowed to occur within SMA jurisdiction under current regulations. It is also beneficial in allowing a community to test its development regulations – to get a glimpse of its possible future when all the remaining buildable land is developed to the maximum extent allowed under the proposed Draft SMP regulations.

The results of the analysis were used as a geospatial tool for understanding development patterns along the shoreline in combination with the results of the Inventory and Characterization Report. Below is a list of the analysis categories and their descriptions:

Build-out analysis categories (completed for all parcels intersecting the County's shoreline jurisdiction):

Category	Description	Assumption
Vacant Dividable	Undeveloped parcels that can be further developed.	Based on total parcel size and base zoning density
Vacant Non-dividable	Lands which cannot be subdivided into multiple lots under current zoning regulations.	Based on total parcel size and base zoning density
Underdeveloped (Occupied Dividable)	Existing residential property that is developed, but not to the density allowed for zoning (i.e. – a 40 acres parcel zoned R5 that has 1 residence but could be developed as 8 lots).	Only completed for residential properties: based on total parcel size and base zoning density
Fully built out (Occupied Non-dividable)	Already developed at the density allowed by zoning (i.e. – a 5 acre parcel zoned R5 with a single family residence). Includes forest lands and open space lands where specific land use designations limit potential for any future development or land division.	Residential properties: based on existing development (presence / absence) total parcel size and base zoning density
Not Eligible	Lands where development will not occur.	This <u>does not include</u> public lands such as state and county parks, tax exempt properties, long term commercial forests, etc. and <u>does not include properties</u> that have critical areas that would not meet the minimum size requirements for future development.

Note: Determining whether a property is underdeveloped or dividable is based on assumptions established by the County.

The “Fully built out (Occupied Non-dividable)” category primarily highlights single-family residential lots that are fully built-out with an existing primary residential structure and that are platted with existing lot sizes generally consistent with density prescribed by underlying zoning. The category also include forest lands and open space lands where specific land use designations limit potential for any future development or land division. While these areas are coded as “fully built-out”, they generally support very little if any existing development and/or modification. These areas were considered “fully built-out” because there is minimal potential for additional development or land division within the foreseeable future.

Forest lands zoned Forest Resource and reported in County records as “DESIG FOREST LND RCW 84.33” in the “land use designation” field are reported as fully built-out. These lands generally occur in the upper reaches of freshwater river shorelines (White, Puyallup and Nisqually watersheds) and are predominantly designated Natural shorelines by the Draft SMP. Similarly, open space lands on the marine shoreline (often zoned R10) and reported in the County records as “CU OPEN SPACE RCW 84.34 CURRENT USE” in the “land use designation” field are reported as fully built-out. A similar pattern occurs with some designated park lands (zoned PR) on the County. These conservation and park open space lands are scattered across the County’s marine shorelines, and are predominantly designated Natural or Conservancy shoreline by the Draft SMP.

All build-out analysis information was derived by Pierce County Planning and Land Services staff looking at what the Zoning categories are at a parcel level in combination with the parcel areas and the number of allowable dwelling units/acre for each zoning category. Below are the basic steps used to complete the build-out analysis¹:

1. Identify appropriate data for analysis – This included current parcels, zoning and shoreline jurisdiction
2. Overlay zoning with parcels information
3. For residential properties, calculate existing density and lot size. Determine maximum density and minimum lot size based on each zoning category. Classify property as residential vacant dividable, residential vacant non-dividable, residential underdeveloped or residential fully built-out.
4. For commercial properties, calculate existing lot size. Determine minimum lot size based on each zoning category. Classify property as commercial vacant dividable, commercial vacant non-dividable, or commercial fully built-out.
5. For resource use (agricultural and forest use) properties – as well as parks and recreation (PR zoning) properties, calculate existing lot size. Determine minimum lot size based on each zoning category. Classify property as vacant dividable, vacant non-dividable, or fully built-out.
6. Create a new development category field and CODE parcels based on the above categories and descriptions.

¹ 1. Property areas inventoried as critical areas (wetlands, erosion hazards, floodways) were not excluded from the analysis – County staff made the assumption that while future development may be limited on such parcels, allowances for use and historical development patterns suggest that some use and development is possible.