

CITY OF PORT ANGELES
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SHORELINE RESTORATION PLAN
for City of Port Angeles' Shoreline: Strait of Juan de Fuca

Prepared for:



City of Port Angeles
Community and Economic Development
321 East 5th Street
Port Angeles, WA 98362

Prepared by:



750 Sixth Street South
Kirkland . WA 98033

p 425.822.5242
f 425.827.8136
watershedco.com



1904 3rd Avenue, Suite 725
Seattle, Washington 98101

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The Watershed Company
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The Watershed Company Contact Person:
Dan Nickel

Makers Contact Person:
John Owen

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SHORELINE RESTORATION PLAN CITY OF PORT ANGELES

1.0 INTRODUCTION

Port Angeles' Shoreline Master Program applies to activities in the shoreline jurisdiction zone. Activities that have adverse effects on the ecological functions and values of the shoreline, when permitted, must be mitigated. By law, the proponent of that activity is required to return the subject shoreline to a condition equivalent to the baseline level at the time the activity takes place. It is understood that some individual uses and developments cannot always be mitigated fully; some impacts may be sufficiently minor on an individual level, such that mitigation is not required, other unregulated activities (such as operation and maintenance of existing legal developments) may not require mitigation, still other actions occurring outside of shoreline jurisdiction may have offsite impacts on shoreline functions. Together, these actions could result in incremental and unavoidable degradation of the baseline condition. However, in the aggregate, the Shoreline Master Program must ensure that development will not cause a net loss of shoreline ecological functions. The subsequent challenge is to improve the shoreline over time in areas where the baseline condition is currently degraded, severely or marginally. In the long-term, the ideal is to improve the conditions along the entire shoreline, and thereby incrementally raise the baseline condition. The implementation of the Shoreline Master Program needs to be balanced with goals of the Growth Management Act which encourages development within concentrated urban areas such as Port Angeles.

WAC Section 173-26-201(2)(f) of the Shoreline Master Program Guidelines (Guidelines)¹ says:

“master programs shall include goals and policies that provide for restoration of such impaired ecological functions. These master program provisions shall identify existing policies and programs that contribute to planned restoration goals and identify any additional policies and programs that local government will implement to achieve its goals. These master program elements regarding restoration should make real and meaningful use of established or funded nonregulatory policies and programs that contribute to restoration of ecological functions, and should appropriately consider the direct or indirect effects of other regulatory or nonregulatory programs under other local, state, and federal

¹ The Shoreline Master Program Guidelines were prepared by the Washington Department of Ecology and codified as WAC 173-26. The Guidelines translate the broad policies of the Shoreline Management Act (RCW 90.58.020) into standards for regulation of shoreline uses. See <http://www.ecy.wa.gov/programs/sea/sma/guidelines/index.html> for more background.

laws, as well as any restoration effects that may flow indirectly from shoreline development regulations and mitigation standards.”

Degraded shorelines are not just a result of pre-Shoreline Master Program activities, but also of unregulated activities and exempt development. The new Guidelines also require that “[l]ocal master programs shall include regulations ensuring that exempt development in the aggregate will not cause a net loss of ecological functions of the shoreline.” While some actions within a shoreline jurisdiction are exempt from a permit, the Shoreline Master Program should clearly state that those actions are not exempt from compliance with the Shoreline Management Act or the local Shoreline Master Program. Because the shoreline environment is also affected by activities taking place outside of a specific local master program’s jurisdiction (e.g., outside of city limits, outside of the shoreline area within the city), assembly of out-of-jurisdiction actions, programs and policies can be essential for understanding how the City fits into the larger watershed context. The latter is critical when establishing realistic goals and objectives for dynamic and highly inter-connected environments.

Restoration of shoreline areas, in relation to shoreline processes and functions, commonly refers to methods such as re-vegetation, removal of invasive species or toxic materials and removal of bulkhead structures, piers, and docks. Consistent with Ecology’s definition, use of the word “restore,” or any variations, in this document is not intended to encompass actions that reestablish historic conditions. Instead, it encompasses a suite of strategies that can be approximately delineated into four categories:

- Creation (of a new resource)
- Restoration (of a converted or substantially degraded resource)
- Enhancement (of an existing degraded resource)
- Protection (of an existing high-quality or previously restored resource).

As directed by the Guidelines, the following discussions provide a summary of baseline shoreline conditions, list restoration goals and objectives, and discuss existing or potential programs and projects that positively impact the shoreline environment. In total, implementation of the Shoreline Master Program (with mitigation of project-related impacts) in combination with this Restoration Plan (for restoration of lost ecological functions that occurred prior to a specific project) should result in a net improvement in the City of Port Angeles’ shoreline environment in the long term.

In addition to meeting the requirements of the Guidelines, this Restoration Plan is also intended to support the City’s or other non-governmental organizations’ applications for grant funding, and to provide the interested public with information for the various entities working within the City to enhance the environment.

2.0 SHORELINE INVENTORY SUMMARY

2.1 Introduction

The City recently completed a comprehensive inventory and analysis of its shorelines (December 2010) as an element of its Shoreline Master Program update. The purpose of the shoreline inventory and analysis was to gain a greater understanding of the existing condition of Port Angeles' shoreline environment to ensure the updated Shoreline Master Program policies and regulations are well-suited in protecting ecological processes and functions. The inventory describes existing physical and biological conditions in the shoreline zones within City limits and includes recommendations for restoration of ecological functions where they are degraded. The Shoreline Analysis Report for the City of Port Angeles' Shoreline: Strait of Juan de Fuca (The Watershed Company, Makers Architecture + Urban Design, and Landau Associates 2010) is summarized below.

2.2 Shoreline Boundary

As defined by the Shoreline Management Act of 1971, shorelines include certain waters of the state plus their associated "shorelands." At a minimum, the waterbodies designated as shorelines of the state are streams whose mean annual flow is 20 cubic feet per second (cfs) or greater and lakes whose area is greater than 20 acres. Shorelands are defined as:

"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...Any county or city may determine that portion of a one-hundred-year-floodplain to be included in its master program as long as such portion includes, as a minimum, the floodway and the adjacent land extending landward two hundred feet therefrom... Any city or county may also include in its master program land necessary for buffers for critical areas (RCW 90.58.030)."

The City's Shoreline Master Program was first adopted in 1979 and most recently updated in 1993. This SMP consists of the goals and policies in the city's Comprehensive Plan and provisions in the City's Municipal Code. Together these documents represent the City's current SMP.

The City's existing shoreline management area includes all adjoining marine shorelines and shorelands extending 200 feet from the ordinary high water mark (OHWM). This shoreline management area has been adjusted (subject to City Council and Ecology approval) concurrent with this SMP update (for more details see the Shoreline Inventory Report Appendix A (The Watershed Company et al. 2010)). Modifications to the

jurisdiction boundary, as summarized below, are based on new information regarding associated wetlands.

2.3 Inventory

The City of Port Angeles' shoreline inventory includes all land currently within the City's proposed shoreline jurisdiction (see the Shoreline Analysis Report – Appendix A (The Watershed Company et al. 2010)). The total area subject to the City's updated SMP, not including aquatic area, is approximately 363 acres (0.57 square miles), and encompasses approximately 17.7 miles of marine shoreline. In order to address the shoreline in manageable units and to help evaluate the differences between discrete shoreline areas, the Strait of Juan de Fuca shoreline has been divided into eleven assessment units based on a combination of factors, including sediment drift cells, land use, shoreline condition, and exposure. The reaches are depicted in Figure 1. The following inventory and analysis information is summarized from detailed information presented in the Shoreline Analysis Report.

Figure 1. Shoreline reach breaks



2.3.1 Land Use and Physical Conditions

The City of Port Angeles is located in Clallam County, Washington. The north side of the City fronts the Strait of Juan de Fuca and is surrounded by unincorporated Clallam County to the west, south and east. The City encompasses approximately 10.7 square miles of land and approximately 53 square miles of surface water (NOAA 2010).

The study area for this report includes all lands and waters currently within the City’s proposed shoreline jurisdiction (Appendix A), as well as relevant discussion of the contributing watershed. This includes both the lands and waters within the existing city limits, as well as the lands and waters within the City’s Urban Growth Area UGA. The total land area subject to the City’s updated SMP, (not including submerged lands, which are also subject to the City’s updated SMP), is approximately 363 acres, and encompasses approximately 17.7 miles of marine shoreline. The dominant feature of the shoreline is Ediz Hook, a 3.5-mile-long natural spit that shelters Port Angeles Harbor. Ediz Hook creates and protects Port Angeles Harbor, making this area attractive for industrial and commercial activity since the early 1900s. Most industries focus on wood products or marine uses. Land use in the west harbor area presently includes two mills, a marina, boat manufacturing and repair facilities, commercial facilities, restaurants, a U.S. Coast Guard base, and more than one log storage yard.

The downtown Port Angeles area includes several creek outfalls, and land use consists of a public pier with transient moorage, viewing tower, an aquarium and educational facility, a public beach area, a public trail, two ferry terminals, and mixed-use development.

Land use west of the harbor is dominated by single-family residential and undeveloped land. A cemetery, a retired landfill, and a solid waste transfer station are the other major land uses in this area. East of the harbor is a mix of older and new housing, some commercial development, and the Olympic Memorial Hospital. Outside of the City boundary, in the UGA to the east, most of the land is zoned Rural Character Conservation, intended primarily for residential use but allowing some agricultural and commercial uses. The Waterfront Trail runs along the shoreline on abandoned railroad right-of-way in this area as well. Summary details for area, impervious surface, shoreline modification, and land use patterns are listed in Table 1.

Table 1. Main land use features in shoreline reaches.

Shoreline Reach and area (ac)	Impervious Area (%)	Shoreline Modification	Main Land Uses ^{1, 2}
Reach 1 Landfill; 6.48	<1	~30% rock seawall	State/County exempt ³ 98%
Reach 2 Western City; 46.18	<1	~77% rock armor	State/County exempt ³ 27% Single-family 36% Undeveloped 13%
Reach 3	3	~100% rock armored	Resources 57%

Shoreline Reach and area (ac)	Impervious Area (%)	Shoreline Modification	Main Land Uses ^{1, 2}
Outer Industrial; 16.63			State/County exempt ³ 39%
Reach 4 Outer Ediz Hook; 53.33	14	~92% rock armor	No data ⁴ 66% State/County exempt ³ 34%
Reach 5 Inner Ediz Hook; 46.80	29	~100% rock armor, fill	No data ⁴ 56% State/County exempt 31% Indian exempt 10%
Reach 6 Inner Industrial; 10.85	21	~96% rock armor, fill, sheet pile	State/County exempt ³ 52% Resources 29% No data ⁴ 19%
Reach 7 Lagoon; 30.01	14	~100% rock armor, fill, sheet pile	Resources 75% No data ⁴ 56% State/County exempt ³ 22%
Reach 8A Downtown Tse-whit-zen; 12.91	28	~100% rock armor, fill, sheet pile	No data ⁴ 56% State/County exempt ³ 43%
Reach 8B Downtown – Marina; 20.05	60	~100% rock armor, fill, sheet pile	State/County exempt ³ 48% No data ⁴ 37% Undeveloped land 15%
Reach 8C Downtown Transition; 11.29	61	Nearly ~100% rock armor, fill, sheet pile	State/County exempt ³ 49% No data 45%
Reach 8D Downtown – Mixed Use; 26.11	60	~100% rock armor, fill, sheet pile	No data ⁴ 43% State/County exempt ³ 31%
Reach 9 Olympic; 14.00	4	~98% rock armor, fill, sheet pile	No data ⁴ 68% State/County exempt 16% Single-family 12%
Reach 10 Rayonier; 17.65	53	~61% rock armor, fill, sheet pile	Undeveloped land 42% No data ⁴ 29% State/County exempt ³ 29%
Reach 11 Eastern City (UGA); 50.73	2	~79% rock armor	State/County exempt ³ 47% Single-family 24% Undeveloped land 16%
Total	21.4%	~82%	

¹Other land uses may be present but account for less than 10% of total

²Land use categorized by County assessor data

³Tax exempt parcels

⁴No data available on land use in County assessor database

2.3.2 Biological Resources and Critical Areas

Geologically hazardous areas include modified (filled) land, marine bluffs, unstable slopes, and ravines. Much of the shoreline area is within floodplain, and each reach consists of wetlands and Washington Department of Fish and Wildlife (WDFW) Priority Habitats and Species (PHS) occurrences. Table 2 shows species, habitats, and proportions of critical areas by reach.

Table 2. Land in critical areas by shoreline reach.

Shoreline Reach	Wetland (NWI)	GHA ¹	Streams	Flood-plain	PHS
Reach 1 Landfill	61% (City-mapped=51%)	88%	Dry Creek	46%	Cliff/bluffs, abalone, red sea urchin
Reach 2 Western City	14% (City-mapped=18%)	70%	-	28%	Cliff/bluffs, bald eagle nest and nest buffer, abalone, geoduck, red sea urchin
Reach 3 Outer Industrial	22%	80%	-	85%	Bald eagle, red sea urchin ² , abalone ³
Reach 4 Outer Ediz Hook	18%	50%	-	100%	Bald eagle, red sea urchin ² , abalone ³
Reach 5 Inner Ediz Hook	4%	7%	-	99%	Hardshell clam, abalone, harbor seal, harlequin duck, shorebird concentration
Reach 6 Inner Industrial	7%	90%	-	48%	Bald eagle nest buffer, abalone
Reach 7 Lagoon	4% (City-mapped=33%)	99%	-	54%	Bald eagle nest buffer, abalone ³
Reach 8A Downtown Tse-whit-zen	15%	93%	-	33%	Offshore shellfish, bald eagle nest buffer
Reach 8B Downtown – Marina	5%	94%	-	15%	Offshore shellfish
Reach 8C Downtown Transition	15% (City-mapped=13%)	77%	Tumwater Creek	32%	Offshore shellfish
Reach 8D Downtown – Mixed Use	10% (City-mapped=6%)	91%	Valley Creek, Peabody Creek	71%	Offshore shellfish, common loon, eelgrass beds, waterfowl concentrations
Reach 9 Olympic	2%	77%	-	53%	Red sea urchin, offshore shellfish, common loon, eelgrass beds, harbor seal
Reach 10 Rayonier	24% (City-mapped=12%)	90%	Ennis Creek	80%	Red sea urchin, harbor seal, seal haul outs, bald eagle nest buffer, seabird colony
Reach 11 Eastern City (UGA)	5% (City-mapped=6%)	50%	Lees Creek	32%	Red sea urchin, abalone, bald eagle nest and buffer, urban natural open space, cliff/bluffs
Total					

¹Geologically hazardous areas

² While mapped in WDFW PHS data, a representative of the Lower Elwha Klallam Tribe indicates that the species is unlikely to be present in the specified reach.

³ While mapped in WDFW PHS data, a representative of the Lower Elwha Klallam Tribe indicates that the species is not present in the specified reach.

Extensive loss and impairment of estuarine habitat has occurred along the Port Angeles shoreline. Much of downtown Port Angeles was filled with upland and nearshore dredge materials in the 1950s (see Table 2), and creeks discharging to the harbor have been channelized and otherwise altered to varying degrees. All presently are lacking in significant estuarine habitat. At least 42 sites in or adjacent to shoreline jurisdiction have reported hazardous substances (see Table 2 of the Shoreline Analysis Report).

An analysis of shoreline ecological functions for each reach was reported in the Shoreline Analysis Report. The resulting scores are presented below, in descending order of function rating (5 = high quality functions and 1 = low quality functions).

<u>Rank</u>	<u>Score</u>
1. Reach 5: Inner Ediz Hook	3.1
2. Reach 11: Eastern City (UGA)	2.9
3. Reach 1: Landfill	2.8
4. Reach 7: Lagoon.....	2.6
5. Reach 2: Western City	2.5
6. Reach 9: Olympic.....	2.3
7. Reach 10: Rayonier	2.3
8. Reach 8D: Downtown – Mixed Use.....	2.2
9. Reach 4: Outer Ediz Hook	2.1
10. Reach 8C: Downtown - Transition.....	2.0
11. Reach 8A: Downtown – Tse-whit-zen	1.8
12. Reach 6: Inner Industrial	1.7
13. Reach 3: Outer Industrial	1.6
14. Reach 8B: Downtown - Marina.....	1.5

3.0 RESTORATION GOALS AND OBJECTIVES

Shoreline restoration that is compatible with continued water dependent uses is a fundamental component of the goals and objectives of the proposed SMP. Goal 2 of the proposed Shoreline Master Program is directly relevant to shoreline restoration. It is as follows:

Port Angeles' shoreline ecology is protected and, where appropriate, restored.

This overall restoration goal can be broken into the following more specific goals related to shoreline functions:

- Protect and restore water quality;
- Protect and restore native shoreline vegetation, habitat functions, and habitat forming processes; and

- Encourage restoration that allows for continued water dependent uses and public access.

Objectives that assist in defining actions or projects to restore the natural processes and ecological functions are found in policies throughout the proposed SMP. The following policies, in particular, help guide restoration priorities in the City.

- Protect critical saltwater habitats in recognition of their importance to the marine ecosystem of the City of Port Angeles and the State of Washington. These habitats provide critical reproduction, rearing, and migratory nursery areas for valuable recreational and commercial species. They also provide habitat for many marine plants, fish, and animals (SMP 3.B.4.b.1).
- Protect and restore existing diversity of vegetation and habitat values, wetlands and riparian corridors associated with shoreline areas (SMP 3.B.9.b.2.c).
- Protect and restore habitats for State-listed “priority species” (SMP 3.B.9.b.2.c).
- Enhance and restore the natural characteristics of Ediz Hook (SMP 3.B.9.b.2.c).
- Protect and enhance natural erosion and sediment transport processes (SMP 3.B.9.b.4.d).
- Protect and restore estuarine habitats, especially at Ennis Creek (SMP 3.B.9.b.4.g).
- In conjunction with applicable agencies, the City will continue to take action to improve water quality in the harbor by:
 - Improving treatment of sewer overflows and faulty septic systems.
 - Aggressively pursuing storm water quality measures, both within and outside shoreline jurisdiction (SMP 3.B.13.b.1).

Opportunities and strategies can be identified based on the objectives. At this level, no specific performance standards are applied to goals. For example, one overall goal is to improve water quality to meet the vision of a restored ecosystem, not to improve it by a particular measure. Individual restoration projects that may be implemented as part of this plan will generally identify specific measurable goals. Ultimately, most restoration priorities will be in some part opportunistic based on site access, available funding, and feasibility. Given the many factors necessary to implement restoration projects, implementation of the restoration plan will not fall to the City alone, rather, it will rely on involvement, funding, partnerships, and collaboration among federal, state, and local agencies, profit and non-profit organizations, and private entities.

Table 3 shows the relationship of main goals, objectives, natural processes, and ecological functions. The first column lists the goals, the second column shows the objectives associated with those goals and the third column shows the natural process and ecological function that will be enhanced by completing the objectives. Objectives are found under multiple goals affecting different natural processes and ecological functions. Potential metrics for monitoring each objective are listed in the right hand column.

Table 3. Main restoration goals and objectives addressing natural processes in the City of Port Angeles.

Restoration goal	Objective(s)	<u>Natural process(es)</u> <i>Ecological function(s) addressed</i>	Potential metrics
Protect Critical Areas	Inventory, identify, and conserve Habitats of Local Importance	<u>Hydrologic processes, sediment/nutrient transport, habitat function</u> <i>Support vegetation</i> <i>Woody debris recruitment</i> <i>Organic material availability</i> <i>Terrestrial and aquatic habitat</i> <i>Migration corridors</i> <i>Food production and delivery</i>	Habitat diversity Species abundance and diversity Connectivity/areas of isolation Woody debris density Wetland acreage Wetland functions Wetland ratings Water quality
	Inventory, identify, and conserve wetlands		
	Protect and restore native vegetation		
Protect natural erosion processes of marine bluffs	Restore beach deposits and processes, including connections of feeder bluffs to marine systems	<u>Sediment transport, habitat function</u> <i>Support vegetation</i> <i>Wood debris recruitment</i> <i>Terrestrial and aquatic habitat</i> <i>Beach formation and maintenance</i>	Linear feet of bulkhead Beach accretion over time
Protect Ediz Hook	Develop an Ediz Hook master plan	<u>Hydrologic processes, sediment/nutrient transport, habitat function</u> <i>Support vegetation</i> <i>Woody debris recruitment</i> <i>Terrestrial and aquatic habitat</i> <i>Food production and delivery</i>	Extent of tree canopy Density of woody debris Linear feet of bulkhead
Develop and implement sustainable resource management practices for shoreline	Develop shoreline zoning to protect intact, unique, or major physical shoreline resources, to avoid hazardous areas, or to preserve open space.	<u>Hydrologic processes, sediment/nutrient transport, habitat function</u> <i>Migration corridors</i> <i>Terrestrial and aquatic habitat</i> <i>Beach formation and maintenance</i>	Habitat patch size and condition Beach accretion or loss over time

Restoration goal	Objective(s)	Natural process(es) Ecological function(s) addressed	Potential metrics
resources	Review and revise the Harbor Resource Management Plan	<u>Sediment/nutrient transport, Hydrologic processes</u> <i>Toxic compound removal Vegetation support Nutrient removal Water and sediment storage</i>	Number of creosote pilings Water quality Soil contamination Contaminant levels in marine biota Storm flows
Ensure minimum adverse impact to the shoreline environment	Identify and implement requirements to mitigate negative impacts of development	<u>Hydrologic processes, sediment/nutrient transport, habitat function</u> <i>Support vegetation Terrestrial and aquatic habitat Beach formation and maintenance processes Water and sediment storage</i>	Connectivity/areas of isolation Linear feet of bulkhead Water quality measurements Storm flows
	Develop innovative land management to preserve open space	<u>Hydrologic processes, sediment/nutrient transport, habitat function</u> <i>Migration corridors Support vegetation Woody debris recruitment Terrestrial and aquatic habitat</i>	Connectivity/areas of isolation Habitat patch size and condition Habitat diversity
Encourage shoreline restoration and enhancement	Rehabilitate degraded shorelines for stability and habitat enhancement	<u>Hydrologic processes, sediment/nutrient transport, habitat function</u> <i>Terrestrial and aquatic habitat Beach formation Support vegetation Woody debris recruitment</i>	Fish & shellfish abundance and diversity Acreage of vegetation Density of woody debris Linear feet of bulkhead
	Preserve and protect aquatic habitats	<u>Hydrologic processes, sediment/nutrient transport, habitat function</u> <i>Aquatic habitat Beach formation</i>	Fish & shellfish abundance and diversity Beach aggradation over time Aquatic habitat patch size and condition
	Reduce and remove shoreline hardening and overwater structures	<u>Hydrologic processes, sediment/nutrient transport, habitat function</u> <i>Beach formation Terrestrial and aquatic habitat Migration corridors Support vegetation</i>	Linear feet of bulkhead Number of overwater structures Extent of tree canopy Fish & shellfish abundance and diversity
Protect water quality	Adopt and enforce adequate regulations	<u>Hydrologic processes, sediment/nutrient transport</u> <i>Water storage</i>	% impervious surface Water quality Wetland acreage

Restoration goal	Objective(s)	<u>Natural process(es)</u> <i>Ecological function(s) addressed</i>	Potential metrics
	Identify and address existing sources of pollution	<i>Sediment storage Toxic compound removal Nutrient removal</i>	Storm flows Number of creosote pilings Soil contamination levels Contaminant levels in marine species
Promote environmental conservation through outreach, education, and stewardship	Inform the public on long-term benefits of conservation and protection	<u>Hydrologic processes, sediment/nutrient transport, habitat function</u> <i>Support vegetation Terrestrial and aquatic habitat Habitat migration corridors Water and sediment storage Nutrient removal</i>	Public support for public restoration projects Number of restoration projects implemented on private property Acreage or number of restored/remaining impaired areas Linear feet of bulkhead Water quality
	Partner with local, state, and federal groups to inform public		
	Educate builders and realtors on environmental and economic benefits of conservation		
Enhance fisheries resources	Participate in watershed planning and salmon recovery efforts	<u>Hydrologic processes, sediment/nutrient transport, habitat function</u> <i>Terrestrial and aquatic habitat Habitat migration corridors Water and sediment storage Nutrient removal</i>	Acreage or number of restored/remaining impaired areas Species abundance and diversity

4.0 ONGOING CITY PLANS AND PROJECTS

4.1 Comprehensive Plan

The Port Angeles Comprehensive Plan (City of Port Angeles 2009) defines goals addressing the environment in its Land Use and Conservation elements. Each goal is accompanied by policies and/or objectives intended to guide progress toward the goal. Many of these objectives are identical or closely related to the objectives presented in Section 3.

4.2 Port Angeles Harbor Shoreline Habitat Assessment

The 2001 evaluation of shoreline and nearshore salmonid habitat extended from east of the former Rayonier mill to the end of Ediz Hook (Pentec Environmental 2001). The assessment of habitat quality utilized aerial photographs and field verification to gather information for use in a Tidal Habitat Model (THM) designed to score shoreline and nearshore areas salmonid habitat quality, particularly for juveniles. The results of the THM aided in identifying areas with the highest potential for improvement. Specifically, the Daishowa Lagoon (now the Nippon Lagoon) and nearshore assessment

units were identified as having high potential to increase habitat value for salmon. Project recommendations for these areas are as follows:

- Daishowa (Nippon) Lagoon: improving fish passage through the channel, removing large woody debris from deeper parts of the lagoon, planting saltwater marsh vegetation and native riparian species.
- Nearshore assessment units: improve stream and estuarine habitat in lower streams reaches (Ennis, Peabody, and Tumwater) by recontouring to increase area of shallow water habitat, establishing large woody debris, planting native marsh and riparian vegetation; reestablishing beach habitat at Francis Park; restoring other beach sites where possible through riprap removal, recontouring, and placement of sand/gravel; establishing or reestablishing eelgrass beds; planting riparian vegetation where armoring cannot be removed; shading upper shore.

4.3 Stormwater Management Program (SWMP)

The City's SWMP is a set of planned actions designed to protect water quality by reducing the discharge of pollutants. Components of the SWMP related to shoreline restoration include the following:

- Illicit Discharge Detection and Elimination

The City maintains a GIS database of all known discharges, outfalls, and receiving waters owned, operated, or maintained by the City. Planned actions include a field assessment of impacted receiving waters, a plan to trace and remove sources of discharges, and program evaluation and assessment. The City has adopted Ecology's Stormwater Management Manual for Western Washington maintenance standards and is currently implementing them.

- Controlling Runoff from New Development, Redevelopment, and Construction Sites

The City has developed an ordinance addressing runoff from new development, redevelopment, and construction activities at sites one acre or greater in size. The City may reduce the size threshold in the future. Actions include employing Ecology's manual for design criteria and best management practices, conducting stormwater plan review and oversight, pre- and post-construction site inspection, and compliance and maintenance standards for stormwater discharge.

- Pollution Prevention and Operation and Maintenance for Municipal Operations

The City has developed and implemented a program with the goal of preventing or reducing pollutant runoff from municipal operations. It includes annual inspections, spot checks, road runoff control and maintenance, public land runoff control, and maintenance, and a stormwater pollution prevention plan (SWPPP).

4.4 Community and Economic Development Department

The Department is overseeing the process of updating both the SMP and the Harbor Resource Management Plan of 1989, as well as being the department that developed the revised Comprehensive Plan (see Section 4.1.1). The SMP Analysis Report (The Watershed Company et al. 2010) collated and summarized potential restoration projects and opportunities for the shoreline area throughout the City and UGA. These projects, among others, are included in Table 5.

5.0 PARTNERSHIPS

Federal, state, regional, and local agencies and organizations are actively involved in shoreline restoration, conservation, and protection in and around Port Angeles. These partners and their local roles in shoreline protection and/or restoration are identified below and organized in order by the scope of the organization (federal, state, regional, and local).

5.1 U.S. Army Corps of Engineers (USACE)

5.1.1 Outer Ediz Hook

The USACE has conducted maintenance work consisting of relocation of fallen revetment rock back into the armoring of the north shore of Ediz Hook facing the Strait of Juan de Fuca. (USACE 2002), and beach nourishment in the same area. The shoreline in this area is presently almost entirely armored with stone, fronted by cobbles, gravels, and patches of sand. Although the beach and armoring collect large woody debris and aquatic vegetation transported by waves, the Hook is at risk due to loss of materials that once originated from bluff erosion (now limited by armoring) and the Elwha River (on which sediment supplies are trapped above two dams).

5.1.2 Elwha Dam

Removal of the Elwha Dam is expected to begin in September 2011. Goals of the removal include a reduction in coastal erosion in delta and nearshore areas as sedimentation processes return. Dam removal will take place over approximately three years so that release of trapped silt, gravel, and rock is gradual and does not overwhelm the delta, beaches, and nearshore areas.

Additional restoration approaches and measures have been identified as necessary for realizing the full environmental benefits of dam removal (Shaffer et al. 2008). To identify these, some initial work will be needed: defining movement of sediment once it reaches the nearshore; investigating historic habitat, key fish, and vegetation conditions and distribution; identifying habitat distribution and resource use; and modeling future conditions based on the preceding elements. Once the degree of restoration still needed after dam removal is identified and the continuing impact of the remaining shoreline alterations is determined, further restoration actions can be defined and prioritized. Other participants in the planning effort post-removal restoration are the U.S. Geological Survey (USGS), the National Park Service (NPS), and the Lower Elwha Klallam Tribe.

5.2 U.S. Geological Survey (USGS)

The USGS has been a partner in studying a number of restoration issues and ecological processes in advance of Elwha Dam removal. These are ongoing efforts and include beach surveys and characterization in the Elwha River delta, nearshore substrates and habitat mapping and characterization offshore of the Elwha River mouth, Chinook habitat use in the Elwha River estuary, nutrient sampling in the river, freshwater movement as it relates to sediment dispersal at the mouth of the river, vegetation mapping in the Elwha estuary, surface and groundwater measurement in the estuary, and biological surveys in the estuary.

5.3 Washington State Department of Natural Resources (DNR)

The DNR works with lessees on their public aquatic lands, including those in Clallam County, to protect habitat to the extent possible. As well, the agency's Aquatic Restoration Program identifies, plans, and implements restoration projects. The Program also offers support to private and public entities working on restoration projects on or adjacent to State-owned aquatic lands. Project interests include creosote and derelict vessel removal and other cleanup efforts.

5.4 Strait of Juan de Fuca Ecosystem Recovery Network (ERN)

The Strait of Juan de Fuca ERN comprises elected officials and upper-level staff of governments, agencies, institutions, organizations, and key business groups from Clallam and Jefferson Counties. The group's common goal is to "Recover and sustain the ecological health of the Strait of Juan de Fuca and North Olympic Peninsula using an ecosystem-based management approach, while connecting with and enhancing our socio-economic well-being." The ERN partnership produced an action agenda aimed at, among other subjects and issues, marine hazards and toxins, ocean acidification and air emissions, stormwater issues, salmon recovery, watershed planning, migration corridors, aquaculture, and sewage discharge. The Clallam Work Group of the ERN focuses on providing assistance to members' government and non-government organizations and agencies implement the local and regional actions and strategies listed

in Tables 5 & 6. These actions and strategies are designed to promote the following goals:

- A. Protect intact ecosystem processes, structures, and functions
- B. Restore ecosystem processes, structures, and functions
- C. Prevent sources of water pollutants
- D. Work effectively and efficiently together on priority issues
- E. Assist the Partnership in implementing the Performance Management System.

The Port Angeles SMP/Harbor Management Plan (HMP) Steering Committee prioritized projects recommended by ERN in May 2010.

5.3 North Olympic Peninsula Lead Entity (NOPLE)

NOPLE consists of a Technical Review Group (TRG) made up of scientist and people with special knowledge of salmon, a Lead Entity Group (LEG) of government staff, and four citizens groups. The groups developed the NOPLE Habitat Recovery Strategy in 2001, updating it continuously as new information becomes available. The strategy acts to gather local salmon information and priorities, build a network of salmon habitat recovery entities, provide information to grant applicants, and list priorities for SRFB project proposals to be used by SRFB to guide funding amounts. The mission of NOPLE is “to recover priority salmon habitat from Sequim Bay west along the Strait of Juan de Fuca to Cape Flattery.”

The TRG meets monthly to develop and recommend NOPLE Strategy updates, to provide technical assistance and feedback to applicants for SRFB funding, and to provide the CFGs and LEG with scores, ranks and comments on proposed projects. Current projects that are part of or are under consideration by NOPLE are included in Table 5.

5.6 Water Resource Inventory Area (WRIA) 18 Participation

5.6.1 Elwha-Dungeness Planning Unit

The Elwha-Dungeness Planning Unit, in development of the Elwha-Dungeness Watershed Plan, utilized the results of a series of workshops and Planning Unit meetings to compile recommendations for restoration in WRIA 18 and Sequim Bay in west WRIA 17 (Elwha-Dungeness Planning Unit 2005). Recommendations address both WRIA 18 as a whole and some groups of smaller sub-basins, as well as the nearshore marine environment. Table 6 lists fish- and habitat-related conservation and restoration recommendations from the plan.

5.6.2 Washington State Conservation Commission

The WRIA 18 Salmon and Steelhead Limiting Factors Final Report (Haring 1999) made action recommendations for the watershed and each sub-unit within WRIA 18 based on a limiting factors analysis. A number of recommendations address subtidal and nearshore marine areas adjacent to the Port Angeles shoreline; others are aimed at improving conditions in streams that enter shoreline jurisdiction, and impact water quality in the nearshore. These recommendations are included in Table 5.

5.7 Clallam Marine Resource Committee (MRC)

The MRC includes participants from the Lower Elwha Klallam Tribe (LEKT), the City of Port Angeles, and other tribe and local government representatives, as well as citizens from the academic, development, commercial fishing, conservation, and recreation communities. The 2009-2013 Clallam County Marine Resources Committee Strategic Plan (MRC 2009) states the MRC mission “To protect and restore the marine waters, habitat, and species of Clallam County along the Strait of Juan de Fuca and to achieve ecosystem health and sustainable resource use.” Among the group’s near-term objectives are to continue monitoring the Elwha nearshore, monitor water quality changes resulting from the Elwha River dam removals, and to assist other efforts to clean up and restore Port Angeles Harbor. The Strategic Plan includes projects aimed at restoring the Elwha nearshore environment and suggests partners and potential funding agencies. Recommended projects for nearshore restoration are reversing the loss of the Angeles point shoreline, monitoring nearshore habitats associated with dam removal, and developing and implementing an Elwha nearshore restoration plan. The Plan also proposes the removal of fill material from the Port Angeles landfill, with the City and Ecology as potential partners. The MRC also partners with WDFW, the LEKT, Olympic National Park, Peninsula College, Puget Sound Partnership (PSP), and others to provide restoration information to the Elwha Nearshore Consortium for inclusion in yearly newsletters.

5.8 Lower Elwha Klallam Tribe

A main goal of the LEKT is to restore the Elwha river system and all runs of native fish in the Elwha River and other watersheds that drain into the Strait of Juan de Fuca as well as related nearshore areas, including Port Angeles Harbor. For the Elwha River, a primary strategy for attaining this goal is the removal of the Elwha Dam and subsequent restoration projects. Efforts include current and ongoing beach substrate, elevation, and profiling monitoring, as well as fish and biological surveys of the estuary for baseline data. The LEKT is also planning revegetation as a component of the restoration.

The LEKT is also involved in coordination and oversight of cleanup activities at the former Rayonier mill site. The Ennis Creek Conceptual Restoration Plan (Ennis Technical Team 2010), co-authored by the LEKT and Rayonier, includes

recommendations to remove the pier, jetty, all concrete structures, an asphalt parking lot, and return lower Ennis Creek to its natural meander, floodplain and forested riparian habitat. The Plan also includes restoration of estuary habitat to improve sediment transport processes, remove barriers to nearshore salmonid migrations, and restore natural vegetation communities. LEKT plans to lead the management of restoration related projects on the site. Other related projects include exotic plant eradication, protection of existing intact habitats, the replacement of fish-barrier culverts in Port Angeles with bridges, and the placement of engineered log jams along Ennis Creek. Restoration would also include improved public access to the site. It should be noted that future use of the former Rayonier mill site has not been finalized by the City. While planned restoration activities mentioned above and included in the final Ennis Creek Conceptual Restoration Plan are proposed, future use and development of the site may include some water-oriented uses and public access. This would likely include replacement of the existing over-water structure, albeit with a much smaller pier.

Other planned and ongoing shoreline restoration related activities by the LEKT include annual exotic plant eradication projects along the Elwha River and connection to the City of Port Angeles' wastewater system to collect and treat water coming from reservation lands. This latter project is funded as mitigation for anticipated increased groundwater levels in the Elwha River valley.

5.9 Puget Sound Partnership

The Puget Sound Partnership consists of representatives from a variety of interests from the Puget Sound region including business, agriculture, the shellfish industry, environmental organizations, local governments, tribal governments, and the Washington state legislature. Some of the Partnership's key tasks are as follows:

- Develop a set of recommendations for the Governor, the Legislature and Congress to preserve the health of Puget Sound by 2020 and ensure that marine and freshwaters support healthy populations of native species as well as water quality and quantity to support both human needs and ecosystem functions.
- Engage citizens, watershed groups, local governments, tribes, state and federal agencies, businesses and the environmental community in the development of recommendations.
- Review current and potential funding sources for protection and restoration of the ecosystem and, where possible, make recommendations for the priority of expenditures to achieve the desired 2020 outcomes.

The Partnership through the Leadership Council released an Action Agenda in December 2008. Implementation of this Action Agenda has resulted in State and Federal funding of restoration and protection initiatives and projects. This includes integrating

the work of the Puget Sound Nearshore Restoration Project to increase focus on completing work necessary to request Puget Sound restoration funds under the Water Resources Development Act slated for 2012.

5.10 Puget Sound Nearshore Ecosystem Restoration Project (PSNERP)

The Army Corps of Engineers and WDFW co-lead PSNERP as an effort to evaluate ecosystem degradation in the Puget Sound Basin, to develop and assess potential solutions to identified problems, and to recommend actions and projects to restore and preserve the nearshore ecosystem. The 2009 technical report Management Measures for Protecting and Restoring the Puget Sound Nearshore (Clancy et al. 2009) defines and describes 21 general management recommendations focusing on actions for improving degraded nearshore areas (Table 4).

Table 4. PSNERP Management Measures for restoring Puget Sound nearshore areas (from Clancy et al. 2009).

Management Measure	Description
Armor Removal or Modification	Removal, modification, or relocation of coastal erosion protection structures such as rock revetments, bulkheads, and concrete walls on bluff-backed beaches, barrier beaches, and other shorelines.
Beach Nourishment	The intentional placement of sand and/or gravel on the upper portion of a beach where historic supplies have been eliminated or reduced.
Berm or Dike Removal or Modification	Removal or modification of berms, dikes and other structures to restore tidal inundation to a site that was historically connected to tidal waters. Includes dike/berm breaching and complete dike/berm removal.
Channel Rehabilitation or Creation	Restoration or creation of channels in a restored tidal wetland to change water flow, provide habitat, and improve ecosystem function.
Contaminant Removal and Remediation	Removal or remediation of unnatural or natural substances (e.g., heavy metals, organic compounds) harmful to the integrity or resilience of the nearshore. Pollution control, which is a source control measure, is a different measure.
Debris Removal	The removal of solid waste (including wood waste), debris, and derelict or otherwise abandoned items from the nearshore.
Groin Removal or Modification	Removal or modification of groins and similar nearshore structures built on bluff-backed beaches or barrier beaches in Puget Sound.
Habitat Protection Policy or Regulations	The long-term protection of habitats (and associated species) and habitat-forming processes through zoning, development regulations, incentive programs and other means.
Hydraulic Modification	Modification of hydraulic conditions when existing conditions are not conducive to sustaining a more

Management Measure	Description
	comprehensive restoration project. Hydraulic modification involves removing or modifying culverts and tide gates or creating other engineered openings in dikes, road fills, and causeways to influence salt marsh and lagoon habitat. This measure is used in managed tidal systems (as opposed to naturally maintained systems).
Invasive Species Control	Eradication and control of nonnative invasive plants or animals occupying a restoration site and control measures to prevent introduction or establishment of such species after construction is complete.
Large Wood Placement	Installment of large, unmilled wood (large tree trunks with root wads, sometimes referred to as large woody debris) within the backshore or otherwise in contact with water to increase aquatic productivity and habitat complexity.
Overwater Structure Removal or Modification	Removal or modification of overwater structures such as piers, floats and docks to reduce shading and restore wave regimes.
Physical Exclusion ¹	Installation of exclusionary devices (fences, barriers, mooring buoys, or other devices) to direct or exclude human and/or animal use of a restoration site.
Pollution Control	Prevention, interception, collection, and/or treatment actions designed to prevent entry of pollutants into the nearshore ecosystem.
Property Acquisition and Conservation	Transfer of land ownership or development rights to a conservation interest to protect and conserve resources, enable restoration or increase restoration effectiveness.
Public Education and Involvement	Activities intended to increase public awareness of nearshore processes and threats, build support for and volunteer participation in restoration and protection efforts, and promote stewardship and responsible use of nearshore resources.
Revegetation	Site preparation, planting, and maintenance to manipulate soils and vascular plant populations to supplement the natural development of native vegetation.
Species Habitat Enhancement	Installation or creation of habitat features (sometimes specific structures) for the benefit of native species in the nearshore.
Reintroduction of Native Animals	Reestablishment of native animal species at a site where they existed or as replacement for lost habitat elsewhere.
Substrate Modification	The placement of materials to facilitate establishment of desired habitat features and improve ecosystem functions, structures, or processes.
Topography Restoration	Dredging, excavation and /or filling to remove or add layers of surface material so that beaches, banks, tidal wetlands, or mudflats can be created.

1. Public access is a key principle of SMA; therefore, exclusionary devices for humans are not a management measure supported under the SMA or in the Port Angeles SMP.

5.11 Clallam County Streamkeepers

Streamkeepers is a citizen-based volunteer program of the County's Department of Community Development that involves Clallam County residents in projects to protect and restore salmon habitat. The primary goal of providing useful data to aid decision-makers in restoring local watersheds is approached through projects describing current conditions, identifying trends in watershed conditions, screening for potential problems, determining restoration priorities, and monitoring the effectiveness of restoration projects.

6.0 POTENTIAL PROJECTS AND PRIORITIZATION

Several site or reach specific restoration, enhancement, or protection projects have been identified within the City’s shoreline jurisdiction. Projects were identified in Haring’s (1999) analysis of salmon habitat limiting factors, the Strait of Juan de Fuca Ecosystem Recovery Network (ERN), the North Olympic Peninsula Lead Entity (NOPE), the City’s Waterfront and Transportation Improvement Plan (WTIP), and through the Port Angeles Shoreline Inventory and Analysis Report, which summarized recommendations from several resources (TWC 2010). These projects are listed by reach in Table 5. Each project has been given a prioritization level (high – medium – low). Projects received a high prioritization if they are located within the City or UGA and (1) were previously identified as high priority by one of the above review efforts and/or (2) clearly provide a high restoration value that is reasonably feasible in the future. Conversely, projects received a low prioritization if they (1) have a low level of perceived long-term benefit, (2) are located well outside of shoreline jurisdiction, and/or (3) are not readily feasible. New information, as well as changes in ecosystem condition or land use could affect the assessment of ecological benefits and/or feasibility of individual projects, resulting in changes to the prioritization identified here.

Table 5. Restoration project recommendations and opportunities in the City of Port Angeles’ shoreline jurisdiction listed by shoreline reach.

Reach	Restoration Opportunity	Source	Prioritization
Reach 1 Landfill	Develop and implement a short-term LWD strategy to provide LWD presence and habitat diversity to Dry Creek until full riparian function is restored	Haring 1999	Medium
	Restore functional riparian zones throughout the Dry Creek watershed	Haring 1999	Medium
	Remediate stormwater impacts to Dry Creek; ensure that stormwater impacts resulting from future construction in the watershed are fully addressed at the time of construction	Haring 1999	Medium
	Explore opportunities to further limit influence of landfill on shoreline area, and continue to remove existing landfill debris that is embedded in the beach and upland's abandoned landfill cell.	TWC 2010	High
	Improve vegetation on bluff and at base of bluff with native species.	TWC 2010	Medium
Reach 2 Western City	Explore opportunities to improve vegetation at the top of the bluff and at the toe of the bluff near the water supply line.	TWC 2010	Medium

Reach	Restoration Opportunity	Source	Prioritization
	Evaluate the feasibility of re-routing the industrial water supply line and removing the bank armoring. Bluff erosion is a key component to providing sediment to the Hook, and should be allowed to occur at a relatively natural pace. However, development at the top of the bluff makes it exceptionally difficult to remove armoring and allow natural erosion to occur.	TWC 2010	High
	Seek ways to mitigate some of the negative impacts of armoring, by including LWD in the armoring or possibly providing beach nourishment along the armored segment to simulate natural sedimentation rates.	TWC 2010	Medium
	Restore drift processes and recruitment of marine sediments from the Elwha River and between the Elwha River and the west-end of Ediz Hook.	Haring 1999	Medium
	Elwha River Estuary Restoration	ERN, NOPLE Work Plan	Medium
	Elwha River Nearshore Biodiversity Investigations	ERN, NOPLE Work Plan	Medium
Reach 3 Outer Industrial	Explore opportunities to improve vegetation.	TWC 2010	Medium
	Seek ways to mitigate some of the negative impacts of armoring, by including LWD in the armoring or possibly providing beach nourishment along the armored segment to simulate natural sedimentation rates.	TWC 2010	Medium
	The placement of LWD or alternative bioengineering enhancements along the north shore of Ediz Hook may help retain sediment from the longshore drift following Elwha Dam removal.	TWC 2010	High
Reach 4 Outer Ediz Hook	Explore opportunities for active control/elimination of non-native vegetation and replanting with native vegetation.	TWC 2010	Medium
	Seek ways to mitigate some of the negative impacts of armoring, by including LWD in the armoring or continuing and expanding beach nourishment activities conducted by the Corps along the armored segment to simulate natural sedimentation rates.	TWC 2010	Medium
	The placement of LWD or alternative bioengineering enhancements along the north shore of Ediz Hook may help retain sediment from the longshore drift following Elwha Dam removal.	TWC 2010	High
Reach 5 Inner Ediz Hook	Support as feasible continued efforts of WDFW, the Corps, WDNR, LEKT and other entities to restore this reach.	TWC 2010	Medium
	DNR harbor habitat restoration. Partial creosote removal conducted in 2008; identify and prioritize remaining creosote removal opportunities with goal of eliminating them. Ediz Hook nearshore restoration ongoing. Project underway.	ERN	High

Reach	Restoration Opportunity	Source	Prioritization
	Ediz Hook Restoration Phase III and beyond. Phases I and II completed	ERN	High
	At City facilities, explore restoration of armored areas (hard armor removal, beach nourishment, LWD placement), design upgrades to any in- and over-water structures (such as launches, piers, etc), removal of any abandoned structures or debris, and revegetation. Any design must ensure protection of the road prism, utilities, and City facilities.	TWC 2010	Medium
Reach 6 Inner Industrial	As opportunities arise, modify existing shoreline structures to incorporate design elements that minimize impact.	TWC 2010	Low
	Protect and enhance the remaining area of unarmored shoreline at the south end of the reach.	TWC 2010	Medium
Reach 7 Lagoon	Restore unrestricted tidal flow and fish passage	TWC 2010, Haring 1999	Medium
	Remove wood debris from the deeper areas of the lagoon.	TWC 2010	High
	Plant saltwater marsh vegetation and native riparian vegetation in the areas surrounding the lagoon.	TWC 2010	Medium
Reach 8A Downtown Tse-whit- zen; Reach 8B Downtown – Marina; Reach 8C Downtown Transition; Reach 8D Downtown – Mixed Use	Improve stream/estuarine habitat in the streams entering Port Angeles Harbor (Tumwater and Peabody Creeks), similar to what was recently accomplished on Valley Creek. Actions could include: recontouring to increase the area of shallow water habitat, placement of LWD, planting of native marsh and riparian vegetation, daylighting streams, re-meandering stream channels, and identifying and addressing sources of pollution to streams	TWC 2010	High
	Improve conditions along armored shorelines where feasible by implementing one or more of the following: riprap removal, slope cut-back, additions of finer-grained sediments, and placement of LWD, and riparian plantings	TWC 2010	Medium
	Establish or reestablish eelgrass beds, including over areas of wood accumulation that have been removed and/or capped with sand.	TWC 2010	High
	Clean up and restore Unocal Bulk site.	TWC 2010	Medium
	Enhance and enlarge Hollywood Beach. The small pond east of the Red Lion motel could be reconnected to the harbor.	TWC 2010, WTIP, ERN	High
	Additional restoration/enhancement opportunities may be available at the privately owned Oak Street waterfront property, a portion of which is leased by the City of Port Angeles.	TWC 2010, WTIP	Medium

Reach	Restoration Opportunity	Source	Prioritization
	Remediate stormwater management in the watershed to collect, treat, and discharge stormwater in a manner that avoids adverse impacts to Tumwater Creek and other surface waters; particular attention should be given to eliminating stormwater discharges that are creating major sediment contribution off Black Diamond Road, and taking measures to stabilize erosion from the gully	Haring 1999	Medium
	Restore functional estuary processes	Haring 1999	Low
	Remove channel constrictions in the lower channel of Tumwater Creek and restore functional floodplain processes	Haring 1999	Low
	Develop and implement a short-term LWD strategy to provide LWD presence and habitat diversity to Tumwater Creek until full riparian function is restored	Haring 1999	Medium
	Restore functional riparian zones throughout the Tumwater Creek watershed	Haring 1999	Medium
Reach 9 Olympic	Improve conditions along armored shorelines where feasible by implementing one or more of the following: riprap removal, slope cut-back, additions of finer-grained sediments, and placement of LWD, and riparian plantings.	TWC 2010	Medium
	Establish or reestablish eelgrass beds, including over areas of wood accumulation that have been removed and/or capped with sand.	TWC 2010	High
Reach 10 Rayonier	Rayonier Mill Cleanup and Restoration: Contaminant cleanup. Planning stage.	TWC 2010, ERN, ETT 2010 ¹	High
	Rayonier Mill Cleanup and Restoration: Derelict harbor structure survey and removal	TWC 2010, ERN, Haring 1999, ETT 2010	Medium
	Acquiring beach areas east of Rayonier Mill site	ERN	Medium
	Feasibility study to remove beach fill and armoring west of Rayonier Mill site	ERN, ETT 2010	Medium
	Restoration of natural floodplain function in the lower channelized portions of Ennis Creek	Haring 1999	Medium
	Secure fish passage through Highway 101 by maintaining fishway/replacing culvert with bridge. 3 culverts exist below Hwy 101 at 2 locations.	Haring 1999	Medium
	Collect and treat stormwater from Highway 101 and other impermeable surfaces	Haring 1999	Medium
	Restore damaged riparian areas and LWD presence and function throughout the Ennis Creek channel	Haring 1999, ETT 2010	Medium
	County/City should monitor water quality in the vicinity of the golf course, downstream, and near storm drains	Haring 1999	Medium
	Evaluate flow and water quality impacts of runoff from	Haring 1999	Medium

Reach	Restoration Opportunity	Source	Prioritization
	the mill landfills, Highway 101, and agricultural areas of concern; remediate identified problems		
Reach 11 Eastern City (UGA)	Improve passage conditions in Lees Creek, initially at Highway 101 and at RM 0.1, and subsequently at other locations	Haring 1999	Low
	Restore riparian presence and function in Lees Creek, develop and implement a short-term LWD recovery strategy, and fence livestock away from the channel in agricultural areas on both the East and West forks	Haring 1999	Low
	Identify and remove/correct floodplain constrictions in Lees Creek	Haring 1999	Low
	Enhance shoreline with native vegetation	TWC 2010	Medium
	Add LWD in pocket areas along shoreline to improve conditions along the Olympic Discovery Trail	TWC 2010	Medium
	Restore drift processes and recruitment of marine sediments to the west of Morse Creek.	Haring 1999	Medium
Aquatic	Port Angeles Harbor marine wood waste analysis/characterization and removal/remediation	ERN, Haring 1999	High
	Remove derelict fishing gear and structures within the harbor	ERN	Medium
	Pollutant load assessment and feasibility study to reconnect inner harbor lagoon at west end of harbor	ERN	Medium
	Reduce potential impacts from aquaculture activities	ERN	Low
	Clean up and restore Marine Trades area of harbor. Project underway; feasibility study next.	ERN	Medium
	Eliminate remaining combined sewer overflows	ERN	High

¹ ETT 2010: Ennis Technical Team. 2010. Ennis Creek & Estuary Restoration Conceptual Plan

Those projects receiving a High Priority status are listed and summarized below. Those projects which were listed in multiple reaches are combined to better represent overall restoration objectives and priorities for Port Angeles shorelines. These are not ranked in order of preference.

- Eliminate remaining combined sewer overflows.
- Port Angeles Harbor marine wood waste analysis/characterization and removal/remediation, including the lagoon.
- Establish or reestablish eelgrass beds, including over areas of wood accumulation that have been removed and/or capped with sand.
- Enhance and enlarge Hollywood Beach. The small pond east of the Red Lion motel could be reconnected to the harbor.
- Improve stream/estuarine habitat in the streams entering Port Angeles Harbor (Tumwater and Peabody Creeks), similar to what was recently accomplished on Valley Creek. Actions could include: recontouring to increase the area of shallow water habitat, placement of LWD, planting of native marsh and riparian vegetation, daylighting streams, and identifying and addressing sources of pollution to streams.
- Restoration of Ediz Hook (Phases I and II completed). The placement of LWD or alternative bioengineering enhancements along the north shore of Ediz Hook may help retain sediment from the longshore drift following Elwha Dam removal.
- DNR harbor habitat restoration. A partial removal of creosote pilings was conducted in 2008; additional creosote recovery needs should be prioritized and implemented. Ediz Hook nearshore restoration ongoing. Project underway.
- Rayonier Mill Cleanup and Restoration: Contaminant cleanup. Planning stage.
- Evaluate the feasibility of re-routing the industrial water supply line and removing the bank armoring. Bluff erosion is a key component to providing sediment to the Hook, and should be allowed to occur at a relatively natural pace. However, development at the top of the bluff makes it exceptionally difficult to remove armoring and allow natural erosion to occur.
- Explore opportunities to further limit influence of landfill on shoreline area, and continue to remove existing landfill debris that is embedded in the beach and upland's abandoned landfill cell.

7.0 STRATEGIES TO ACHIEVE LOCAL RESTORATION GOALS

This section discusses programmatic measures for the City of Port Angeles designed to foster shoreline restoration and achieve a net improvement in shoreline ecological processes, functions, and habitats. The City's SMP represents an important vehicle for

facilitating and encouraging restoration projects and programs that could be led by private and/or non-profit entities, or the City itself. The discussion of restoration mechanisms and strategies below highlights programmatic measures that the City may potentially implement as part of the proposed SMP, as well as parallel activities that would be led by other governmental and non-governmental organizations. A number of these strategies are promoted and supported by the City's Comprehensive Plan (See Section 4.1.1).

7.1 Capital Facilities Program

The City could develop shoreline restoration as a new section of the City's Capital Facilities Program (CFP) to facilitate implementation. Current CFP projects that may be prime candidates for immediate consideration due to interest and potential outside support are listed in Table 7.

7.2 Development Opportunities

When shoreline development occurs, the City has the ability to look for opportunities to conduct restoration in addition to minimum mitigation requirements as part of the SMP. Development may present timing opportunities for restoration that would not otherwise occur and may not be available in the future. Mitigation may also allow for "banking" opportunities. However, banking opportunities should be focused in rural areas outside of the UGA. In certain cases, on-site mitigation opportunities are limited due to building site constraints, limited potential ecological gains, or other site-specific factors. In these instances, the City shoreline administrator could identify an off-site restoration site that could be contributed to in lieu of on-site mitigation.

7.3 Development Incentives

Through the SMP, the City may provide development incentives for restoration, including the reduction or relaxation of standards (e.g., setback reduction incentives) or the waiving of some or all of the development application fees, infrastructure improvement fees, or stormwater fees. This may serve to encourage developers to try to be more imaginative or innovative in their development designs to include more access and preservation.

7.4 Shoreline Restoration Fund

A second possibility is a Shoreline Restoration Fund. A chief limitation to implementing restoration is local funding, which is often required as a match for State and federal grant sources. To foster ecological restoration of the City's shorelines, the City may establish an account that may serve as a source of local match monies for non-profit organizations implementing restoration of the City's shorelines. This fund may be administered by the City shoreline administrator and be supported by a levy on new shoreline development proportional to the size or cost of the new development project.

Monies drawn from the fund would be used as a local match for restoration grant funds, such as the SRFB, Aquatic Lands Enhancement Account (ALEA), or another source.

7.5 Resource Directory

Development of a resource list would be helpful in aiding property owners who want to be involved in restoration. Examples of grant programs that could be included are:

Landowner Incentive Program (LIP): This is a competitive grant process through Washington Department of Fish and Wildlife that provides financial assistance to private individual landowners for the protection, enhancement, or restoration of habitat to benefit species-at-risk on privately owned lands.

Salmon Recovery Funding Board (SRFB) Grant Programs: SRFB administers two grant programs for protection and/or restoration of salmon habitat. Eligible applicants can include municipal subdivisions (cities, towns, and counties, or port, conservation districts, utility, park and recreation, and school districts), tribal governments, state agencies, nonprofit organizations, and private landowners.

7.6 Volunteer Coordination

The City will continue to emphasize and accomplish restoration projects by using community volunteers and coordinate with organizations such as Clallam County Streamkeepers and People for Puget Sound.

7.7 Regional Coordination

The City will continue its association and active involvement with NOPL, the Elwha Dungeness Planning Unit, and ERN. The City should also look for other opportunities for involvement in regional restoration planning and implementation. In addition to site or reach specific projects, several regional partners have identified program oriented recommendations to improve the water quality and water quantity, as well as habitat in the Port Angeles area. These programs are listed in Table 6, and they offer numerous opportunities to develop or continue regional partnerships.

Table 6. General program recommendations for the restoration, enhancement, and protection of water quality, water quantity, and habitat along the City's shorelines. Recommendations were drawn from WRIA 18, the Strait of Juan de Fuca Ecosystem Recovery Network (ERN), and from the Shoreline Inventory and Analysis report (TWC 2010).

Habitat Function	Program	Source
Water Quantity	Increased setbacks to allow for more natural erosion rates while decreasing threats to structures.	TWC 2010
	Develop an information clearinghouse to facilitate access to monitoring information	WRIA

Habitat Function	Program	Source
	Measure water use	WRIA
	Report and update GIS information on public water systems; work to meet WAC 246-290-100 requirements	WRIA
	Resolve inconsistencies in water rights data	WRIA
	Strive to keep surface water in basins of origin	WRIA
	Follow groundwater withdrawal guidelines in the WRIA 18/West 17 Plan	WRIA
	Develop seawater intrusion policy, plans, and testing	WRIA
	Drill exempt wells only when public alternatives do not exist	WRIA
	Pursue WRIA 18 groundwater modeling and research	WRIA
Water Quality	Complete and implement septic system investigation, operation, and maintenance program	WRIA
	Include remediation and enhancement in animal-keeping pollution control.	WRIA
	Reduce pollutant loadings by protecting and restoring riparian areas, regularly reviewing critical areas regulations, and using biological and innovative stormwater controls.	WRIA
	Clean up industrial sites, collect hazardous waste, review point-source permits and consider NPDES revisions to meet water quality goals.	WRIA
	Implement City NPDES Phase II permit	ERN
	Identify and protect critical aquifer recharges areas; require nitrate reduction where groundwater exceeds 3 mg/L; require and enforce stormwater pre-treatment; encourage well decommissioning	WRIA
	Fish and shellfish monitoring and consumption advisories	ERN
	Enhance conditions for shellfish by removing bacterial pollution sources in the nearshore; implement water cleanup plans/strategies; support PSP State and local monitoring programs	WRIA
	Prioritize water quality monitoring, assessment, and correction actions; implement surface water field monitoring; consider a facility to process organic wastes or a disposal site for "vactor" waste in stormwater	WRIA
Habitat	Develop and implement management of native and wild fish stocks, fish habitat, and hatcheries while instream flow and habitat improvement projects are implemented.	WRIA
	Strive to maintain or restore important fish and wildlife habitats in all management actions	WRIA
	Identify according to habitat importance rivers, riparian corridors, and wetlands	WRIA
	Protect, maintain, enhance, or restore high-functioning streams, riparian areas, floodplains, estuaries, and historical wetlands	WRIA
	Identify, study, and restore degraded river, riparian, and wetland areas	WRIA
	Develop a plan to increase value and make better use of existing water resources	WRIA
	Prepare an annual WRIA 18 habitat restoration and salmon recovery monitoring report	WRIA
	Conduct regular reconnaissance of streams to identify factors that might affect restoration and rehabilitation actions	WRIA
	Continue to update salmon productivity limiting factors information per the WRIA 18 Limiting Factors Analysis	WRIA
	Initiate restoration where there is adequate fish and habitat information;	WRIA

Habitat Function	Program	Source
	update characterization of streams where needed	
	Restore nearshore connections at stream mouths	WRIA
	Monitor flows, pollutant loads, habitat factors, and water use in streams	WRIA
	Identify causes of degradation in urban streams and rehabilitate	WRIA
	Develop approaches to minimize human impacts on streams	WRIA
	Follow wetland mitigation sequencing to avoid impacts	WRIA
	Monitor and assess riparian areas regularly, include marine riparian	WRIA
	Use native plants to restore riparian areas	WRIA
	Integrate riparian management with planning processes and other habitat restoration efforts	WRIA
	Redraw FEMA delineations to reflect actual fluvial geomorphology	WRIA
	Elwha Nearshore Action Plan	ERN

8.0 PROPOSED IMPLEMENTATION TARGETS AND MONITORING METHODS

8.1 Project Evaluation

When a restoration project is proposed for implementation by the City, other agency, or by a private party, the project should be reviewed to assess whether the project’s objectives are consistent with those of this Restoration section of the SMP and, if applicable, whether the project warrants funding and implementation above other candidate restoration projects. If the project is fully funded and applicable permitting is in process then this added review will not be necessary. (It is recognized that, due to funding sources or other constraints, the range of any individual project may be narrow.) It is also expected that the list of potential projects may change over time, that new projects will be identified and existing opportunities will become less relevant as restoration occurs and as other environmental conditions, or our knowledge of them, change.

When reviewing potential restoration projects, priority for allocation of public resources should be accorded to projects that most effectively meet the following criteria:

- Restoration meets the goals and objectives for shoreline restoration.
- Restoration that addresses underlying ecological processes is of a higher priority than restoration of functions.
- Restoration avoids residual impacts to other functions or processes.
- Projects address a known degraded condition.

- Conditions that are progressively worsening are of greater priority.
- Restoration has a high benefit to cost ratio.
- Restoration has a high probability of success.
- Restoration is feasible, such as being located on and accessed by public property or private property that is cooperatively available for restoration.
- There is public support for the project.
- The project is supported by and consistent with other restoration plans.
- Restoration is consistent with the goals of the Shoreline Management Act (e.g., accommodates water dependent uses) and Growth Management Act.

The City should consider developing a project “score card” as a tool to evaluate and prioritize the implementation of unfunded projects consistent with these criteria.

8.2 Monitoring and Adaptive Management

In addition to project monitoring required for individual restoration and mitigation projects, the City should conduct system-wide monitoring of shoreline conditions and development activity, to the degree practical, recognizing that individual project monitoring does not provide an assessment of overall shoreline ecological health. The following three-pronged approach is suggested:

1. Track information using the City’s GIS and permit system as activities occur (development, conservation, restoration and mitigation), such as:
 - a. New shoreline development
 - b. Shoreline variances and the nature of the variance
 - c. Compliance issues, particularly repeated violations
 - d. New impervious surface areas or replacement of impervious surfaces with pervious alternatives
 - e. Number and type of pilings
 - f. Removal of fill
 - g. Vegetation retention/loss
 - h. Bulkheads/armoring

The City may require project proponents to monitor as part of project mitigation, which may be incorporated into this process. Regardless, as development and restoration activities occur in the shoreline area, the City should seek to monitor shoreline conditions to determine whether both project specific and SMP overall goals are being achieved.

2. Periodically review and provide input to the regional ongoing monitoring programs, such as DNR monitoring, Puget Sound Ambient Monitoring Program, and additional information provided by local organizations (e.g., Streamkeepers) to identify any major environmental changes that might occur.
3. Re-review status of environmental processes and functions at the time of periodic SMP updates to, at a minimum, validate the effectiveness of the SMP. Re-review should consider what restoration activities actually occurred compared to stated goals, objectives and priorities, and whether restoration projects resulted in a net improvement of shoreline resources.

Under the Shoreline Management Act, the SMP is required to result in no net loss of shoreline ecological functions. If this standard is found to not be met at the time of review, Port Angeles will be required to take corrective actions. The goal for restoration is to achieve a net improvement. The cumulative effect of restoration over time between reviews should be evaluated along with an assessment of impacts of development that is not fully mitigated to determine effectiveness at achieving a net improvement to shoreline ecological functions.

Evaluation of shoreline conditions, permit activity, GIS data, and policy and regulatory effectiveness should occur at varying levels of detail consistent with the Comprehensive Plan update cycle. A complete reassessment of conditions, policies and regulations should be considered every seven years. To conduct a valid reassessment of the shoreline conditions every seven years, it is necessary to monitor, record, and maintain key environmental metrics to allow a comparison with baseline conditions. As monitoring occurs, the City should reassess environmental conditions and restoration objectives. Those ecological processes and functions that are found to be worsening may need to become elevated in priority to prevent loss of critical resources. Alternatively, successful restoration may reduce the importance of some restoration objectives in the future.

8.3 Reporting

This document includes summaries of opportunities and projects to restore shoreline conditions based upon a detailed inventory and analysis of shoreline conditions and information gathered from multiple sources. Nonetheless, exhaustive scientific information about shoreline conditions and restoration options is cost prohibitive at this stage. Additionally, restoration is at times experimental. Monitoring must be an aspect of all restoration projects. Information from monitoring studies will help demonstrate what restoration is most successful. Generally, conservation of existing natural areas is the least likely to result in failure. Alternatively, enhancement (as opposed to complete restoration of functions), has the highest degree of uncertainty.

This Restoration Plan does not provide a comprehensive scientific index of restoration opportunities that allows the City to objectively compare opportunities against each other. If funding was available, restoration opportunities could be ranked by which opportunities are expected to have the highest rates of success, which address the most pressing needs, and other factors. Funding could also support a long-term monitoring program that evaluates restoration over the life of the SMP (as opposed to independent monitoring for each project).

City planning staff is encouraged to track all land use and development activity, including exemptions, within shoreline jurisdiction, and may incorporate actions and programs of the other departments as well. A report may be assembled that provides basic project information, including location, permit type issued, project description, impacts, mitigation (if any), and monitoring outcomes as appropriate. Examples of data categories might include square feet of non-native vegetation removed, square feet of native vegetation planted or maintained, reductions in chemical usage to maintain turf, linear feet of eroding stream bank stabilized through plantings, or linear feet of shoreline armoring removed. The report would also outline implementation of various programs and restoration actions (by the City or other groups) that relate to watershed health.

The staff report may be assembled to coincide with Comprehensive Plan updates and may be used, in light of the goals and objectives of the Shoreline Master Program, to determine whether implementation of the SMP is meeting the basic goal of no net loss of ecological functions relative to the baseline condition established in the Inventory and Analysis Report. In the long term, the City should be able to demonstrate a net improvement in the City of Port Angeles' shoreline environment.

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