DRAFT

COUNTYWIDE SHORELINE RESTORATION PLAN

Clallam County Shoreline Master Program Update

Ecology Grant No. G1000062
Updated February 2016

Prepared by:
Environmental Science Associates (ESA) in cooperation with Ann Seiter, Coastal Geologic Services, Kramer Consulting, and Clallam County Department of Community Development

Prepared for:
Clallam County

Cover Photo: Dungeness River. A. Seiter

CONTENTS

LIST OF TABLES

LIST OF FIGURES

1.0 Introduction

According to the Vision Statement for the Clallam County Shoreline Master Program (SMP) Update, Clallam County residents "envision a future environment that is at least as beautiful and productive as today--a future with more people, more fish and wildlife, sustainable forests for generations of working families, and accessible, clean shorelines." Achieving this vision will require the ***protection*** of shoreline ecological functions to keep the environment "at least" as healthy and productive as it is now, and ***restoration*** of ecological processes in order to have "more" of what people currently enjoy, use, and value.

The Shoreline Restoration Plan is one of several technical documents prepared as part of the SMP update process. The plan builds on other foundational elements of the SMP update process including:

- A **Consistency Review** of the County's SMP with updated state requirements;
- A visioning process with local and interested citizens and the preparation of a **Vision Statement** expressing the community's goals;
- An **Inventory and Characterization** of shoreline conditions;
- Preparation of **Shoreline Environment Designations** or confirmation that the existing designations are consistent with State law**;**
- A revised **Shoreline Master Program (SMP)**containing a goals, policies, and regulations for shoreline management in Clallam County;
- A **Cumulative Impact Analysis** and **No Net Loss statement** documenting the effectiveness of the SMP update in maintaining or ideally improving ecological conditions over time. [1]

1.1 Purpose and Scope

The purpose of the Shoreline Restoration Plan is to identify where and how shoreline ecological functions need to and can be restored in the future. State guidelines for SMPs (in WAC 173-26) define the required elements for Restoration Plans in order to identify restoration potential, establish goals and priorities for restoration actions, and develop a strategy for implementation (see box). According to the state guidelines, SMPs should, along with other regulatory and non-regulatory programs, foster restoration through a combination of public and private programs and actions.

This Restoration Plan acknowledges and builds on the existing efforts of community organizations and individuals who are already engaged in restoration activities, including federal and tribal governments, state agencies, watershed councils, the marine resources committees, salmon recovery groups, private

[1] The Consistency Review, Vision Statement, Inventory and Characterization Report and updated Shoreline Master Plan (with Shoreline Environment Designations) have been prepared under a grant from the Washington Department of Ecology (Ecology). Environmental Science Associates (ESA) is the lead consultant for the SMP update under the direction of the Clallam County Department of Community Development, with support from Coastal Geologic Services, Kramer Consulting, and Ann Seiter Technical Writing and Editing.

citizens, and educators. These organizations have collected an extensive array of scientific data, ecosystem recovery plans, water quality cleanup plans, educational materials, and citizen involvement programs that will complement the implementation of the SMP in restoring impaired ecological functions.

Many of the restoration opportunities described in this plan could affect private property. It is not Clallam County's intention to require restoration on private property or to commit privately owned land for restoration purposes without the willing cooperation and participation of the affected landowners. Clallam County supports restoration actions on public and private lands, and strongly encourages private landowners to help implement this plan via voluntary measures.

The geographic scope of this Restoration Plan focuses on marine waters, lakes, streams and adjacent associated shorelands (e.g., floodplains, wetlands) located within the County's SMP shoreline jurisdiction. Figure 1-1 shows locations of SMP stream reaches within each Water Resource Inventory Areas (WRIA). The SMP also applies to Lake Sutherland, Lake Pleasant, Dickey Lake, Wentworth Lake, Elk Lake, and Beaver Lake.

Requirements for Shoreline Master Program Restoration Plans

Identify degraded areas, impaired functions and sites with potential for ecological restoration
Establish overall goals and priorities for restoration of degraded areas and impaired ecological functions
Identify existing and ongoing projects and programs which are reasonably assured of being implemented and will contribute to local restoration goals
Identify additional projects and programs to meet restoration goals
Identify timelines and benchmarks for implementing restoration projects and programs and achieving local restoration goals
Provide for mechanisms or strategies to ensure implementation
(WAC 173-26-201(2)(f))

Restoration goals, objectives, and polices described in this restoration plan apply across Clallam County. Although the regulatory jurisdiction of the SMP is confined to a narrow zone along shorelines of the state, the state guidelines require the County to view restoration planning from a more comprehensive watershed perspective. The Restoration Plan incorporates other major plans addressing restoration throughout the County that may directly or indirectly benefit maintaining and restoring shoreline ecological functions. For example, the shorelines of County streams and lakes that drain to the Pacific Ocean are treated in the North Pacific Coast (WRIA 20) Salmon Restoration Strategy (North Pacific Coast Lead Entity, 2015, as amended), which is adopted by reference. Clallam County does not have jurisdiction for the management of shorelines in the cities of Sequim, Port Angeles or Forks, federal lands, or tribal trust/reservation lands; however there may be restoration actions on these lands that benefit the county as whole.

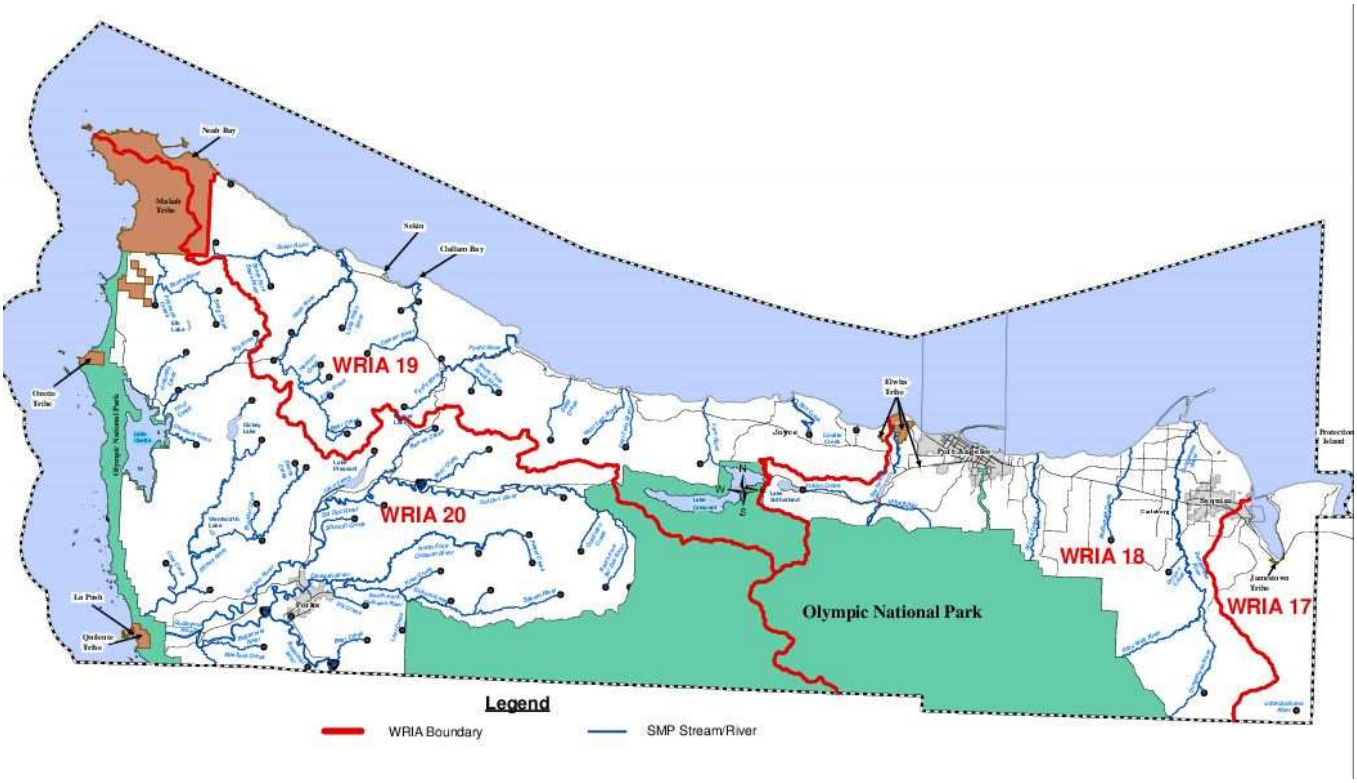


Figure 1-1. Geographic scope of the restoration plan

1.2 Orientation to Document

The Restoration Plan for the Clallam County SMP update complements the County's Shoreline Inventory and Characterization Reports (ESA, March 2012; and ONRC/Clallam County, 2012) that describes a baseline of ecological function along Clallam County shorelines as of 2012. The Restoration Plan is divided into the following major sections:

1. Introduction:
    - Purpose, guidelines, and geographic scope.
    - Definitions and comparison of mitigation, restoration, and no net loss. A substantial point of discussion in the update of the SMP has been the distinction between salmon restoration and restoration actions to meet the "No Net Loss" standard required by SMP guidelines.
2. Restoration opportunities and ecological functions:
    - Regional restoration goals and shoreline restoration objectives.
    - Key organizations, major restoration plans, and a brief synopsis of priority actions for major restoration topics including marine resources, watershed planning, salmon recovery, conservation stewardship/education, and regional coordination.
    - Narrative of key ecosystem functions and restoration goals—marine and freshwater shorelines.

- Matrices of existing and conceptual restoration activities.

3. Strategies for implementing the restoration plan and monitoring the results:
    - Sources of funding and technical assistance for restoration projects
    - Guidelines for voluntary restoration
    - Obstacles and challenges to restoration plan implementation
    - Restoration monitoring, benchmarks, and timelines
4. Appendices include a summary or links to many of the sources of information for restoration planning on the north Olympic Peninsula:
    - Links to major restoration plans.
    - List of restoration organizations.
    - A summary of the Puget Sound Action Agenda Priority Actions and Strategies.
    - Puget Sound Watershed Characterization.
    - North Pacific Coast Lead Entity Salmon Recovery Strategy.

1.3 Definition of Restoration and the Relationship to No Net Loss

The Inventory and Characterization Report for the Clallam County SMP update (2012) indicates that Clallam County shorelines are in relatively good shape compared to other parts of Puget Sound, but describes ecological impairment that has occurred in many locations across the County. For example, several populations of fish and wildlife have declined to critical levels, water quality problems have closed shellfish beds in some locations, and local residents have experienced property damage and threats from erosion and flooding. In order to address existing impairment, restoration goals and actions are designed to achieve an overall improvement in shoreline ecological functions over time. In describing restoration activities, it is important to distinguish between restoration, protection, mitigation, and how these actions relate to the requirements for "no net loss" of ecological function in the SMP guidelines.

> *"Restore," "restoration" or "ecological restoration" means the reestablishment or upgrading of impaired ecological shoreline processes or functions. This may be accomplished through measures including but not limited to re-vegetation, removal of intrusive shoreline structures and removal or treatment of toxic materials. Restoration does not imply a requirement for returning the shoreline area to aboriginal or pre-European settlement conditions* (WAC 173-26-020 (31))

Restoration activities are intended to generate an *increase* in the size, amount, and/or functions of an ecosystem when compared to a baseline condition. Scientists in the field of restoration ecology indicate that long-term restoration strategies are needed to improve underlying ecological functions and causes of impairment rather than constructing temporary fixes at degraded sites.

In contrast to restoration, which refers to an *increase* in ecosystem function, the term **"protection"** as used in SMPs refers to the continuation of an existing level of ecosystem condition and function. Environmental regulations and programs frequently use the term protection to refer to the continuation

of relatively pristine environments in an unaltered state. In the context of the SMP, the concept of protection also means that new development may proceed as long as it does not result in adverse impacts on ecological conditions and functions compared to pre-development conditions, whether or not these conditions were pristine or altered. Protection strategies, such as regulations and best management practices, are intended to prevent new or additional impairment to existing ecological functions.

Table 1-1 identifies and differentiates some typical shoreline protection and restoration actions. Protection measures are addressed in the SMP (and may also be required by other local, state and/or federal regulations).

Table 1-1. **Examples of Typical Protection and Restoration Actions**

Examples of Protection Actions	Examples of Restoration Actions
• Treating stormwater runoff using best management or low impact development practices • Maintaining existing wetlands • Minimizing new development on feeder bluffs or other sensitive or dangerous areas • Maintaining/repairing on-site septic systems • Observing buffer and setback requirements • Protecting/preserving existing trees/vegetation • Protecting water quality by limiting pesticide/fertilizer use • Regulating groundwater withdrawals • Limiting construction of new docks, bulkheads, and staircases • Clustering residential development • Preserving property through easement or acquisition	• Removing dikes and setting levees back • Replacing bulkheads with soft shore stabilization (bio-stabilization) • Replanting/enhancing riparian/nearshore vegetation • Planting/transplanting eelgrass, kelps, and other aquatic macrophytes • Replacing or enlarging blocked or undersized culverts • Removing fill from wetlands, intertidal habitats and floodplains • Removing invasive species • Reconnecting intertidal wetlands • Replacing existing dock/pier decking with open grating material to allow light penetration • Replacing treated wood docks/piers with concrete, steel and other materials • Retrofitting existing impervious surfaces to include stormwater treatment and flow control • Removing derelict vessels, fishing gear, creosote pilings and other in-water apparatus • Decommissioning underused forest roads • Adding large woody debris or engineered log jams to streams • Replacing pavement with pervious pavement (such as parking lots and boat launches) • Relocating public infrastructure outside of floodplains and other sensitive habitats

SMPs are required to provide a combined level of protection and restoration that ensures at least **no net loss** of ecological functions. The SMP sets forth multiple requirements for new development that require impacts to be avoided, minimized or otherwise mitigated to achieve no net loss at the scale of individual projects. In addition, the SMP establishes a policy that the County will track no net loss at the scale of

the entire County using a set of specific indicators that tie to the baseline conditions described in the 2012 Inventory and Characterization Report

At the individual project level, no net loss is achieved largely through mitigation sequencing. Mitigation sequencing requires project proponents to design proposed development to avoid and minimize impacts to ecological functions, and undertake restoration or other compensatory actions for those impacts that cannot be avoided. Mitigation requirements in the Clallam County SMP apply to new development. Grandfathered uses are not required to mitigate for past impacts until or unless new development is proposed. Even then, the mitigation does not have to restore ecological conditions above the baseline conditions at the time of development. The baseline conditions are those that are described in the Inventory and Characterization Report *and* in any site-specific studies or analyses required to support the development proposal.

No net loss has been the subject of numerous discussions at meetings of the Clallam County SMP Advisory Committee and public forums, particularly with respect to the relationship of no net loss and salmon recovery. A key issue is the relationship between state no net loss guidelines to do no additional harm, and requirements under the Federal Endangered Species Act and other laws to restore salmon populations to self-sustaining and harvestable levels. The Federal Clean Water Act and State Water Pollution Control Act also require cleanup of impaired water bodies to meet water quality standards. In other words, the "no net loss" standard in SMP guidelines stipulates that the "bar" of ecological function cannot slip beyond current conditions, while salmon recovery and water quality rules mandate that currently impaired conditions must improve such that there is a *net gain* overall.

Clallam County has taken an ecosystem approach to salmon recovery, and as a result there may be a high degree of overlap between salmon restoration activities and restoration activities that are directed more generally toward the improvement of shoreline ecological functions. Some believe that because salmon recovery represents a higher bar than the SMP no net loss standard, a net gain of shoreline functions and salmon habitat will not be attainable without actions that go above and beyond the restoration actions to meet the requirements of the SMP. As such there is concern about how to account for gains in ecological function or condition. This is challenging because it is difficult to segregate out or differentiate salmon recovery projects from non-salmon recovery project when both are designed to benefit and enhance aquatic habitats.

As illustrated in Figure 1-2, a combination of mitigation, and restoration activities will be needed to maintain ecological functions at the existing "no net loss" level documented in the 2012 Inventory and Characterization Report. Salmon recovery represents a higher bar of ecosystem function than what is required under the SMP guidelines for no net loss, and additional restoration activities will be needed to achieve salmon recovery goals.

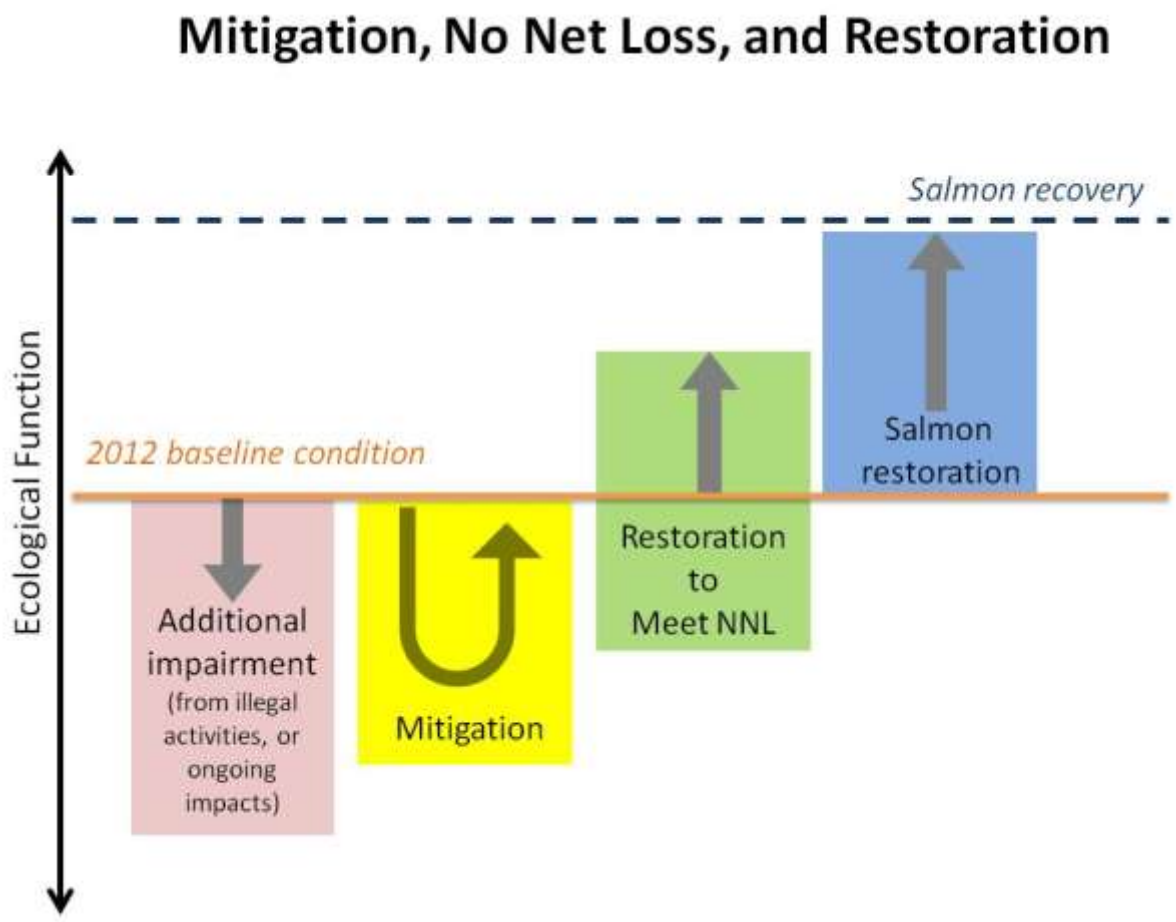


Figure 1-2. Relationship of Mitigation and Restoration to the "No Net Loss" Baseline of Ecological Functions

At the county-wide level, no net loss of ecological function may be achieved through a combination of protection, mitigation, and restoration. Protection occurs through the application of regulations and policies in the County SMP to avoid additional impairment. Mitigation planning occurs during the permit approval process and monitoring of new development activities. Protection and mitigation may not be enough to achieve no net loss without additional restoration. Cumulative impacts from permit-exempt activities, illegal activities, and ongoing impairment associated with previous projects/development will reduce the level of ecological function unless additional restoration is undertaken. Table 1-2 describes the continuum of mitigation, no net loss, and restoration actions in more detail.

Table 1-2. Comparison of Mitigation, No Net Loss, and Restoration

	Mitigation	Restoration to achieve No Net Loss under the SMP	Restoration
Scale	Project/site level (triggered by development activity)	County-wide level (voluntary; not necessarily triggered by development)	Site specific actions are linked to watersheds, marine drift cells, Puget Sound ecosystem recovery, and salmon recovery domains
Scope	Addresses new, permitted development	Addresses: • cumulative impacts of new development with mitigation • ongoing impairment which may continue to drive down ecological function • new illegal impairment	Addresses previous and ongoing impairment
Baseline	Uses existing conditions as a baseline to establish mitigation	Uses existing conditions as a baseline, based on Inventory & Characterization Report, site-specific analyses and indicators	Goal is the achievement of recovery goals and water quality standards as an improved baseline
Comparison to baseline over time	Compensates for unavoidable adverse impacts resulting from new activities. Actions specified in permits. Supports no net loss.	As good/better than existing ecological conditions, measured using indicators of shoreline structure and ecological function. Supports restoration.	Better than existing conditions and functions
Policies and Guidance	SMP Policies • Follow process: avoid-minimize-compensate • Geographic proximity to impacts (same watershed, drift cell, reach if possible) • Same ecological function (channel meander, habitat loss, water quality) • Compatible with other conservation plans and activities	SMP Policies for No Net Loss • Protection: prevent additional impairment • Compensate for cumulative or ongoing impairment • SMP restoration plan—improve shoreline ecological functions	Guidance from: • Salmon recovery plans • Marine Resources Comm. Strategy • Ecosystem Recovery Network strategy (link to Puget Sound Action Agenda) • Clean Water Act (TMDL) plans

2.0 Overview of Restoration Goals and Activities in Clallam County

Restoration efforts in Clallam County reflect decades of scientific study, community involvement, and partnerships between Clallam County, tribes of the north Olympic Peninsula, state and federal agencies, other public and private partner organizations, and landowners. Each watershed council, salmon recovery group, marine resources committee, or conservation entity has developed specific goals and restoration plans for their focus location or species of interest. Ongoing programs provide County residents and visitors with information and assistance to promote stewardship in the use of Clallam County shorelines. Clallam County plays a central role in coordinating restoration efforts in the north Olympic Peninsula, and integrating restoration with shoreline management and land use.

2.1 General Restoration Goals

Restoration goals have been established by the many watershed councils and citizen groups working in Clallam County with local agencies and tribes. Project priorities and sequencing have been developed over the last two decades for salmon recovery, flood hazard mitigation, water quality cleanup, marine species protection, and other purposes. A review of the goals from many of the organizational charters and restoration plans indicates that there are five umbrella goals that broadly apply to the Clallam County SMP:

1. Protect and restore ecosystem health.

   Goals for ecosystem health include salmon recovery and other species recovery efforts, and the protection and restoration of fish and wildlife habitats. Ecosystem health is affected by the physical functions and processes that support the ongoing formation of beaches, estuaries, and floodplains, and other physical shoreline conditions. Goals for ecosystem health also include the maintenance of clean water in marine and freshwater environments.

2. Maintain and improve ecosystem functions that provide for economic prosperity and human health.

   Many local organizations such as watershed councils and the advisory committee for the Clallam County SMP update have expressed goals to coordinate ecosystem restoration and protection efforts with the people who are economically impacted by ecosystem health. These people include fishermen, shellfish growers, forest workers, tourism operators, and business owners. Flood hazard mitigation plans call for actions that will prevent loss of life and property from the risk of flooding. Goals for human health also encompass a clean and adequate water supply for current and future human needs.

3. Promote the collection and use of scientific information.

Goals for incorporating science into ecosystem management and restoration include the collection of high quality data and promoting its use and dissemination. Information sharing for technical studies and projects in local watersheds are also included in this goal to promote effectiveness and adaptive management.

4. Increase public awareness, education, and involvement.

   Many local organizations and academic institutions promote education and outreach to improve stewardship and understanding and help to prevent/resolve conflict. Some organizations are set up specifically to assist landowners with the implementation of conservation practices.

5. Encourage cooperation and coordination for implementation.

   The goal of working together to promote efficiency and effectiveness is expressed by most of the organizations working on regional restoration efforts. The Strait of Juan de Fuca Ecosystem Recovery Network and Washington Coast Sustainable Salmon Partnership are specifically devoted to improving communication and collaboration between governments, watershed councils, and the many restoration groups on the north Olympic Peninsula. Thousands of community hours have gone into the completion of an array of restoration plans for the marine environment and local watersheds, and there is a strong community interest in seeing that the plans are implemented.

2.2 Shoreline Restoration Objectives

Based on the general goals and the analysis of information compiled during the SMP update, several objectives for restoration are recommended for the implementation of the SMP. They are as follows:

Ecosystem Health

- Implement regional plans for salmon recovery, water quality cleanup, marine resource protection, flood hazard reduction, and watershed management. If possible, integrate regional restoration plans into the implementation of the SMP. Consider restoration plans that have been approved by the County or are mandated by state and federal regulations in the implementation of the SMP.
- Restore water quality in rivers and lakes through the implementation of Total Maximum Daily Load (TMDL) plans, point-source pollutant control, improved stormwater management, and use of best management practices.
- Continue to implement projects to reduce sedimentation through replacement of stream structure (large woody debris placement, revegetation, etc).
- Continue restoration of river deltas, salt marshes, and pocket estuary habitats along the Strait of Juan de Fuca to improve fish and wildlife habitat, upgrade water quality, and reduce flood hazards.

- Manage stormwater runoff to protect stream flow and salmonid habitat. Restoration techniques include retrofits, low impact development measures, improvements to stormwater facilities, and other means.
- Protect floodplains and channel migration zones from modification that would impair hydrologic functions or habitat.
- Restore floodplain functions that have been degraded or damaged, where feasible, to improve hydrologic functions or habitat.
- Evaluate proposals for flood protection measures for downstream or downshore impacts to shoreline residents, sediment transport processes, and fish and wildlife habitat.
- Restore wetlands in the shoreline jurisdiction to improve hydrologic conditions and enhance habitat.
- Restore and revegetate lake, river and stream riparian zones to improve habitat conditions for fish and wildlife and eliminate non-native invasive plants.

Human Health and Prosperity

- Work with property owners, North Olympic Land Trust, and other organizations to identify high priorities for conservation easements or purchase. Implement easements and acquisitions from willing sellers/grantors to reduce potential hazard to landowners or disruption of ecological function.
- Identify funding opportunities to set back residential structures that are identified as existing non-conforming uses in the SMP, or are located in hazard areas identified in the SMP or County-approved flood hazard reduction plans

Restoration-Related Scientific Information

- Supplement the Shoreline Inventory and Characterization on an ongoing basis as new data is made available. Integrate information on forage fish spawning, bluff recession, critical habitat, drift cells, water quality, dam removal, and other ongoing data collection efforts.
- Review findings of monitoring programs including the Intensively Monitored Watersheds[2], status and trends monitoring permit requirements, or other monitoring efforts to determine status of shoreline ecological function at site specific, drift cell, or watershed scales.
- Review status of No Net Loss indicators bi-annually to evaluate the status of ecological functions on a County-wide basis.
- Complete and /or update maps of floodplains and channel migration zones.

[2] The Intensively Monitored Watersheds (IMWs) program is a Salmon Recovery Funding Board-funded project to conduct in-depth studies of a few select watersheds in order to evaluate the response of fish populations to management actions that affect habitat quality and quantity. In Clallam County, the West Twin Creek, East Twin Creek, and Deep Creek watersheds are currently being studied under the IMW program.

Public Awareness and Involvement

- Implement stewardship education programs for Clallam County shoreline landowners on a periodic or targeted basis. (Examples include: a neighborhood shoreline stewardship program every three to five years in freshwater and marine shorelines with higher density development).
- Seek funding for targeted neighborhood shoreline design programs in areas subject to potential hazard from floods, tsunamis or erosion. (Examples would include a shoreline protection design using soft armoring or other techniques on a neighborhood, rather than parcel by parcel, basis.)

Coordinate Implementation

- Identify additional shoreline restoration opportunities and work with local recovery networks and organizations to integrate new projects into strategic work plans.

2.3 SMP Restoration Policies

The SMP identifies policies and regulations for shoreline restoration as required by the shoreline guidelines. Restoration is an allowed use in all shoreline environment designations. The regulations governing restoration activities are intended to promote and facilitate implementation, monitoring, and tracking of restoration actions in accordance with the following specific policies:

1. Restoration should be used to complement and not take the place of the shoreline protection strategies required by [the SMP] to achieve the greatest overall ecological benefit.

2. Clallam County should support voluntary and cooperative restoration efforts between local, state, and federal public agencies, Tribes, non-profit organization, and landowners to improve shorelines with impaired ecological functions and/or processes.

3. Restoration actions should improve shoreline ecological functions and processes as well as shoreline features.

4. Restoration actions should promote sustainability of sensitive and/or regionally important plant, fish, and/or wildlife species and their habitats.

5. Restoration should be integrated with and should support other natural resource management efforts in Clallam County and in the greater Puget Sound region.

6. The County should minimize policy and regulatory barriers to ecological restoration and where feasible provide incentives to encourage voluntary restoration projects.

2.4 Major Restoration Plans and Local Organizations

Clallam County has an integrated set of organizations that are actively involved in restoration, planning, and educational efforts. The scope of major restoration plans and organizational missions goes beyond

the restoration requirements of the SMP, but many restoration and stewardship activities identified in the restoration plans occur in shoreline environments.

The following information on key local organizations, major restoration plans, and priority restoration actions in Clallam County is included for information and coordination purposes. The information is organized by subject and does not represent a complete list of plans and organizations working in the region. Links to major restoration plans in Clallam County are found in Appendix A. A list of each organization, their mission, and general membership is located in Appendix B.

2.4.1 Marine Resource Protection and Enhancement

Key local organizations: Two Marine Resources Committees help to steward the protection and restoration of marine waters and nearshore habitats and species. The Marine Resources Committees work in partnership with federal, tribal, and state governments on marine resource issues, particularly the Washington Department of Fish and Wildlife, Ecology, NOAA, and the US Army Corps of Engineers.

The Clallam County Marine Resources Committee (MRC) is an advisory committee to the Clallam County Board of Commissioners as part of the Federal Northwest Straits Initiative. The MRC combines data-driven science with grassroots involvement by citizen groups in an effort to address the depletion of marine resources in the Straits of Juan de Fuca..

Major plans: The Clallam County MRC five-year Marine Resources Strategic Plan was adopted in 2014. The plan sets out priorities for ecosystem health, scientific research, public education, and coordination with citizens and agencies.

> Clallam County MRC Marine Resources Strategic Plan:
> http://www.clallamcountymrc.org/media/1219/2014-18-cmrc-strategic-plan.pdf

Priority actions include: Protection, enhancement, and restoration of estuarine and marine resources; collection of scientific data to reduce uncertainty and support decision-making; and promotion of public awareness, education, and outreach. Focus areas are: marine resource protection, enhancement, and restoration; marine debris removal and recycling coordination; oil spill contingency planning; and protection of water and sediment quality.

The North Pacific Coast Marine Resources Committee (NPC MRC) was formed by Clallam County and Jefferson County officials in September 2009 after the completion of a thorough exploratory process. The NPC MRC allows the two counties to share the West End MRC staff resources and funding. The NPC MRC promotes community involvement in Pacific Coast issues in western Clallam and Jefferson Counties.

Mission: *The North Pacific Coast Marine Resources Committee will actively promote ecosystem resilience through understanding, conserving, and restoring our marine resources. This will be accomplished through research, education, community engagement and advocacy for our shared marine environment and the sustainability of its coastal communities.*

Priority actions include: continued NPC MRC representation and participation in the Washington Coastal Marine Advisory Council, continuing educational partnerships to support the Essential Ocean Literacy Principles and Essential Principles of Climate Change, survey the accumulation of micro debris on North Pacific Coast, assist in field trips with Forks High School to survey marine debris, provide funding for restoration projects, continue to support annual cleanups of North Coast beaches, produce an issue of the West End Natural Resources News and host the annual RainFest in Forks, WA

North Pacific Coast Marine Resources Committee:
http://wdfw.wa.gov/about/volunteer/mrc/county_northpacific.html

2.4.2 Watershed Management

Key local organizations: Ongoing watershed councils track multiple issues in their geographic focus area, including salmon recovery, flood hazard reduction, water conservation, and water quality. Watershed councils also serve as a forum for multi-agency and governmental coordination with citizens and scientists. Examples are the Dungeness River Management Team, Elwha-Morse Management Team, WRIA 20 Implementation Body, and citizen advisory groups for the Lyre-Hoko, Clallam Bay-Sekiu, and Crescent Bay regions.

Major plans:

Water Resource Inventory Area (WRIA) Plans: The 1998 Watershed Planning Act (RCW 90.82) required watersheds throughout Washington State to initiate the preparation of local watershed management plans in tandem with salmon recovery. Although the focus was on water quantity, Clallam County and other initiating governments chose to incorporate optional elements into the planning effort related to instream flows, habitat, and water quality. The WRIA boundaries in Clallam County are shown on Figure 1-1. The plan for the Elwha-Dungeness watershed area (WRIA 18) and the Sequim Bay portion of WRIA 17 was adopted in 2005. The plan for Soleduck-Hoh watershed area (WRIA 20) was adopted in 2008 followed by adoption of a WRIA 20 Detailed Implementation Plan in 2010. A draft plan for the Lyre-Hoko watershed area (WRIA 19) was prepared (last Draft in 2009), but has not been approved by the initiating governments.

Elwha-Dungeness (WRIA 18) Watershed Management Plan:
http://www.clallam.net/Environment/elwhadungenesswria.html
http://www.ecy.wa.gov/programs/eap/wrias/Planning/18.html

Lyre-Hoko (WRIA 19) Draft Watershed Management Plan documents:
http://www.ecy.wa.gov/programs/eap/wrias/Planning/19.html

Soleduck-Hoh (WRIA 20) Watershed Management Plan:
http://www.ecy.wa.gov/programs/eap/wrias/Planning/20.html

Dungeness Bay TMDL: Shellfish closures in Dungeness Bay in the late 1990s led to a TMDL (Total Maximum Daily Load) Analysis by the WA Department of Ecology to assess the sources and volumes of bacterial contamination. A shellfish protection district was formed by Clallam County, and implementation of a water quality cleanup plan is overseen by a Clean Water Work Group formed by Clallam County and the Jamestown S'Klallam Tribe.

> Water Quality Cleanup Plan for Bacteria in Dungeness Bay
> http://www.ecy.wa.gov/programs/wq/tmdl/dungeness/index.html

Priority actions in the watershed plans include water conservation, upgrades to irrigation and water supply infrastructure, septic system remediation, animal waste management, habitat protection and restoration, and flood hazard reduction.

2.4.3 Salmon Recovery

Key local organizations: Salmon recovery is a joint function of state and tribal co-managers, federal agencies, and local governments and citizens. Restoration planning and project review of salmon recovery projects in the rivers, streams, and nearshore areas of the Strait of Juan de Fuca is largely coordinated by the North Olympic Lead Entity and for the North Pacific Coast by the North Pacific Coast Lead Entity. Along the eastern Strait of Juan de Fuca, the Hood Canal Coordinating Council is also involved in the restoration of summer chum. The Pacific Coast of Clallam County is coordinated by the North Pacific Coast Lead Entity.

The North Olympic Lead Entity and the North Pacific Coast Lead Entity have developed regional strategies for the Strait of Juan de Fuca and North Pacific Coast salmon populations. The Lead Entities oversee the review and ranking process to determine priorities for funding applications for restoration projects. Local organizations, citizens, and governmental entities involved in the implementation of salmon recovery projects on the ground include the Clallam Conservation District, North Olympic and Pacific Salmon Coalitions, Jamestown S'Klallam Tribe, Lower Elwha Klallam Tribe, Makah Tribe, Quileute Tribe, Washington Department of Natural Resources, Dungeness Agricultural Water Users Association, US Forest Service, and Clallam County.

Major salmon recovery plans: Several populations of salmon within Clallam County are part of the planning areas and species that have been listed as threatened under the Federal Endangered Species Act: Puget Sound Chinook, Hood Canal/Eastern Strait of Juan de Fuca Summer Chum, Coastal/Puget Sound Bull Trout, Puget Sound Steelhead, and Lake Ozette Sockeye. Other Clallam County salmon populations have declined to critical levels as identified by state and tribal fisheries co-managers. Recovery plans for listed species are required under the Endangered Species Act on a regional level; chapters devoted to Clallam County salmon populations are a subset of the regional plans. Recovery plans for Puget Sound Chinook and Hood Canal/ Strait of Juan de Fuca summer chum have been approved by NOAA/ National Marine Fisheries Service. Plan documents are available on the NOAA salmon recovery website. Areas outside of most Endangered Species Act listings, such as the western Strait of Juan de Fuca (WRIA 19) and portions of the North Pacific Coast, have developed recovery plans that can be accessed through the Habitat Work Schedule web site (see below).

Priority actions:

A data base of conceptual, proposed, and completed restoration projects is maintained by the North Olympic and North Pacific Coast Lead Entities and linked to the state-wide Habitat Work Schedule. Currently (2015) a total of 283 projects are included for the North Olympic Region on the Habitat Work Schedule in the rivers, nearshore, and marine areas of Clallam County on the Strait of Juan de Fuca (Figure 2-1).

> North Olympic Lead Entity and Pacific Coast Lead Entity project lists and work plans: http://hws.ekosystem.us/

Individual salmon restoration projects are ranked annually for project funding by local watershed organizations and technical advisory groups, through a process coordinated by the Lead Entities. Funding, land availability, landowner initiative, technical staff availability, and other opportunities often influence the timing of project implementation. Clallam County plays a central role in ensuring that restoration activities are coordinated among agencies and organizations, and are consistent with salmon recovery, watershed management, and land use plans.

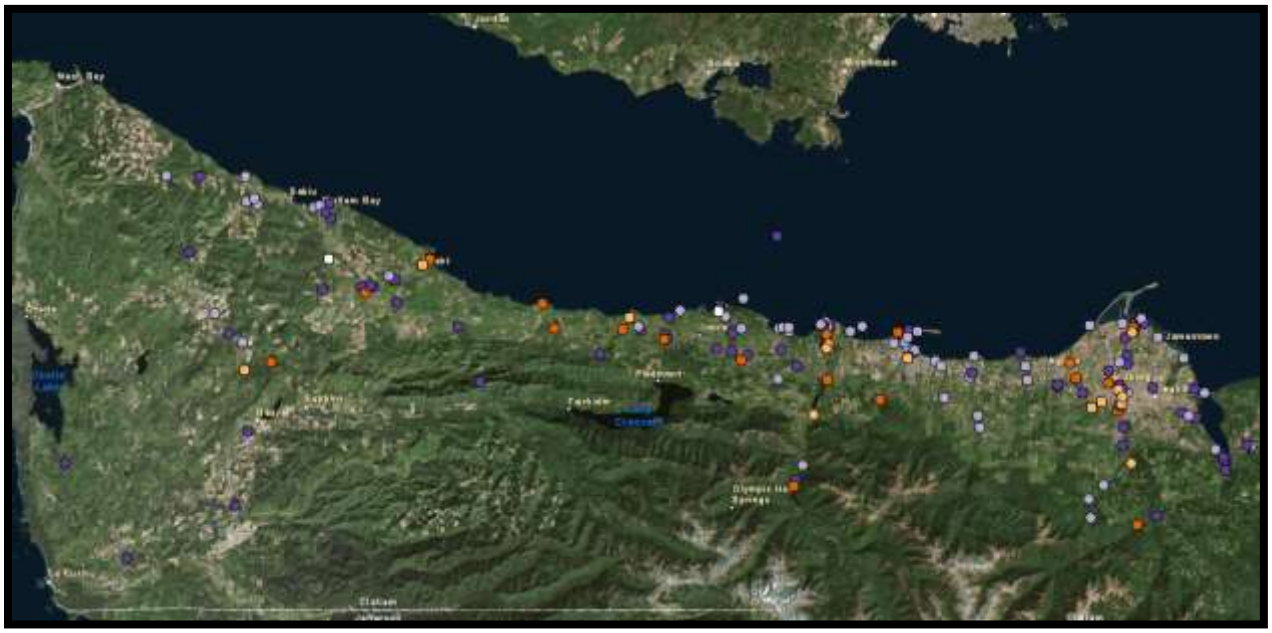


Figure 2-1. Projects listed on the Habitat Work Schedule for the North Olympic Peninsula (violet = conceptual; orange = proposed; red = active; purple = completed).

2.4.4 Elwha River Ecosystem Restoration

Funding, responsibilities, and direction for the removal of the two dams on the Elwha River were established in the 1992 Elwha River Ecosystem and Fisheries Restoration Act (Public Law 102-495), which was signed by President George H.W. Bush. Documents describing the restoration activities for the river system and nearshore environment are summarized in a series of documents related to fisheries resources, re-vegetation, wildlife impacts, and other aspects of the recovery effort.

Elwha River Restoration Documents:
http://www.nps.gov/olym/learn/nature/elwha-restoration-docs.htm

2.4.5 Dungeness River Restoration

Restoration of the Dungeness River has been a priority for the County, tribes, and other organizations. Recent projects include the Lower Dungeness river floodplain restoration and levee realignment, River's End estuary restoration and levee setback, irrigation efficiencies and instream flow restoration, and development of a new water management rule and "water bank" with Ecology. The rule and water bank will make mitigation credits (water rights or portions of water rights) available to rural landowners and developers to drill wells, while also protecting instream flows.

2.4.6 Lake Ozette Sockeye Restoration

The Lake Ozette Sockeye Salmon Recovery Plan was adopted in 2009, and since then the Lake Ozette Sockeye Steering Committee has guided and supported recovery efforts on Lake Ozette. Steering Committee membership includes tribes, local, state, and federal government, landowners, industry representatives, and private citizens. Current projects include habitat restoration, improving hatchery practices, monitoring water quality, and invasive species and studying limiting factors and predation. A Predation Workshop is scheduled for spring of 2016.

Lake Ozette Sockeye Recovery Plan Summary:
http://www.westcoast.fisheries.noaa.gov/publications/recovery_planning/salmon_steelhead/domains/puget_sound/lake_ozette/lakeozetterecoveryplansummary.pdf

2.4.7 Land Conservation, Stewardship, and Education

Agencies, educational and scientific institutions, and non-profit organizations throughout the north Olympic Peninsula offer educational programs and technical assistance for local residents and visitors. Clallam Conservation District offers programs providing on-site assistance to farmers and small landowners for animal management, water conservation, vegetation management, invasive species management, and habitat improvement.

Clallam Conservation District: http://www.clallamcd.org/programs/

Other land conservation, salmon recovery, and educational programs are offered by multiple entities under individual work plans, including WSU/Clallam County Extension, Feiro Marine Life Center, Olympic Park Institute, Dungeness River Audubon Center, Olympic Natural Resources Center, North Olympic Salmon Coalition, Pacific Coast Salmon Coalition, Peninsula College/WWU, and county, state, federal, and tribal governments. Clallam County coordinates volunteer stewardship and citizen science programs like the Streamkeepers program. Information for small forest landowners is offered by WSU Cooperative Extension and Washington Department of Natural Resources. Land conservation and acquisition programs are managed by the North Olympic Land Trust, Friends of the Fields, and other local groups.

North Olympic Land Trust: https://northolympiclandtrust.org/

Invasive species management programs are implemented by tribes, state and federal agencies, and other local entities including the Clallam Conservation District, Clallam Marine Resources Committee, North Pacific Coast Resources Committee, irrigation districts, and the Clallam County Noxious Weed Control Board.

Stewardship information for recreational users is offered by the Chambers of Commerce, WA State Parks, Port of Port Angeles, US Forest Service, US Fish and Wildlife Service, National Park Service, Peninsula Trails Coalition, recreational user groups, and tourist oriented businesses.

Others involved in local stewardship projects and programs include businesses, volunteer groups, farmers, shellfish growers, forest managers, neighborhood groups, environmental organizations, and recreational users of the shoreline environment.

2.4.8 Emergency Management and Hazard Reduction

Clallam County has prepared a hazard mitigation plan in cooperation with several local governments and emergency response agencies, addressing seismic, landslide, utility loss, and flood hazards. In addition, a comprehensive flood hazard reduction plan has been developed for the Dungeness River. Hazard Mitigation Plan for Clallam County, 2010: http://www.clallam.net/EmergencyManagement/documents/ClallamHazardMitigationFINAL10252010.pdf

Dungeness River Comprehensive Flood Hazard Reduction Plan, 2009: (large file) http://www.clallam.net/environment/assets/applets/DRCFHMP-FINAL-LOWRES_5-2010.pdf

2.4.9 Puget Sound Action Agenda and Strait of Juan de Fuca Ecosystem Recovery Network Strategic Plan

The Puget Sound Partnership prepared an "Action Agenda" for the entire Puget Sound ecosystem in 2012, with strategies to integrate protection, restoration, and prevention of pollutants in a regional effort. The Action Agenda profile for the Strait of Juan de Fuca region outlines key ecosystem benefits in the Strait region, potential major impacts, and priority action area strategies. Coordination of the implementation of local efforts with regional objectives is accomplished through the Ecosystem

Recovery Network (ERN) organization for the Strait of Juan de Fuca, the local integrating organization for the Puget Sound Partnership. The ERN is currently drafting a work plan which will include their 2-year Implementation Plan and the proposed 2016-2017 Near Term Actions (NTAs).

The Plan may found at: http://www.psp.wa.gov/2016_AA_LIO_planning.php

2.4.10 Washington Coast Sustainable Salmon Partnership Salmon Action Plan

The Washington Coast Sustainable Salmon Partnership has developed a regional salmon action plan, which outlines goals and priority actions for, **"***healthy, diverse and self-sustaining populations of salmonids, maintained by health habitats and ecosystems, which also support the ecological, cultural, social, and economic needs of human communities."*

The plan may be found at: http://www.wcssp.org/SustainableSalmonPlan.html

3.0 Restoration Opportunities and Ecological Functions

3.1 Strait of Juan de Fuca

The Strait of Juan de Fuca watersheds in Clallam County include all or portions of WRIAs 17, 18 and 19 (Figure 1-1). Within a short 100-mile stretch from Cape Flattery to Diamond Point, the physical environment of Clallam County is characterized by vast differences in geology, precipitation, extent of development, and ecological function. Precipitation varies from 100 inches per year in Neah Bay to approximately 16 inches per year in the Sequim area. Major river systems including the Dungeness, Elwha, and Lyre are fed by snowpack from the Olympic Mountains, while many other streams rely on input from rainfall, groundwater storage, and even fog drip. As described in detail in the Inventory and Characterization Report, marine shorelines in the eastern Strait are largely composed of glacial deposits, while the western Strait is predominately bedrock with pockets of erosion-prone material. In the marine environment, the Strait of Juan de Fuca is the corridor for migration for fish, marine mammals, and birds, and has been a major transportation route for people for centuries. These varying ecological and social functions require a tailored approach to ecosystem restoration, to account for the differences in underlying conditions and the pattern of growth and resource use anticipated in the future. The following sections describe the shoreline restoration issues and opportunities for the eastern(Section 3.3), central (Section 3.4), western Strait of Juan de Fuca (Section 3.5), and North Pacific Coast (Section 3.6) planning areas of Clallam County (Figure 3-1).

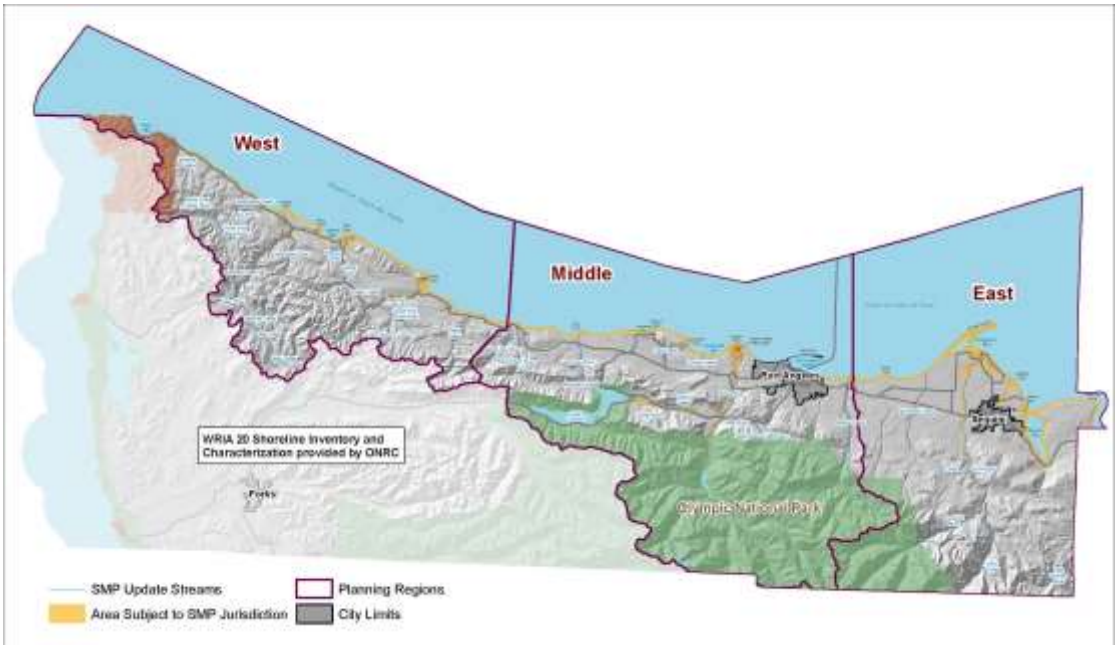


Figure 3-1 East, Middle (Central) and West Strait of Juan de Fuca planning regions in Clallam County

General restoration objectives for marine and freshwater shorelines within the three planning regions are described below, along with matrices of site-specific restoration opportunities. The matrices are organized by reach for marine shorelines, and by stream/waterbody for the freshwater shorelines. The SMP Update proposed Shoreline Environment Designations present within each reach/stream/waterbody are noted as well as areas of degradation and impaired ecological functions, as identified in the Shoreline Inventory and Characterization Report. A separate column describes areas with significant development potential.

The matrices list recently-completed restoration projects within shoreline jurisdiction, and a column listing identified site-specific restoration opportunities within the reach/stream/waterbody is shown, and sorted into three categories:

- **In-progress** projects have been planned and funded and have proponent organization(s); actual construction of the project may be underway.
- **Proposed** projects have undergone preliminary planning and have proponent organization(s), but may not yet be fully funded. Construction of the project has not begun.
- **Potential** projects have been identified by the SMP consultant team, but have not yet undergone any additional planning and have no project proponent.

Salmon restoration projects listed on the Habitat Work Schedule are also identified. The tables represent a selection of the restoration opportunities that are available. It is important to note that additional restoration activities are underway through the Tribes, Road Maintenance and Abandonment Plans, and other efforts.

The ecosystem process and functions that are expected to improve are listed for each identified restoration opportunity. The identified shoreline processes and functions include:

- Habitat (fish and/or wildlife)
- Large woody debris
- Water quality
- Floodplain processes
- Channel migration
- Sediment supply and transport
- Tidal hydrology—*marine projects only*
- Beach erosion and accretion—*marine projects only*

3.2 Cumulative Impacts Analysis

A Cumulative Impacts Analysis (CIA) No Net Loss (NNL) report has been prepared, based upon the proposed policies and regulations in the SMP Update. The purpose of the CIA is to evaluate the cumulative impacts of reasonably foreseeable future development to verify that proposed policies and regulations for shoreline management are adequate to ensure no net loss of shoreline functions. The CIA includes an assessment of development risks along Clallam County shorelines, based upon existing land use patterns and Comprehensive Plan/Zoning designations. In areas with high risk of new moderate- to high-intensity development, it may not be feasible to effectively mitigate all functions on-site , or on-site mitigation alone may be insufficient to replicate the current level of shoreline functioning, in which case off-site restoration may be necessary to achieve the no net loss requirement. The identified areas with significant development potential are identified in the matrices below.

3.3 Eastern Clallam County Shorelines

The shorelines of eastern Clallam County are the most developed in the unincorporated areas of the County. Ecological functions, extent of impairment, and management issues identified in the Inventory and Characterization Report are summarized below.

3.3.1 Marine shorelines

Marine shorelines of eastern Clallam County are characterized by active feeder bluffs and numerous beaches and sand spits that depend on shoreline sediment transport processes. Shoreline owners in highly erosive bluff areas (e.g. Monterra) and low bank beaches (such as Diamond Point and 3 Crabs Road) are at substantial risk from bluff failures, storm action, and tsunamis. Sensitive habitats in the eastern Strait region include lagoons, bays, and intertidal salt marsh areas at the mouths of rivers and streams, eelgrass beds, shellfish beds, forage fish spawning beaches, and feeding and rearing areas for numerous species of fish and birds. Impairment to these functions has occurred from removal of forest cover, construction of roads and structures above erosive bluff areas, overwater structures, and bulkheads and other bank protection structures. Fecal coliform contamination in Dungeness Bay has caused the downgrade of health certification for shellfish beds. The lower Dungeness and Morse Creek river deltas and estuaries have been substantially modified by dikes and levees.

3.3.2 Freshwater shorelines

Freshwater shorelines within SMP jurisdiction in eastern Clallam County include the Dungeness River, and McDonald and Morse Creeks. Numerous smaller independent streams and associated estuaries occur along marine shorelines. Removal of forest cover, construction of levees and other structures encroachments in to the floodplain and channel migration zone, and sedimentation have impaired ecological functions, notably salmon habitat, in eastern Clallam County rivers. Water withdrawals for irrigation and the outtake structures have also impaired ecological function. Homes in the riparian zone are at substantial risk of flooding and channel movement in several locations. Future development of existing parcels in some locations may put landowners and ecological functions at risk from flooding, erosion, or structural impairment if development occurs.

3.3.3 Shoreline objectives for eastern Clallam County

In addition to the Shoreline Restoration Objectives for Clallam County described in Section 2.1, the following general restoration objectives apply to the eastern region of Clallam County:

- Restore tidal processes and estuarine wetland habitats by removing tidal barriers and other stressors in locations such as Washington Harbor, Dungeness River delta, Morse Creek delta, and small "pocket" estuaries along Sequim Bay, Discovery Bay, and the Strait of Juan de Fuca.

- Restore channel migration and floodplain connectivity along freshwater systems. Remediate existing constrictions on channel migration and floodplains including those identified in the Dungeness River Flood Hazard Management Plan.

- Remediate marine shoreline armoring, shoreline structures, and overwater structures affecting nearshore habitat and feeder bluffs where feasible.

- Restore water quality and shellfish certification in Dungeness Bay through the implementation of the TMDL/Water Quality Cleanup Plan.

- Monitor large scale restoration efforts such as Jimmycomelately Creek to evaluate progress towards salmon recovery goals.

- Continue implementation of the Dungeness Watershed Land Protection Strategy to purchase easements and property from willing sellers to protect high-value riparian habitats, enable restoration projects, or reduce flood hazards.

Site-specific restoration opportunities for marine and freshwater shorelines in eastern Clallam County are shown below in Tables 3-1 and 3-2, respectively.

Table 3-1. Matrix of Marine Shoreline Restoration Opportunities – Eastern Clallam County

Eastern Clallam County Marine Shorelines						
Shoreline Reach and *Environment Designation(s)*	**Degraded Areas and Impaired Ecological Functions**	**Areas with Significant Development Potential**	**Completed Restoration Projects[1]**	**Identified Restoration Opportunities[1]**	**Potential Ecosystem Function Improvement**	**Restoration Implementation Sponsor(s)**
Diamond Point (Reach 1) *Shoreline Residential-Conservancy* *Natural* *Shoreline Residential-Intensive*	• Dense residential development, including some docks and bulkheads, is located along Diamond Point. Natural vegetation cover is lacking • Discovery Bay has experienced elevated fecal coliform levels • Some areas of armoring are present along Paradise Cove	• Feeder bluffs south of Diamond Point: new low-density residential development • Diamond Point: new high-density residential development, shoreline armoring, and overwater structures • Travis Spit vicinity: new urban-density residential development	*None identified*	<u>Potential Projects</u> Remove pile wall at Eagle Creek	Habitat (fish) Floodplain processes Channel migration Sediment supply and transport	*None identified*
				Remove wharf piles along Diamond Point	Water quality Habitat (fish)	*None identified*
				Remove fill, restore tidal prism of coastal lagoon/embayment at Diamond Point	Habitat (fish and wildlife) Water quality Tidal hydrology	*None identified*
				Revegetate disturbed areas along Diamond Point, where possible	Habitat (fish and wildlife) Water quality Large woody debris	*None identified*
Sequim Bay (Reach 2) *Shoreline Residential-Conservancy* *Natural*	• Patches of armoring are present along the bay; approximately 20% of the reach shoreline is armored • Approximately 15 overwater structures are present • Sequim Bay is a "water of concern" for low dissolved oxygen levels, and Jimmycomelately Creek is listed for fecal coliform and low dissolved oxygen levels • Natural vegetation cover is lacking in developed areas	• (entire reach): New moderate-density residential development, shoreline armoring, and overwater structures	• Pitship pocket estuary culvert removal and protection (HWS) • N. Sequim Bay drift cell conservation (HWS) • Lower Sequim Bay estuary and Jimmycomelately Creek Restoration (HWS)	<u>Potential Projects</u> Remove unnecessary shoreline armoring /bulkheads and creosote walls	Habitat (fish) Sediment supply and transport Beach erosion and accretion Water quality	*None identified*
				Remove dikes at south end of bay	Habitat (fish and wildlife) Sediment supply and transport Beach erosion and accretion Tidal hydrology Water quality	*None identified*
				Restore tidal flushing to lagoon area south of John Wayne Marina	Habitat (fish) Sediment supply and transport Tidal hydrology Water quality	*None identified*
				Patches of disturbed vegetation are present along the bay; revegetate these areas, where possible.	Habitat (fish and wildlife) Water quality Large woody debris	*None identified*

[1] HWS=project is identified on the Habitat Work Schedule

Shoreline Reach and *Environment Designation(s)*	Degraded Areas and Impaired Ecological Functions	Areas with Significant Development Potential	Completed Restoration Projects[1]	Identified Restoration Opportunities[1]	Potential Ecosystem Function Improvement	Restoration Implementation Sponsor(s)
Gibson Spit (Reach 3) *Natural* *Shoreline Residential-Conservancy* *Marine Waterfront*	• A road across the Bell Creek estuary has degraded tidal hydrology, sediment supply, and tidal channel formation processes. • The fill at the end of Port Williams Road may be disrupting sediment transport to Gibson Spit • Some patches of armoring are present in the reach • Numerous overwater structures are mapped in Graysmarsh	*None identified*	Washington Harbor restoration project (HWS)		Habitat (fish and wildlife) Sediment supply and transport Tidal hydrology Water quality	Jamestown S'Klallam Tribe City of Sequim
				In-Progress Project Graysmarsh restoration feasibility analysis (HWS)	*Varies, depending on selected restoration actions*	WA Department of Fish and Wildlife
				<u>Potential Project</u> Removal of fill and armoring at Graysmarsh (Gierin Creek estuary)	Habitat (fish and wildlife) Sediment supply and transport	*None identified*
				Revegetate the disturbed areas between Graysmarsh and Gibson spit, where possible	Habitat (fish and wildlife) Water quality Large woody debris	*None identified*
Kulakala Point (Reach 4) *Natural* *Shoreline Residential-Conservancy* *Shoreline Residential-Intensive*	• Dense residential development, including some bulkheads, is located along the shoreline in the 3 Crabs Road vicinity. Natural vegetation cover is generally absent • The concrete flume at the mouth of Cooper Creek may impede sediment transport • The water quality of Cassalery Creek, Cline Ditch, Cooper Creek, Meadowbrook Creek, Meadowbrook Slough, and the Dungeness River has listed water quality impairments • Dungeness Bay has experienced elevated fecal coliform levels • Portions of Cline Spit are armored • Levees are present along the Dungeness River mouth	• Three Crabs Road vicinity: new armoring • Dungeness Harbor: new moderate-density residential development and overwater structures	• Dungeness estuary restoration	<u>In-Progress Project</u> Meadowbrook Creek restoration (HWS)	Habitat (fish and wildlife) Large woody debris Water quality Floodplain processes	Jamestown S'Klallam Tribe
				Restoration of tidal flushing channels in the 3 Crabs Road vicinity	Sediment supply and transport Habitat (fish) Water quality	North Olympic Salmon Coalition
				Restore riparian habitat along streams in the 3 Crabs Road vicinity	Habitat (fish and wildlife) Water quality Large woody debris	Clallam Conservation District
				(Also see Dungeness River estuary restoration in freshwater matrix)		
				<u>Potential Project**s**</u> Community sewage system along 3 Crabs Road	Water quality	Clallam Conservation District; Clallam County Ecology
				Reconfiguration of boat launch and groin at the north end of Sequim-Dungeness Way	Sediment supply and transport Beach erosion and accretion Habitat (fish)	*None identified*
				Removal of derelict structures east of Cline Spit	Sediment supply and transport Beach erosion and accretion Habitat (fish)	*None identified*

Shoreline Reach and *Environment Designation(s)*	Degraded Areas and Impaired Ecological Functions	Areas with Significant Development Potential	Completed Restoration Projects[1]	Identified Restoration Opportunities[1]	Potential Ecosystem Function Improvement	Restoration Implementation Sponsor(s)
				Removal of armoring and dikes at Cline Spit to improve fish habitat and increase lagoon area (CGS)	Habitat (fish and wildlife) Sediment supply and transport Beach erosion and accretion Water quality	*None identified*
				Revegetate the disturbed areas along Marine Drive, where possible	Habitat (fish and wildlife) Water quality Large woody debris	*None identified*
Dungeness Spit (Reach 5) *Federal Ownership* *Shoreline Residential-Conservancy*	*None identified*	*None identified*	*None identified*	*None identified*		
Green Point (Reach 6) *Shoreline Residential-Conservancy* *Shoreline Residential-Intensive* *Natural* *Federal Ownership*	• Natural vegetation cover is generally absent in the eastern half of the reach • Levees are present at the mouth of Morse Creek • Lees Creek is listed for low dissolved oxygen levels	• (entire reach): New moderate and low density residential development	*None identified*	<u>In-Progress Projects</u> Dungeness drift cell protection and restoration (HWS)	Sediment supply and transport Beach erosion and accretion Habitat (fish and wildlife)	Jamestown S'Klallam Tribe
				Siebert Creek ecosystem protection (HWS)	N/A	North Olympic Land Trust
				Proposed Projects Lower Morse Creek outreach feasibility study (HWS)	*Varies, depending on selected restoration actions*	North Olympic Salmon Coalition
				<u>Potential Project</u> Restore Morse Creek estuary	Habitat (fish and wildlife) Sediment supply and transport Water quality Floodplain processes Channel migration	*None identified*
				Revegetate disturbed areas along the bluffs, where possible	Habitat (fish and wildlife) Water quality Large woody debris	*None identified*

Table 3-2. Matrix of Freshwater Shoreline Restoration Opportunities – Eastern Clallam County

Eastern Clallam County Freshwater Shorelines						
Stream and *Environment Designation(s)*	**Degraded Areas and Impaired Ecological Functions**	**Areas with Significant Development Potential**	**Completed Restoration Projects[1]**	**Identified Restoration Opportunities[1]**	**Potential Ecosystem Function Improvement**	**Restoration Implementation Sponsor(s)**
Little Quilcene River *Resource Conservancy*	*None identified*	*None identified*	*None identified*	*None identified*		
Lower Dungeness River and Tributaries *Shoreline Residential-Conservancy* *Resource Conservancy* *Natural* *Shoreline Residential-Intensive*	• Dungeness River water quality is listed as impaired for temperature and fecal coliform • There are five irrigation diversions on the Dungeness • Portions of the lower Dungeness are constrained by levees • Development and agriculture has removed natural vegetation in many areas along the lower river	• Lower Dungeness: New moderate- to low-density residential development and armoring	• Septic system remediation • Irrigation tailwater treatment • Irrigation efficiency projects • Rivers End Floodplain Acquisition (HWS) • Structure decommission (HWS) • Engineered log jam placement (HWS) • Estuary connectivity project (HWS) • Upper Dungeness Road decommission (HWS) • Engineered log jam placement at Railroad Bridge (HWS) • Irrigation ditch piping (HWS) • Hurd Creek habitat restoration (HWS) • Lower Dungeness River floodplain acquisition (HWS) • Dungeness estuary restoration	<u>In-Progress Projects</u> Implementation of TMDL water quality plan	Water quality Habitat (fish)	Dept. of Ecology Jamestown S'Klallam Tribe Clallam County Clallam Conservation District
				Dungeness River floodplain restoration project (HWS). Project elements include Rivers End acquisition (complete), dike setback and channel reconstruction, Ward Road reconfiguration, railroad bridge trestle replacement, Dungeness Meadows dike reconfiguration, Ribson side channel restoration, and upper Haller dike setback	Channel migration Floodplain processes Large woody debris Habitat (fish and wildlife) Large woody debris Sediment supply and transport	Jamestown S'Klallam Tribe Clallam County Army Corps of Engineers
				Dungeness Irrigation District water conservation project (HWS)	Habitat (fish) Stream hydrology	Clallam Conservation District Dungeness Irrigation District
				Dungeness habitat protection (HWS)	N/A	Jamestown S'Klallam Tribe
				Dungeness River dike setbacks and logjams (HWS)	Habitat (fish) Channel migration Floodplain processes Sediment supply and transport	Jamestown S'Klallam Tribe Army Corps of Engineers Clallam County
				Lower Dungeness River channel re-meander and engineered log jam placement (HWS)	Habitat (fish) Channel migration Large woody debris Floodplain processes	Dungeness River Management Team Clallam County

[1] HWS=project is identified on the Habitat Work Schedule

Eastern Clallam County Freshwater Shorelines						
Stream and *Environment Designation(s)*	**Degraded Areas and Impaired Ecological Functions**	**Areas with Significant Development Potential**	**Completed Restoration Projects[1]**	**Identified Restoration Opportunities[1]**	**Potential Ecosystem Function Improvement**	**Restoration Implementation Sponsor(s)**
				<u>Proposed Projects</u> Dungeness River improved fisheries enforcement (HWS	Habitat (fish)	Jamestown S'Klallam Tribe WA Dept. of Fish and Wildlife
				Dungeness River mainstem restoration (HWS). Project elements include: habitat protection, large wood restoration, railroad bridge restoration, riparian habitat protection, riparian restoration, watershed restoration, Kinkade Island dike removal, and road decommissioning.	Channel migration Floodplain processes Large woody debris Habitat (fish and wildlife) Large woody debris Sediment supply and transport	Clallam Conservation District WA Dept. of Fish and Wildlife Jamestown S'Klallam Tribe North Olympic Land Trust Clallam County
				Riparian conservation for landowners	Habitat (fish and wildlife) Large woody debris Water quality	Clallam Conservation District
				<u>Potential Project</u> Setback/removal of structures in channel migration zone	Channel migration Habitat (fish)	*None identified*
				Revegetate disturbed riparian areas, where possible	Habitat (fish and wildlife) Water quality Large woody debris	Jamestown S'Klallam Tribe North Olympic Salmon Coalition
Canyon Creek *Resource Conservancy*	*None identified*	*None identified*	*None identified*	<u>Potential Project</u> Removal of migration barrier and reconfiguration of hatchery facilities	Habitat (fish)	*None identified*
Upper Dungeness, Greywolf and Tributaries *Resource Conservancy*	*None identified*	*None identified*	*None identified*	<u>Proposed Project</u> Manage/restore forest roads to minimize sediment transport	Water quality	US Dept. of Agriculture/ Forest Service
McDonald Creek *Shoreline Residential-Conservancy* *Resource Conservancy*	• A portion of the creek is used to convey Dungeness River irrigation water • Large woody debris presence is limited in the lower creek	*None identified*	• Large wood recovery (HWS) • Barrier rehabilitation (HWS)	<u>Proposed Project</u> Barrier removal and channel restoration (HWS)	Habitat (fish and wildlife) Large woody debris	Agnew Irrigation District WA Dept. of Fish and Wildlife Jamestown S'Klallam Tribe WA Dept. of Transportation

Eastern Clallam County Freshwater Shorelines						
Stream and *Environment Designation(s)*	**Degraded Areas and Impaired Ecological Functions**	**Areas with Significant Development Potential**	**Completed Restoration Projects[1]**	**Identified Restoration Opportunities[1]**	**Potential Ecosystem Function Improvement**	**Restoration Implementation Sponsor(s)**
Natural				Potential Project Revegetate disturbed riparian areas, where possible	Habitat (fish and wildlife) Water quality Large woody debris	*None identified*
Morse Creek *Natural* *Resource Conservancy* *Shoreline Residential-Conservancy* *Shoreline Residential-Intensive*	• The lower mile of the creek is diked and bordered by dense residential development • The lower portion of the creek was historically channelized	• Mid-Morse Creek subdivision: new high-density residential development and armoring	• Riverine restoration (HWS). The project included re-activation of historic channel and floodplain	In-Progress Project Property acquisition (HWS)	N/A	WA Dept. of Fish and Wildlife
				Proposed Projects Large woody debris restoration (HWS)	Large woody debris Habitat (fish)	Lower Elwha Klallam Tribe North Olympic Salmon Coalition
				Lower Morse Creek community outreach feasibility study (HWS)	N/A	North Olympic Salmon Coalition
				Potential Project Revegetate the disturbed riparian areas along the lower river, where possible	Habitat (fish and wildlife) Water quality Large woody debris	
Peabody Creek *City Limits*	• Peabody Creek is 303d listed for fecal coliform and bioassessment		• Clallam County Courthouse Retrofit Project (2015): Pervious asphalt and rain gardens were installed using stormwater LID BMPs to divert and reduce the volume of water while improving the water quality entering the storm drain system and Peabody Creek		Habitat (fish and wildlife) Water quality Ground water recharge and protection	Clallam County WA. Department of Ecology

3.4 Central Clallam County

The primary ongoing restoration activity in the central portions of the Strait of Juan de Fuca is the removal of the Elwha River dams from 2010 to 2014, and associated restoration activities will continue for several years. There are substantial uncertainties about sediment movement, re-vegetation, and fish and wildlife colonization following dam removal, and extensive monitoring activities have been initiated.

Ecological functions, extent of impairment, and management issues identified in the Inventory and Characterization Report for Central Clallam County Shorelines and restoration plans are summarized below.

3.4.1 Marine shorelines

Marine shorelines in the central Strait of Juan de Fuca include urbanized environments in or near the City of Port Angeles, recreational development at the mouths of small stream estuaries, and the Elwha River delta. West of Crescent Bay there is little modification along the rocky shorelines, and shoreline vegetation is largely present throughout. Shoreline armoring has occurred west of the City of Port Angeles and between the Elwha River mouth and Morse Creek. Few shoreline modifications exist at the present time west of Crescent Bay. An exception is the large man-made structure known as the "mole" located west of the West Twin River, which disrupts littoral drift and has been identified as a nearshore restoration priority. Levees, culverts and dikes have also interrupted tidal exchange and salt marsh formation at the mouths of Salt Creek and other small watersheds in the region. Shoreline access opportunities west of Crescent Bay are limited due to topography and ownership patterns.

3.4.2 Freshwater shorelines

Freshwater shorelines in the Central Strait include the Elwha River and its tributaries and several independent tributaries to the Strait. The streams have been impacted by historical logging activities (e.g., timber harvest, channel straightening, and in-channel wood removal) and associated infrastructure (e.g., roads and railroads). Fish access to drainages including Little River, Lake Sutherland, and Indian Creek have been altered by the dams. Lake Sutherland has moderate to high density development; the potential for new development is limited to infill. Lake Sutherland residents have experienced periodic flooding associated with high flows and snowmelt, and report periodic algal blooms. Residential development, removal of vegetation, and barriers have impacted the lower floodplain and estuary of Salt Creek and the Lyre River.

3.4.3 Shoreline objectives for central Clallam County

In addition to the Shoreline Restoration Objectives for Clallam County described in Section 2.1, the following general restoration objectives apply to the central region of Clallam County:

- Complete the Elwha River and nearshore ecosystem restoration plan and monitor results. Restore stream habitat structure, water quality, and temperature by retaining or replanting forest cover, and placing large woody debris and engineered log jams.

- Remove culverts and barriers throughout creeks and tributaries in the region that block fish migration or channel movement processes.
- Remove the “mole” from the nearshore near the West Twin River.
- Remove or replace hard shoreline armoring and small pilings or structures inhibiting sediment transport processes.
- Restore tidal processes and estuarine wetland habitats by removing barriers, fill and other stressors in the Salt Creek and Lyre River estuaries, and reconnect the rivers with lower floodplains.
- Maintain water quality in Lake Sutherland and Indian Creek. Identify solution for lake outfall and fish screens.
- Continue intensive watershed monitoring programs in designated watersheds, including the East and West Twin Rivers and Deep Creek.

Site-specific restoration opportunities for marine and freshwater shorelines in central Clallam County are shown below in Tables 3-3 and 3-4, respectively.

Table 3-3. Matrix of Marine Shoreline Restoration Opportunities – Central Clallam County

Central Strait Clallam County Marine Shorelines						
Shoreline Reach and *Environment Designation(s)*	**Degraded Areas and Impaired Ecological Functions**	**Areas with Significant Development Potential**	**Completed Restoration Project(s)[1]**	**Identified Restoration Opportunities[1]**	**Potential Ecosystem Function Improvement**	**Restoration Implementation Sponsor(s)**
Angeles Point (Reach 7) *Shoreline Residential-Conservancy* *Resource Conservancy* *Shoreline Residential-Intensive* *Natural* *Tribal Ownership*	• Levees are located at the mouth of the Elwha River • Patches of armoring are located at the western end of the reach • Natural vegetation cover is sparse at the north end of Angeles Point • The Elwha River has a water quality listing for elevated temperatures	• East Angeles Point: New moderate-density residential development and armoring • Freshwater Bay: new moderate-density residential development	*None identified*	<u>In-Progress Projects</u> Elwha River estuary restoration (HWS)	Sediment supply and transport Beach erosion and accretion Habitat (fish and wildlife) Floodplain processes Large woody debris Tidal hydrology Water quality	National Park Service Lower Elwha Klallam Tribe
				Revegetate disturbed areas along Angeles Point, where possible Restore shoreline and coastal wetlands	Habitat (fish) Sediment supply and transport Beach erosion and accretion Water quality	Coastal Watershed Institute
				<u>Potential Project</u> Restore stream mouth and reconfigure shoreline armoring/fill associated with boat ramp.	Habitat (fish) Sediment supply and transport Beach erosion and accretion	*None identified*
Observatory Point (Reach 8) *Resource Conservancy* *Shoreline Residential-Conservancy* *Natural*	*None identified*	*None identified*	*None identified*	*None identified*		

[1] HWS=project is identified on the Habitat Work Schedule

Shoreline Reach and *Environment Designation(s)*	Degraded Areas and Impaired Ecological Functions	Areas with Significant Development Potential	Completed Restoration Project(s)[1]	Identified Restoration Opportunities[1]	Potential Ecosystem Function Improvement	Restoration Implementation Sponsor(s)
Crescent Bay-Low Point (Reach 9) *Resource Conservancy* *Shoreline Residential-Conservancy* *Natural* *Shoreline Residential-Intensive* *Marine Waterfront*	• A breakwater, associated with a boat ramp, is located at the Whiskey Creek campground • A dike road crossing the Salt Creek estuary limit sediment transport, tidal influence, and tidal channel formation	• Whiskey Creek Beach: new low-density residential development • Lyre River vicinity: new moderate- to low-density residential development	*None identified*	<u>In-Progress Project</u> <u>Purchase and restore shorelines along the eastern side of the Lyre River mouth</u>	Habitat (fish and wildlife) Tidal hydrology Water quality Sediment supply and transport	North Olympic Land Trust, North Olympic Peninsula Lead Entity, Makah Tribe, Lower Elwha Klallam Tribe, Puget Sound Partnership
				<u>ProposedProject</u> Salt Creek estuary restoration, involves installing openings in existing dike road	Habitat (fish and wildlife) Tidal hydrology Water quality Sediment supply and transport	North Olympic Salmon Coalition
				<u>Potential Projects</u> Removal of shoreline armoring at mouth of Whiskey Creek	Habitat (fish) Sediment supply and transport Beach erosion and accretion	*None identified*
				Removal of soldier pile wall at western side of the Lyre River mouth	Beach erosion and accretion Habitat (fish and wildlife) Tidal hydrology	*None identified*
Twin Rivers (Reach 10) *Resource Conservancy* *Natural*	• A large manmade object (e.g., 'the mole') obstructs littoral drift in the western portion of the reach	*None identified*	*None identified*	<u>Proposed Project</u> Twin Rivers nearshore restoration; involves riparian protection planning, inventory, and coordination	Sediment supply and transport Habitat (fish)	Coastal Watershed Institute North Olympic Land Trust
				<u>Potential Projects</u> Enhance riparian area between the Twin Rivers mouths.	Habitat (fish and wildlife)	*None identified*
				Remove bluff armoring west of West Twin River	Sediment supply and transport Sediment supply and transport Habitat (fish)	*None identified*
				Removal of mole west of West Twin River	Sediment supply and transport Habitat (fish)	Puget Sound Nearshore Ecosystem Restoration Project

Table 3-4. Matrix of Freshwater Shoreline Restoration Opportunities – Central Clallam County

Central Strait Tributaries - Clallam County Freshwater Shorelines						
Stream and *Environment Designation(s)*	**Degraded Areas and Impaired Ecological Functions**	**Areas with Significant Development Potential**	**Completed Restoration Projects[1]**	**Identified Restoration Opportunities[1]**	**Potential Ecosystem Function Improvement**	**Restoration Implementation Sponsor(s)**
Elwha River *Resource Conservancy* *Shoreline Residential-Conservancy* *Natural* *Tribal Ownership*	• Fish access and sediment transport is blocked by the Glines Canyon dam (currently in the process of being removed) • Levees are present along the east bank of the lower river • Natural vegetation cover has been altered in some areas along the lower river • The Elwha has water quality listings for elevated temperatures and PCBs • There are several significant water diversions in the lower watershed	*None identified*	• Removal of Glines Canyon dam (HWS) • Lower dam removed (HWS) • Engineered log jam placement (HWS) • Large woody debris placement project (HWS) • Hatchery outfall and berm removal (HWS) • Floodplain restoration (HWS) • Elwha culvert replacement		Habitat (fish and wildlife) Sediment supply and transport Floodplain processes Water quality Channel migration	National Park Service Lower Elwha Klallam Tribe
				<u>In-Progress Projects</u> Elwha River estuary restoration (HWS)	Sediment supply and transport Beach erosion and accretion Habitat (fish and wildlife) Floodplain processes Large woody debris Tidal hydrology Water quality	National Park Service Lower Elwha Klallam Tribe
				Engineered log jam placement (HWS)	Habitat (fish) Large woody debris	Lower Elwha Klallam Tribe
				Revegetation project (HWS)	Habitat (fish and wildlife) Water quality Large woody debris	National Park Service Lower Elwha Klallam Tribe
				Salmon and steelhead weir (HWS)	N/A	WA Dept. of Fish and Wildlife
				Steelhead brood development (HWS)	N/A	Lower Elwha Klallam Tribe
				<u>Pink salmon captive brood project (HWS)</u>	N/A	WA Dept. of Fish and Wildlife, Lower Elwha Klallam Tribe

[1] HWS=project is identified on the Habitat Work Schedule

Central Strait Tributaries - Clallam County Freshwater Shorelines						
Stream and *Environment Designation(s)*	**Degraded Areas and Impaired Ecological Functions**	**Areas with Significant Development Potential**	**Completed Restoration Projects[1]**	**Identified Restoration Opportunities[1]**	**Potential Ecosystem Function Improvement**	**Restoration Implementation Sponsor(s)**
			(HWS)		Habitat (fish)	National Park Service Lower Elwha Klallam Tribe
				<u>Proposed Projects</u> Nearshore restoration action plan: implementation and monitoring (HWS)	N/A	Coastal Watershed Institute North Olympic Land Trust
Little River *Resource Conservancy* *Shoreline Residential-Conservancy*	• Vegetation has been altered in some areas by low-density residential development and Little River Road	• Lower Little River: new low-density residential development	*None identified*	*None identified*		
Indian Creek and Lake Sutherland *Natural* *Shoreline Residential-Intensive* *Shoreline Residential-Conservancy*	• The shoreline of Lake Sutherland is densely developed, and many overwater structures are present. Natural vegetation has been cleared in many areas • A lake level control structure is located at the inlet of Indian Creek • Lake Sutherland experiences periodic algae blooms • Portions of the Indian Creek riparian corridor have been altered by residential development and Highway 101	• Indian Creek: new low-density residential development • Lake Sutherland: new armoring and overwater structures	*None identified*	<u>Potential Projects</u> Shoreline stewardship information programs	N/A	
				Septic system maintenance/remediation	Water quality Habitat (fish)	
				Revegetate disturbed riparian areas along Lake Sutherland, where possible	Habitat (fish and wildlife) Water quality Large woody debris	
Salt Creek *Shoreline Residential-Conservancy*	• Salt Creek contains several older, undersized culverts which may periodically block fish passage • Salt Creek has water quality listings for dissolved oxygen and elevated temperatures	• Lower Salt Creek: new low-density residential development	• Engineered log jam placement (HWS) • Nordstorm Creek barrier removal (HWS) • Habitat restoration (HWS) • Barr Creek barrier removal	<u>In-Progress Projects</u> Large woody debris placement, phase II (HWS)	Habitat (fish) Large woody debris	Lower Elwha Klallam Tribe
				Barrier correction project (HWS)	Habitat (fish)	Lower Elwha Klallam Tribe
				<u>Proposed Projects</u>		

Central Strait Tributaries - Clallam County Freshwater Shorelines						
Stream and *Environment Designation(s)*	**Degraded Areas and Impaired Ecological Functions**	**Areas with Significant Development Potential**	**Completed Restoration Projects[1]**	**Identified Restoration Opportunities[1]**	**Potential Ecosystem Function Improvement**	**Restoration Implementation Sponsor(s)**
Natural	• Some areas of the creek are large woody debris-deficient		(HWS) • Liljedahl Creek fish passage restoration (HWS)	Final fish passage corrections (HWS)	Habitat (fish)	Lower Elwha Klallam Tribe Clallam Conservation District Clallam County
				Habitat protection	N/A	North Olympic Land Trust
				Large woody debris placement, phase III (HWS)	Habitat (fish) Large woody debris	Lower Elwha Klallam Tribe
				Salt Creek estuary restoration, involves installing openings in existing dike road (HWS)	Habitat (fish and wildlife) Tidal hydrology Water quality Sediment supply and transport	North Olympic Salmon Coalition
				<u>Potential Project</u> Revegetate disturbed riparian areas, where possible	Habitat (fish and wildlife) Water quality Large woody debris	
Lyre River *Resource Conservancy* *Shoreline Residential-Conservancy* *Shoreline Residential-Intensive*	• The Lyre River has a water quality listing for elevated temperatures • Low-density development is located along the downstream end of the river; natural vegetation is absent in some areas	• Lower Lyre River: new low-density residential development	• Nelson Creek fish passage barrier removal (HWS)	<u>In-Progress Project</u> Estuary protection and restoration; involves property purchase and potential revegetation and stream channel restoration (HWS)	Habitat (fish and wildlife) Large woody debris Water quality Floodplain processes Channel migration	Lower Elwha Klallam Tribe Makah Tribe WA Dept. of Fish and Wildlife North Olympic Lead Entity for Salmon North Olympic Land Trust
East Twin River *Resource Conservancy*	• The upper portion of the river has a water quality listing for elevated temperatures	*None identified*	• Sadie/Susie Creek fish barrier removal (HWS) • Large woody debris placement (HWS) • Intensively monitored watershed treatments (HWS)	*None identified*		

Central Strait Tributaries - Clallam County Freshwater Shorelines						
Stream and *Environment Designation(s)*	**Degraded Areas and Impaired Ecological Functions**	**Areas with Significant Development Potential**	**Completed Restoration Projects[1]**	**Identified Restoration Opportunities[1]**	**Potential Ecosystem Function Improvement**	**Restoration Implementation Sponsor(s)**
West Twin River *Resource Conservancy*	*None identified*	*None identified*	• Intensively monitored watershed treatments (HWS)	*None identified*		

3.5 Western Strait of Juan de Fuca

The shorelines of western Clallam County are generally undeveloped (with the exception of Clallam Bay/Sekiu and Neah Bay) and are adjacent to commercial timber land, both publically and privately owned. Ecological functions, extent of impairment, and management issues identified in the Inventory and Characterization Report are summarized below

3.5.1 Marine shorelines

Marine shorelines along the western Strait of Juan de Fuca are largely characterized by commercial timberlands, with developed pockets in Neah Bay and the Clallam Bay/Sekiu region. Road construction and timber harvest combined with high levels of precipitation, steep slopes, and unstable soil characteristics have set up conditions that contribute to mass wasting events along the Strait. Highway 112 has been closed numerous times since its construction due to landslides. The lower Pysht River and estuary has had extensive diking, channelizing, and fill and has been identified as a high priority restoration area by the Lower Elwha Klallam Tribe and other groups. Sedimentation processes at the mouth of the Clallam River have periodically rendered the river impassible for migrating salmon. Approximately one-quarter of the Clallam Bay shoreline has been armored, and forest cover is present on one-quarter. Public access opportunities in this region are limited outside of the developed areas.

3.5.2 Freshwater shorelines

Freshwater shorelines have similarly been impacted by a combination of slope, soil, and human activities. As described in the WRIA 19 Salmonid Restoration Plan, the Deep Creek watershed has been significantly degraded by mass wasting events and debris flows; a single event documented in 1990 scoured the mainstem by as much as 10 vertical feet for approximately 10 river miles. Restoration activities throughout the rivers in the western Strait focus on reforestation, culvert removal, road re-location and placement of large woody debris and other structures to improve habitat structure and formation. Old infrastructure including railroad grades, dredge spoils, and pilings are located in lower rivers such as the Pysht, and are recommended for removal.

3.5.3 Shoreline objectives for the western Strait of Juan de Fuca

In addition to the Shoreline Restoration Objectives for Clallam County described in section 2.1, the following general restoration objectives apply to the western Strait region of Clallam County:

- Implement the WRIA 19 Salmonid Restoration Plan, June 2015.
- Replace culverts and road crossings that block fish migration or stream habitat formation.
- Re-align or remove roads and railroad beds to reduce or eliminate mass wasting events and sedimentation to streams.
- Reconnect historic river channels, floodplains, and estuaries through the removal of fill and setback of structures as feasible.

- Restore the Pysht River estuary and salt marsh.
- Conduct small-scale restoration projects along the Strait of Juan de Fuca near creek mouths and small beaches, such as at Bullman Beach and the Olson Creek mouth.
- Remove or replace hard shoreline armoring with soft armoring where practical, such as at the Hoko River mouth and Clallam Bay.
- Enhance forage fish spawning beaches at identified locations. Remove creosote pilings and derelict structures.

Site-specific restoration opportunities for marine and freshwater shorelines in west Clallam County are shown below in Tables 3-5 and 3-6, respectively.

Table 3-5. Matrix of Marine Shoreline Restoration Opportunities – Western Clallam County

Western Strait Clallam County Marine Shorelines						
Shoreline Reach and *Environment Designation(s)*	**Degraded Areas and Impaired Ecological Functions**	**Areas with Significant Development Potential**	**Completed Restoration Projects[1]**	**Identified Restoration Opportunities[1]**	**Potential Ecosystem Function Improvement**	**Restoration Implementation Sponsor(s)**
Deep Creek (Reach 11) *Resource Conservancy* *Marine Waterfront* *Natural*	• The breakwater at the mouth of Jim Creek impedes natural sediment flow in the area • Deep Creek has water quality listings for low dissolved oxygen and elevated temperature	*None identified*	*None identified*	<u>Potential Projects</u> Removal of rock armoring east of Deep Creek mouth	Sediment supply and transport Habitat (fish)	*None identified*
				Reduce footprint of breakwater and parking area and enhance riparian area at Jim Creek mouth	Sediment supply and transport Habitat (fish and wildlife)	*None identified*
Pysht River (Reach 12) *Resource Conservancy* Natural *Shoreline Residential-Intensive*	• The Pysht River estuary was historically diked, channelized, and filled	*None identified*	*None identified*	<u>Proposed Project</u> Pysht River salt marsh estuary restoration (HWS). Project involves the removal of dredge deposits from the historic salt marsh.	Habitat (fish and wildlife) Tidal hydrology Water quality Sediment supply and transport	Lower Elwha Klallam Tribe Merrill and Ring
				<u>Potential Project</u> Replace culvert and remove fill/armoring at Butler Cove	Habitat (fish) Sediment supply and transport Tidal hydrology	*None identified*
Pillar Point (Reach 13) *Resource Conservancy*	*None identified*	*None identified*	*None identified*	*None identified*		
Slip Point (Reach 14) *Resource Conservancy*	*None identified*	*None identified*	*None identified*	*None identified*		

[1] HWS=project is identified on the Habitat Work Schedule

Western Strait Clallam County Marine Shorelines						
Shoreline Reach and *Environment Designation(s)*	**Degraded Areas and Impaired Ecological Functions**	**Areas with Significant Development Potential**	**Completed Restoration Projects[1]**	**Identified Restoration Opportunities[1]**	**Potential Ecosystem Function Improvement**	**Restoration Implementation Sponsor(s)**
Clallam Bay (Reach 15) *Marine Waterfront* *Natural* *Resource Conservancy*	• The shoreline of Clallam Bay is extensively armored and several overwater structures and two marina breakwaters are present • Natural vegetation cover is limited along the shoreline • Clallam River water quality is listed for elevated temperatures	• (entire reach): new urban development	*None identified*	<u>In-Progress Project</u> (see riparian revegetation project in freshwater matrix)		
				<u>Potential Projects</u> Removal of derelict creosote piling within the Clallam River estuary	Water quality Habitat (fish)	*None identified*
				Enhancement of forage fish spawning beaches within Clallam Bay	Habitat (fish)	*None identified*
				Potential removal of hard shoreline armoring where not necessary within Clallam Bay	Sediment supply and transport Beach erosion and accretion Habitat (fish)	*None identified*
				Revegetate disturbed areas along Clallam Bay, where possible	Habitat (fish and wildlife) Water quality Large woody debris	*None identified*
Sekiu-Kydaka Point (Reach 16) *Natural* *Shoreline Residential-Conservancy* *Marine Waterfront*	• A small section of shoreline armoring is located at the eastern end of the reach	• Hoko River vicinity: new moderate-density residential development	*None identified*	*None identified*		
Shipwreck Point (Reach 17) *Shoreline Residential-Intensive*	• Nearly half of the reach is armored (Highway 112) • Sekiu River water quality is listed for elevated temperatures	*None identified*	*None identified*	<u>Potential Projects</u> Investigate potential setback of revetment and structures west of Hoko River mouth	Habitat (fish) Sediment supply and transport Beach erosion and accretion	*None identified*

Western Strait Clallam County Marine Shorelines						
Shoreline Reach and *Environment Designation(s)*	**Degraded Areas and Impaired Ecological Functions**	**Areas with Significant Development Potential**	**Completed Restoration Projects[1]**	**Identified Restoration Opportunities[1]**	**Potential Ecosystem Function Improvement**	**Restoration Implementation Sponsor(s)**
Resource Conservancy *Natural*				Replace undersized culvert at Olson Creek mouth	Habitat (fish) Tidal hydrology	*None identified*
Rasmussen/ Bullman Creek (Reach 18) *Resource Conservancy* *Shoreline Residential-Intensive* *Marine Waterfront*	• Patches of shoreline armoring are located at Bullman Beach and the mouth of snow creek. • Natural vegetation cover is limited along Bullman Beach	• Bullman Beach: new armoring	*None identified*	<u>Potential Project</u> Enhancement of forage fish spawning beaches at Bullman Beach	Habitat (fish)	*None identified*
				Revegetate disturbed areas along Bullman Beach, where possible	Habitat (fish) Sediment supply and transport Beach erosion and accretion Water quality	*None identified*

Table 3-6. Matrix of Freshwater Shoreline Restoration Opportunities – Western Clallam County

Western Strait Tributaries - Clallam County Freshwater Shorelines						
Stream and *Environment Designation(s)*	**Degraded Areas and Impaired Ecological Functions**	**Areas with Significant Development Potential**	**Completed Restoration Projects[1]**	**Identified Restoration Opportunities[1]**	**Ecosystem Functions**	**Restoration Implementation Sponsors**
Deep Creek *Resource Conservancy*	• Portions of Deep Creek have water quality listings for dissolved oxygen, fine sediments, and temperature	*None identified*	• Large woody debris placement (HWS) • Road decommissioning (HWS) • Intensively monitored watershed treatments (HWS)	<u>Potential Project</u> Revegetate disturbed riparian areas, where possible	Habitat (fish and wildlife) Water quality Large woody debris	
Pysht River & Tributaries *Resource Conservancy* *Shoreline Residential-Conservancy* *Natural*	• Highway 112 borders much of the mainstem, which separates the river from its natural floodplain • Low-density residential development, and associated clearing, is located along the lower river • Portions of the river have water quality listings for elevated temperatures	• Mid-Pysht River: new low-density residential development	• Large woody debris placement (HWS) • Engineering feasibility study (HWS) • South Fork floodplain restoration	<u>In-Progress Projects</u> Floodplain acquisition and restoration, involves property acquisition, engineered log jam placement, and floodplain restoration (HWS)	Habitat (fish and wildlife) Large woody debris Water quality Floodplain processes	North Olympic Land Trust
				Large woody debris restoration (HWS)	Large woody debris Habitat (fish)	Lower Elwha Klallam Tribe Merrill & Ring
				<u>Proposed Projects</u> Riparian revegetation (HWS)	Habitat (fish and wildlife) Water quality Large woody debris	Lower Elwha Klallam Tribe Makah Tribal Council North Olympic Salmon Coalition
				Pysht River salt marsh estuary restoration (see marine matrix)		
				<u>Potential Project</u> Revegetate disturbed riparian areas, where possible	Habitat (fish and wildlife) Water quality Large woody debris	
Clallam River & Tributaries *Resource Conservancy*	• There are several fish passage barriers in the watershed • The lower river has a water quality listing for elevated temperatures • Portions of the riparian corridor along the lower river are disturbed	Mid-Clallam River: new moderate- to low-density residential development	• Habitat restoration (HWS) • Pearson Creek fish passage barrier removal (HWS) • Habitat assessment (HWS)	<u>In-Progress Projects</u> Riparian revegetation (HWS)	Habitat (fish and wildlife) Water quality Large woody debris	Lower Elwha Klallam Tribe Makah Tribal Council North Olympic Salmon Coalition

[1] HWS=project is identified on the Habitat Work Schedule

Western Strait Tributaries - Clallam County Freshwater Shorelines						
Stream and *Environment Designation(s)*	**Degraded Areas and Impaired Ecological Functions**	**Areas with Significant Development Potential**	**Completed Restoration Projects[1]**	**Identified Restoration Opportunities[1]**	**Ecosystem Functions**	**Restoration Implementation Sponsors**
Shoreline Residential-Conservancy *Shoreline Residential-Intensive*	by clearing, low-density residential development, and Highway 112		• Weel Road (Clallam tributary) culvert removal (HWS)		Habitat (fish)	North Olympic Salmon Coalition
				<u>Proposed Projects</u> Tributary culvert replacement (HWS)	Habitat (fish)	North Olympic Salmon Coalition
				River mouth geomorphology assessment (HWS)	N/A	Clallam County WA Dept. of Fish & Wildlife Lower Elwha Klallam Tribe Makah Tribal Council
Hoko River & Tributaries *Resource Conservancy* *Shoreline Residential-Conservancy* *Natural*	• Channel constrictions from roads and railroads reduce side channel habitat, habitat connectivity, LWD recruitment and channel movement • Portions of the riparian corridor along the lower river are disturbed by agricultural uses, low-density residential development, and Highway 112	*None identified*	• Bear/Cub creeks large woody debris placement (HWS) • Emerson Flats large woody debris placement (HWS) • Herman Creek large woody debris placement (HWS) • Road barrier correction (HWS) • Salmon habitat restoration (HWS) • Brownes Creek instream habitat restoration (HWS) • Road abandonment (9000 Road) (HWS) • 9000 Road barrier correction (HWS)	<u>Proposed Projects</u> Little Hoko River large woody debris placement (HWS)	Large woody debris (HWS) Habitat (fish)	Lower Elwha Klallam Tribe
				Mainstem riparian revegetation (HWS)	Habitat (fish and wildlife) Water quality Large woody debris	Makah Tribal Council North Olympic Salmon Coalition
				Herman Creek large woody debris restoration (HWS)	Large woody debris Habitat (fish)	Makah Tribal Council
					Water quality	Lower Elwha Klallam Tribe
					Habitat (fish)	Lower Elwha Klallam Tribe
Sekiu River *Resource Conservancy* *Shoreline Residential-Conservancy* *Natural*	• Channelization has historically occurred within the watershed • A logging road constrains much of the lower river, resulting in increased channel instability and loss of off-channel salmonid rearing habitat • The lower river has a water quality listing for elevated temperatures	*None identified*	• Log jam construction project (HWS)	<u>Proposed projects</u> Mainstem large woody debris restoration (HWS)	Large woody debris Habitat (fish)	Makah Tribal Council
				Riparian revegetation (HWS)	Habitat (fish and wildlife) Water quality Large woody debris	Lower Elwha Klallam Tribe Makah Tribal Council North Olympic Salmon Coalition

Western Strait Tributaries - Clallam County Freshwater Shorelines						
Stream and *Environment Designation(s)*	**Degraded Areas and Impaired Ecological Functions**	**Areas with Significant Development Potential**	**Completed Restoration Projects[1]**	**Identified Restoration Opportunities[1]**	**Ecosystem Functions**	**Restoration Implementation Sponsors**
Bullman Creek *Shoreline Residential-Conservancy* *Shoreline Residential-Intensive*	*None identified*	*None identified*	*None identified*	*None identified*		

3.6 North Pacific Coast

Located in one of the world's three temperate rainforests, the North Pacific Coast (includes WRIA 20, Figure 1-1) experiences between 90-240+ inches of precipitation each year. The shorelines are generally undeveloped; with land ownership dominated by federal, state, and private commercial forest holdings. Many of the upper watersheds and areas along the coast include late stage forests within the Olympic National Park. Most of the nearshore is located within the Olympic Coast National Marine Sanctuary. Timber production is the primary use of privately held land, with diverse rural-residential, recreational, and agricultural use. The City of Forks is located here, as are the small urban centers of Beaver and Sappho, and the reservations of the Makah and Quileute tribes.

The independent drainages of the Wa'atch and Sooes/Tsoo-yess Rivers are located at the north end of the region. The 77-square-mile Lake Ozette Basin is located to the south of these two rivers, sitting in the coastal plain between the Pacific and the Olympic Mountains. Lake Ozette is the third largest natural lake in Washington State, with a surface area of 11.8 square miles.

South and the east lies the Quillayute Basin, the largest drainage area in the North Pacific Coast. The Quillayute system is fed by the Dickey, Sol Duc, Calawah, and Bogachiel Rivers, and drains over 825 square miles. The Dickey River originates in the coastal plain; the Sol Duc, Calawah, and Bogachiel Rivers originate in the Olympic Mountains.

Information on ecological functions, extent of impairment, and management issues are identified in both the WRIA 20 Shoreline Inventory and Characterization Report (2012) and North Pacific Coast (WRIA 20) Salmon Restoration Strategy: 2015 edition, as amended.

3.6.1 Marine shorelines

Marine shorelines along the North Pacific Coast are in tribal, state, or federal ownership. Clallam County does have jurisdiction in marine waters from mean low tide to the state boundary.

3.6.2 Freshwater shorelines

Freshwater shorelines have been affected by past or present logging practices. The practices of greatest concern include shoreline road construction, narrow riparian buffers, and harvest on steep or unstable slopes. Excessive sedimentation, bank instability and erosion, lack of shade caused by windthrow, and absence of large woody debris or other velocity altering structures were the major impacts cited. Forest practices are not subject to SMP regulations, so many of these factors will need to be addressed through other means. Restoration opportunities, however, have been identified in relation to these impacts and are presented in this restoration plan and the North Pacific Coast (WRIA 20) Salmon Restoration Strategy: 2013 edition (as amended).

3.6.3 Shoreline objectives for the North Pacific Coast

In addition to the Shoreline Restoration Objectives for Clallam County described in section 2.1, these general restoration objectives apply to the North Pacific Coast region of Clallam County:

- Implement the North Pacific Coast (WRIA 20) Salmon Restoration Strategy.
- Replace culverts and road crossings that block fish migration and stream habitat formation, or that imperil stream function.
- Remove floodplain and channel restrictions.
- Remove invasive species from affected riparian areas.

Site-specific restoration opportunities for freshwater shorelines of the North Pacific Coast are shown below in Table 3-7.

Table 3-7. Matrix of Freshwater Shoreline Restoration Opportunities – North Pacific Coast

North Pacific Coast						
Shoreline Reach and *Environment Designation(s)*	**Degraded Areas and Impaired Ecological Functions**	**Areas with Significant Development Potential**	**Completed Restoration Projects[1]**	**Identified Restoration Opportunities[9]**	**Potential Ecosystem Function Improvement**	**Restoration Implementation Sponsor(s)**
Quillayute Basin						
Quillayute Mainstem *Resource Conservancy* *Shoreline Residential-Conservancy*	Invasive species in riparian areas	*Right bank*		<u>In-Progress Project</u> Culvert maintenance and knotweed control are being handled by WDNR or the Quileute Tribe.	Fish passage Riparian restoration	WA Dept. of Natural Resources and Quileute Tribe WA Dept. of Natural Resources and Quileute Tribe
Bogachiel River Resource Conservancy; Shoreline Residential-Conservancy	Invasive species in riparian areas			In –Progress Project Culvert maintenance and knotweed control are being handled by WDNR or the Quileute Tribe.	Fish passage Riparian restoration	WA Dept. of Natural Resources and Quileute Tribe WA Dept. of Natural Resources and Quileute Tribe
Calawah River *Resource Conservancy*	Juvenile rearing habitat degraded by vehicle traffic.			In-Progress Project Sullivan Ponds Restoration	Improved riparian function	Rayonier, Inc. Pacific Coast Salmon Coalition
	Deteriorating and undersized culverts, and side cast constructed roads on unstable geology, and a lack of funding for adequate road maintenance and culvert upgrades, increase the likelihood of road related mass wasting events which was identified as a limiting factor in the Sitkum and Calawah drainages.	*None identified*		Potential Projects Road decommissioning Sitkum R.2900-072 FS 2912 and 2912-060 FS 2923-015 FS 2923 road 2922.020 FS 2922 road	Road decommissioning reduces the potential for massive inputs of fine and coarse sediment from road related mass wasting, which has a significant impact on fish habitat and productivity.	Pacific Coast Salmon Coalition US Forest Service Quileute Tribe

[9] HWS=project is identified on the Habitat Work Schedule

North Pacific Coast						
Shoreline Reach and *Environment Designation(s)*	**Degraded Areas and Impaired Ecological Functions**	**Areas with Significant Development Potential**	**Completed Restoration Projects[1]**	**Identified Restoration Opportunities[9]**	**Potential Ecosystem Function Improvement**	**Restoration Implementation Sponsor(s)**
	Lack of large woody material in N, Fork Calawah			N. Fork Calawah Large Woody Material Assessment.	Development of riverine habitat	Pacific Coast Salmon Coalition US Forest Service Quileute Tribe
Sol Duc River *Resource Conservancy*	Juvenile access, hydrologic storage, overwintering habitat limited.	*None identified*		Potential Projects Gunderson Off-Channel Restoration	Habitat reconnected; hydrologic storage improved	
Resource Conservancy	Undersized culvert blocks fish access to habitat and restricts channel function	*None identified*		Kugel Creek Culvert Replacement	Improve fish passage and channel function	
Dickey River *Resource Conservancy*	Partial barrier and failing culvert created an imminent sediment dump into productive spawning and rearing habitat.	*None identified*	Sands Creek Drainage Culvert Replacement		Potential sediment input eliminated.	Pacific Coast Salmon Coalition
	Undersized culvert blocks fish access to habitat and restricts channel function			Potential Projects Squaw Creek Culvert Replacement	Improve fish passage and channel function	Pacific Coast Salmon Coalition
	Wetland/riparian areas threatened by invasive species; reduced overwintering habitat.			Dickey Camp wetland restoration		Pacific Coast Salmon Coalition
Lake Ozette Basin						
<u>Lake Ozette Tributaries:</u> Big River *Resource Conservancy* *Shoreline Residential-Conservancy*	Currently a limiting factor in the Ozette Basin is retention of water levels in Lake Ozette. By removing relic bridge abutments and associated fill, and re-vegetating the floodplain, this project will facilitate habitat complexity and floodplain interaction.	*None identified*	Funded by SRFB 2013: Big River Floodplain Restoration Project		Removal of the flow constriction and re-establishment of floodplain connectivity will permit slower flows in Big River.	Merrill and Ring; Makah Tribe
Crooked Creek *Resource Conservancy*	Culvert outflow is disconnected from downstream flow height by about 4 feet, limiting downstream and upstream fish passage and access to upstream spawning and rearing areas.	*None identified*	Funded by SRFB 2013: Crooked Creek Culvert to Bridge Upgrade		Culvert outflow is approximately 4 feet above the ordinary high water for the tributary. This project allows salmonids access to upstream habitat.	Merrill and Ring; Makah Tribe; Quileute Tribe

North Pacific Coast						
Shoreline Reach and *Environment Designation(s)*	**Degraded Areas and Impaired Ecological Functions**	**Areas with Significant Development Potential**	**Completed Restoration Projects[1]**	**Identified Restoration Opportunities[9]**	**Potential Ecosystem Function Improvement**	**Restoration Implementation Sponsor(s)**
Lake Ozette *Resource Conservancy*	Sonar surveys at Ozette River weir and shoreline sonar surveys at lake shore spawning beaches	*None identified*		In-Progress Funded by SRFB 2013: Dual frequency identification sonar (DIDSON) for Monitoring Sockeye Abundance at Lake Ozette	Returning adult abundance and spawning abundance	Northwest Indian Fisheries Commission Makah Tribe
Lake Ozette, upper basin *Resource Conservancy*	Eliminate or control state listed noxious weeds, especially knotweed.	*None identified*			Symptom of poor riparian habitat, may prevent/delay normal forest succession on river bars.	Makah Tribe
Sooes/Tsoo-Yess River *Resource Conservancy*	Lower mainstem Sooes-Tsoo-Yess River Large woody material removal from streams has dramatically reduced the amount of material and large complex jams.	*None identified*		Potential Project Install woody material.	Fish passage	Pacific Coast Salmon Coalition

4.0 Restoration Plan Implementation

As a long-range planning effort without dedicated funding, it is difficult to articulate a firm strategy for accomplishing the goals of this restoration plan. Under the Shoreline Management Act, the County is required to review, and amend if necessary, its SMP once every eight years. At the time of the next update, the County is required to report progress towards meeting its restoration goals. However, there is no requirement or timeframe for specifically *implementing* the Restoration Plan.

There are a number of challenges when it comes to implementing this plan. Some of the key challenges are:

- Lack of funding: Designing, carrying out, and monitoring the success of restoration efforts are expensive, particularly at larger (e.g., watershed or reach) scales. Funding for restoration is limited and competition for funds can be extensive.
- Landowner participation: Landowners in areas identified as priorities for restoration efforts may be unwilling or unable to participate in those efforts. Building support and trust among landowners takes time and requires resources.
- Project permitting: Obtaining necessary permits from local, state, and federal regulatory agencies require substantial time and effort. Although encouraged and allowed by the draft SMP, complicated restoration projects may take a year or more to permit.
- Climate change: Changes in regional weather conditions have the potential to dramatically alter seasonal storm patterns and flooding. Depending on the scale of change and time period over which changes occur, restoration priorities could shift substantially within a relatively short period of time in response to changing climate conditions.

One way the County can leverage its resources for restoration projects is to include measures such as vegetation enhancement or the addition of in-water habitat features with recreation improvements and/or public works projects. Another key strategy is to partner with other agencies and organizations on large or complex projects that have regional benefits. Projects will be selected for implementation where there is significant scientific knowledge and local commitment to restoration of key riparian and nearshore environments.

4.1 Strategies for Funding and Technical Assistance

A number of state and federal agencies, such as the Environmental Protection Agency's National Estuary Program, the Puget Sound Partnership, Washington Coast Sustainable Salmon Partnership, and Washington State Department of Fish and Wildlife provide opportunities for grant funding of restoration and preservation projects. Technical assistance is also available for programs such as buffer planting on agricultural lands (e.g., USDA's Conservation Reserve Program). Where data or funding gaps exist, it is important to work cooperatively and strategically with local and regional partners to fill these gaps. Partial restoration should be considered when full restoration is not feasible.

4.2 Voluntary Restoration on Private Lands

Much of the shoreline area in Clallam County is privately-owned; therefore, success of this plan requires willing property owners who will make lands available for restoration through conservation easements, acquisition and other means. Implementation of this plan also requires voluntary participation by citizens in on-the-ground actions such as assisting with planting or other measures on public lands such as parks or open space. Private property owners might also wish to undertake voluntary actions on their own lands to improve habitat, water quality, or other functions.

Voluntary restoration actions range from minor projects that do not require permitting in and of themselves (such as removal of weeds) to larger-scale efforts that may require permit approval (such as levee modifications). Expert assistance (in engineering, fisheries biology, wetland science, wildlife science, or geomorphology/hydrology) is often required to design and implement large-scale restoration projects, whether on public or private land. Minor restoration does not always require expert assistance and can sometimes be accomplished with minimal assistance from the County or state government.

Examples of restoration actions that private property owners can implement relatively easily are listed below. These actions typically do not require special equipment or expertise but can have significant benefits to shoreline functions, especially if undertaken by a community or group of landowners.

1. **Enhance native vegetation along bluffs, banks and buffers**

Plant root systems bind the soil particles together and plant foliage can cover the surface of the ground, thereby improving slope stability and helping prevent erosion and landslides in steeply sloped areas of the shoreline. In addition to protecting and maintaining existing native plants, planting more native vegetation also has important wildlife habitat and water quality benefits.

2. **Remove invasive non-native plants and plant native trees and shrubs**

Invasive plants like Himalayan blackberry, knotweed, English ivy, reed canary grass, morning glory, holly, and butterfly bush can out-compete native vegetation and negatively impact shorelines habitats. The County's Noxious Weed Board, Cooperative Extension, Conservation District and other local organizations can provide landowners with identification, removal, and planning assistance.

3. **Remove debris, refuse, and derelict structures from the shoreline**

Removing litter and pet waste from the shorelines and beaches helps keep them safer for people, pets, birds, fish, and wildlife. Removal of man-made debris from beaches, wetlands and other sensitive areas improves the health of the shoreline for fish and wildlife as well as the long-term quality of water. Examples of such debris include old tires, derelict structures and derelict vessels. Removal of in-water debris (below the ordinary high water mark) typically requires a permit and coordination with regulatory agencies as well as the County planning department.

4.3 Restoration Benchmarks

Clallam County is required to monitor the effectiveness of the SMP, including the restoration plan, over time to assess whether net loss of ecological functions and processes is occurring. The County plans to review shoreline processes and functions at the time of periodic SMP updates to validate the effectiveness of the SMP. This review will consider what restoration activities actually occurred, as compared to stated goals, objectives, and priorities and whether restoration projects resulted in a net improvement of shoreline resources.

To assess changes in shoreline conditions through time, it is necessary to monitor, record, and maintain key environmental indicators to allow a comparison with baseline conditions. To track use and development-related changes in shoreline functions, a checklist will be completed (Exhibit B of the updated SMP) for all use and development proposals (including permit-exempt uses and developments) within shoreline jurisdiction. The checklist contains review questions to help identify and track changes in environmental indicators, such as area of new impervious surface created and area of forest canopy removed. In addition, the checklist contains questions that will help the County ascertain if the development proposal is compatible with this restoration plan.

The County will also track changes in environmental indicators and restoration benchmarks in an annual report. Specific restoration benchmarks that should be tracked may include, but not be limited to, the following:

- Acres of wetland restored within shoreline jurisdiction
- Acres of off-channel habitat restored within shoreline jurisdiction
- Linear feet of hard armoring removed
- Acres of native vegetation planted or restored
- Pieces of large woody debris placed in streams
- Number of culverts replaced and/or number of miles of stream open to fish migration
- Number of creosote structures/pilings removed
- Performance in meeting water quality criteria as measured in the state water quality assessment

Based upon the results of the annual reports, the County will reassess environmental conditions and restoration objectives. Those ecological processes and functions that demonstrate a downward trend of impairment need to be elevated for priority action to prevent loss of critical shoreline resources. Alternatively, successful restoration may reduce the importance of some restoration objectives in the future.

4.4 Timelines and Priorities

In Clallam County, shoreline restoration continues to be a collaborative process. The County intends to adhere as closely as possible to the timelines and benchmarks described below, depending on interdepartmental coordination, partnerships, and the availability of staff and grant funding.

4.4.1 Restoration Project Timelines

Within 2 years of adoption of this plan:

- Continue to serve on organizations dedicated to restoration, such as Dungeness River Management Team, the Marine Resources Committees, the Lead Entities, and the Strait Ecosystem Recovery Network to schedule and explore funding options and partnerships to pursue restoration plan implementation.
- Support a shoreline public education outreach such as a public workshop on voluntary restoration measures.
- Prepare a progress report on restoration plan implementation.

Within 5 years of adoption of this plan:

- Implement at least one of the identified restoration projects.
- Update this restoration plan.

Within 7 years of adoption of this plan:

- Continue to identify and implement an additional three (or more) restoration projects.
- Continue to explore funding options and partnerships.

4.4.2 Restoration Priorities

Tables 3-1 through 3-7 list identified restoration priorities including areas with significant development potential where on-site mitigation may be inadequate to fully compensate for impacts to shoreline functions and processes. Ideally, restoration projects should be focused in the same geographic area and/or be designed to replace the functions that would potentially be lost in the identified high-risk areas. A description of the potential functional loss in these areas is described in the Shoreline Cumulative Impacts Analysis.

Restoration priorities for the North Pacific Coast are identified based on the North Pacific Coast Lead Entity strategic plan. In that document, each watershed's characteristics, vulnerabilities, and restoration needs are described.

Restoration priorities for watersheds draining into the Strait of Juan de Fuca can also be identified using information from the Puget Sound Watershed Characterization, which is a set of coarse-scale water and habitat assessments that compare areas within a watershed in terms of their relative suitability for restoration and protection and their relative conservation value for fish and wildlife habitat (Appendix C). The Characterization helps highlight sub-watersheds that are important for water flow (and water quality) processes and areas have been degraded by development—these areas are often highly suitable for restoration especially if the upper watershed processes are still relatively intact. Overlaying these high priority restoration areas with areas that have high conservation value for fish and wildlife areas helps identify areas where restoration actions typically have a high potential for success.

Within Clallam County, the water flow assessment shows that the higher-elevation watershed sub-basins are high priorities for conservation and protection of water flow processes, while the lower-elevation sub-units had higher levels of degradation and subsequently are higher priorities for restoration. For the freshwater habitat assessment results showed that, in general, the mid-elevation sub-basins had the highest conservation values. Conservation values were lower in the lowland and mountainous sub-basins.

The Watershed Characterization may be found at http://www.ecy.wa.gov/services/gis/data/inlandWaters/pugetsound/characterization.htm.

Conclusion

The Shoreline Restoration Plan has identified where and how shoreline ecological functions need to and can be restored in the future. This plan acknowledges and builds on the efforts of many organizations and individuals who are currently engaged in restoration, and identifies additional restoration opportunities.

Implementation of this plan will help Clallam County meet its no net loss goals and accomplish objectives related to ecosystem health, salmon recovery, and water quality.

APPENDIX A: LINKS TO MAJOR RESTORATION PLANS IN CLALLAM COUNTY

Links to major restoration plans in Clallam County:

Hood Canal/Strait of Juan de Fuca Summer Chum Salmon Recovery Plan:
http://hccc.wa.gov/Salmon+Recovery/Summer+Chum+Salmon/SummerChumSalmonPlan/

5-Year Review: Summary & Evaluation of Puget Sound Chinook, Hood Canal Summer Chum and Puget Sound Sound Steelhead:
http://www.westcoast.fisheries.noaa.gov/publications/status_reviews/salmon_steelhead/multiple_species/5-yr-ps.pdf

Lake Ozette Sockeye Salmon Recovery Plan:
http://www.nwr.noaa.gov/protected_species/salmon_steelhead/recovery_planning_and_implementation/lake_ozette/lake_ozette_sockeye_salmon_recovery_plan.html

Puget Sound Salmon Recovery Plan (See portions for WRIA 18):
http://www.nwr.noaa.gov/protected_species/salmon_steelhead/recovery_planning_and_implementation/puget_sound/puget_sound_chinook_recovery_plan.html

WRIA 19 Salmonid Restoration Plan, (June 2015):
http://mhaggertyconsulting.com/WRIA_19_Plan.php

Elwha River Ecosystem and Fisheries Restoration:
http://www.nps.gov/olym/naturescience/elwha-restoration-docs.htm

North Olympic Lead Entity for Salmon Recovery and Habitat Work Schedules:
http://hws.ekosystem.us/site/180

North Pacific Coast Lead Entity Habitat Work Schedule:
http://hws.ekosystem.us/site/100

North Pacific Coast (WRIA 20) Salmon Restoration Strategy (2015 Edition):
http://www.onrc.washington.edu/MarinePrograms/NaturalResourceCommittees/NorthPacificCoastLeadEntity/Organizational%20Docs/PublicReviewNPCLEDraft2015Strategy.pdf

Clallam County Marine Resources Strategic Plan:
http://www.clallamcountymrc.org/media/1219/2014-18-cmrc-strategic-plan.pdf

Water Quality Cleanup Plan for Bacteria in Dungeness Bay
http://www.ecy.wa.gov/programs/wq/tmdl/dungeness/index.html

Elwha-Dungeness (WRIA 18) Watershed Management Plan:
http://www.clallam.net/Environment/elwhadungenesswria.html

Lyre-Hoko Draft (WRIA 19) Watershed Management Plan documents:
http://www.ecy.wa.gov/programs/eap/wrias/Planning/19.html

Sol Duc-Hoh (WRIA 20) Watershed Management Plan:
http://www.ecy.wa.gov/programs/eap/wrias/Planning/20.html

Puget Sound Action Agenda:
www.psp.wa.gov/action_agenda_center.php

Strait of Juan de Fuca Action Agenda Profile (Puget Sound Partnership)
http://www.psp.wa.gov/downloads/AA2011/120911/AA-draft-120911-local-straitjuan.pdf

Washington Coast Sustainable Salmon Partnership Washington Coast Sustainable Salmon Plan:
http://www.wcssp.org/Documents/PLAN5-7-13_000.pdf

Hazard Mitigation Plan for Clallam County, 2010:
http://www.clallam.net/EmergencyManagement/documents/ClallamHazardMitigationFINAL10252010.pdf

Dungeness River Comprehensive Flood Hazard Reduction Plan, 2009: (large file)
http://www.clallam.net/environment/assets/applets/DRCFHMP-FINAL-LOWRES_5-2010.pdf

APPENDIX B: ADVISORY GROUPS

POLICY AND TECHNICAL GROUPS FOR WRIA 20:

Forks Planning Commission:
[Monthly mtg., 3rd Thurs., 6p.m. @ Forks City Hall]
5 (Mayor & City Council-appointed) members

North Pacific Coast Marine Resources Committee [3rd Tuesday monthly meeting, 4-6:30 pm, Olympic Natural Resources Center]:
Mission: To understand, steward, and restore the marine and estuarine ecological processes of the Washington coast in support of ecosystem health, sustainable marine resource-based livelihoods, cultural integrity, and coastal communities.
Representatives:
Citizens
Clallam Conservation District (CCD)
Clallam County (CLCO)
Jefferson County
Coastal Salmon Recovery & Water Quality Councils
Commercial & Recreational Fishing Associations
Private Business
Makah Tribe (MT)
National Marine Sanctuaries
Quileute Nation (QN)
Surfrider Foundation
WA Department of Natural Resources (WDNR)
WA Department of Fish & Wildlife (WDFW)
University Extension Program

WRIA 20 Watershed Planning Unit:
Not currently active; resources available on web site.
Visioning Statement: The water resources of WRIA 20 are a natural treasure to be protected. These resources sustain natural habitat function, self-maintaining ecosystem processes, and a wide range of physical and biological resources used by society. The WRIA 20 Planning Unit is committed to protect, preserve, and/or restore these resources for its residents, businesses, and governments and to supports local commerce such as forestry, commercial fishing, agriculture, and tourism, as well as a sustainable residential population, public recreation, and Native American treaty uses of natural resources for fishing, hunting, and gathering.
Representatives:
City of Forks
CCD
CLCO
Federal, state, and local agencies
Hoh Tribe
Industries; landowners; watershed residents; and, other interested members of the public
Jefferson County
Lead Entity
Local Citizens
MT

NW Indian Fisheries Commission
Olympic National Forest (ONF)
Olympic Natural Resources Center of UW
Private Land Managers
QN; WDOE; WDFW; WDNR;
WA State Parks

North Pacific Coast Lead Entity:
[Monthly mtg., 3rd Tues., 1-3:30 pm, Olympic Natural Resources Center]
Mission: Lead entities are local, watershed-based organizations that develop local salmon habitat recovery strategies and then recruit organizations to do habitat protection and restoration projects that will implement the strategies.
Representatives:
City of Forks
CCD
CLCO
Commercial Representatives
Hoh Tribe
Hoh Trust
Jefferson County
Local Citizens
MT; QN
Regional Fish Enhancement Group
WDF; WDNR
Wild Salmon Center
US Forest Service (USFS)

POLICY/TECHNICAL ADVISORY GROUP WRIA 18/19:

Strait Ecosystem Recovery Network:

[Quarterly meeting; time/place varies]

Mission: 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 wellbeing.

Representatives:

COPA; COS; Clallam Bay-Sekiu Chamber of Commerce; CCD; CLCO; Clallam Economic Development Council; Clallam Resource Conservation and Development Council; Clallam Marine Resources Committees; Clallam County PUD #1 (CCPUD); Ducks Unlimited; Dungeness River Audubon Center; Feiro Marine Science Center; Friends of the Fields; FutureWise

JS'KT; LEKT; MT

Olympic Environmental Council

Olympic National Park (ONP)

Olympic Park Institute; Olympic Trails Coalition

North Olympic Land Trust (NOLT)

North Olympic Peninsula Lead Entity for Salmon Recovery (NOPLE); North Olympic Salmon Coalition (NOSC); North Olympic Timber Action Committee

North Peninsula Home Builders (including BuiltGreen® committees); Northwest Natural Resource Group; Pacific Northwest National Laboratory; Pacific Shellfish Growers Association

Peninsula College (including WSU Huxley Program)

PSP; Port Angeles Business Association

Port Angeles Harbor Development Authority

Port Angeles Realtor Associations

Port Angeles Regional Chamber of Commerce Protect the Peninsula's Future

Puget Sound Anglers; Sequim-Dungeness Chamber of Commerce; Sequim Realtor Associations

Streamkeepers of Clallam County

Surfrider; WDOE; WDFW; WA Department of Health

WDNR; WA State Parks; Watershed Resource Inventory Areas 18 (WRIA's including Elwha-Morse Management Team and Dungeness River Management Team)

Washington Water Trails; Wild Fish Conservancy

WSU Clallam Beach Watchers/Water Watchers

WSU Clallam County Extensions

WSU Shore Stewards

US Army Corp of Engineers; US Coast Guard

US Fish and Wildlife Service (Dungeness National Wildlife Refuge); USFS

Clallam Marine Resources Committee:

[Monthly mtg., 3rd Mon., 5:30-7:30pm @ Clallam Co]

Mission: To discover collaborative ways to improve shellfish harvest areas, protect marine habitat, support salmon and bottomfish recovery and examine resource management alternatives.

Representatives:

COPA; COS; Commercial Fishers/Sport Fishers ; Commissioner Districts I, II, III;

Community of Clallam Bay-Sekiu

Conservation/Environmental Community

Development Community
Education Community
JS'KT; LEKT; MT

WRIA 18-Dungeness River Management Team:
[Monthly mtg., 2nd Wed., 2-5pm @ Dungeness River Audubon Center]
Mission: To preserve and enhance the Dungeness River Watershed Planning Area through an ecosystem approach to restoring its physical and biological health.
Representatives:
CCD; CLCO; CCPUD; COS; Dungeness Beach Association; Dungeness River Agriculture Water Users Association; Dungeness River Audubon Center; JS'KT; NOLT; Protect Peninsula's Future; Puget Sound Partnership; Riverside Property Owners; Sports Fisheries; WDFW; WDOE; USFS; USFW.

WRIA 18-Elwha-Morse Management Team: *(Not currently active, but resources are available on the website)*
Mission: To preserve and enhance the Elwha – Morse Watershed Planning Area through an ecosystem approach to restoring its physical and biological health.
Representatives:
Business/Industry Caucus; CCD; CLCO; CCPUD; Dry Creek Water District; Education Caucus; Environmental Caucus; Lead Entity; Local Citizens; LEKT; NOLT; ONP; PSP; WDFW; WDOE.

WRIA 19-Lyre-Hoko Watershed Planning Unit: *(Not currently active, but resources are available on the website)*
Mission: To preserve and enhance the Lyre-Hoko Watershed Planning Area through an ecosystem approach to restoring its physical and biological health.
Representatives:
CLCO; CCPUD; Clallam Bay/Sekiu Chamber of Commerce; Crescent Water District; Dry Creek Water District; Local Citizens; LEKT; MT; NOLT; Private Land Managers; WDOE; WDFW.

North Olympic Lead Entity:
[Monthly mtg.; 3rd Wed., time varies @ PA Public Library]
Mission: To recover priority salmon habitat from Sequim Bay west along the Strait of Juan de Fuca to Cape Flattery.
Representatives:
COPA; COS; CCD; CLCO; JS'KT; LEKT; MT; NOSC; ONP; Puget Sound Anglers; PSP; WDFW.

Clallam Bay-Sekiu Community Action Council:
[Monthly mtg., time/place varies]
Mission: Assists in gathering and analyzing information, making recommendations, and advancing the orderly growth and development of the area.
Representatives:
Seven community members representing the diversified interests of the Clallam Bay-Sekiu area including: Senior community, Clallam Bay Correction Center, area business owners, public schools, and three at-large positions.

Crescent Community Advisory Council:
[Monthly mtg., time/place varies]
Mission: Assists in gathering and analyzing information on growth management issues such as land use and zoning, public utility service delivery, transportation, making recommendations and advancing the orderly growth and development of the area.

Representatives:
Seven community members representing the diversified interests of the Joyce-Crescent area including: Crescent School District, Fire District 4, the Grange, area business owner or owner of commercially zoned property, and three at-large positions.

Lake Ozette Sockeye Steering Committee:
[Quarterly mtgs., Sekiu Community Center 10;15-3;15]
Mission: To ensure that Lake Ozette Sockeye are recovered to the extent that there is sufficient abundance for the fish to be self-sustaining, to allow sustainable harvest and to be removed from ESA listing.
Representatives:
A volunteer coalition of stakeholders and governments including landowners, tribes, timber companies, state and federal agencies, and Clallam County

APPENDIX C: PUGET SOUND WATERSHED CHARACTERIZATION

Puget Sound Watershed Characterization:

The Puget Sound Watershed Characterization Project is a set of spatially explicit water and habitat assessments that compare areas within a watershed in terms of their relative suitability and value for restoration and protection. The technical support documents that describe the details of the individual assessments that make up the characterization are available separately, they are:

Puget Sound Characterization - Volume 1: The Water Resource Assessments (Water Flow and Water Quality), April 2012
Puget Sound Characterization - Volume 2: A Coarse-Scale Assessment of the Relative Value of Small Drainage Areas and Marine Shorelines for the Conservation of Fish and Wildlife Habitats in Puget Sound Basin, February 2013
ftp://www.ecy.wa.gov/gis_a/inlandWaters/ps_project/Docs/Watershed_Characterization_WDFW_Report_Final_Dec2013.pdf

The documents are available from Ecology's watershed characterization web page:
http://www.ecy.wa.gov/puget_sound/characterization/assessments.html

The term "watershed characterization" refers to a process that involves integrating information from multiple watershed-level assessments to gain a fuller understanding of ecosystem processes across a broad geographic area. The assessments that make up the Puget Sound Watershed Characterization cover water flow, water quality, and fish and wildlife habitats over the entire drainage area of Puget Sound from the Olympic Mountains on the west to the Cascades on the east, including the Strait of Juan de Fuca and the San Juan Islands.

The main products of the assessments are maps that show the *relative* value of small watersheds or marine shorelines throughout the Basin. Relative value is expressed through quantitative indices which consider an area's *importance* and level of *degradation* for watershed processes as well as its value for habitat/species conservation. Each assessment unit (AU) within a watershed can be symbolized with a color code that represents its level of priority for protection and restoration as well as its relative habitat conservation value. The Department of Ecology has led the assessments for water resources and the Department of Fish and Wildlife has led the assessments for habitats.

Characterization Results for Water Flow

The Water Flow Assessment uses two models to compare the importance and degradation of water flow processes in a watershed to identify areas that are relatively more suitable for protection or restoration of water flow processes. Each model provides a ranking from low to high for how important and how degraded each assessment unit is relative to the other units in the watershed.

The importance model evaluates the watershed in its "unaltered" state. This model combines the **Delivery, Surface Storage, Recharge**, and **Discharge** components to compare the relative **importance** of analysis units in maintaining overall water flow processes in a non-degraded setting. When precipitation is "delivered" as either rain or snow, there are physical features that control the surface and subsurface movement of that precipitation within an assessment unit.

These physical features include land cover, storage areas such as wetlands and floodplains, areas of higher infiltration and recharge and areas that discharge groundwater. These areas are considered "important" to the overall water flow process.

In the importance model, water delivery is evaluated by looking at the quantity and type of precipitation including "rain-on-snow" zones which affect the timing of water movement. Surface storage is estimated by the amount of potential depressional wetlands, lakes, and stream floodplains using data on soil types, topography, and stream confinement. Water movement below the surface, which is important for understanding recharge and discharge, is evaluated using data on precipitation, coarse and fine grained deposits, slope wetlands, and alluvial floodplains. Loss of water through evapotranspiration is considered relatively uniform across a watershed in an unaltered state, thus it is not included in the importance model.

In the water flow degradation model the watershed is evaluated in its "altered" state to consider the impact of human actions on water flow processes. This model combines the delivery, surface storage, recharge, and discharge components to compare the relative degradation to overall water flow processes in analysis units. Degradation to these processes generally accelerates the movement of surface flows downstream. This accelerated delivery increases downstream flooding and erosion and subsequently degrades aquatic habitat over time.

Land cover data is used to estimate changes from forest loss and impervious surfaces, as well as the presence of dams to evaluate the degree to which water delivery has changed. Data from the degree of urban and rural development is used to estimate degradation to surface storage and impacts to wetland and stream storage. Changes to recharge are estimated from land cover data and the associated reduction in area for infiltration. Road density evaluates areas for impacts to shallow subsurface flows. Reduction in discharge is estimated by well density and the effect of land cover alternation to floodplain and slope wetlands. Water loss is evaluated by looking at the change to evaporation and transpiration as represented by the total amount of impervious cover in the watershed. Precipitation is not included in the degradation model because it is assumed that this component has not been changed by land uses.

Using the results of the analyses, AUs are separately ranked into four broad categories, based upon their level of importance of providing watershed processes overall water flow assessment results (Figure C-1). Each AU is scored according to its priority for restoration, conservation and protection relative to the other AUs in that WRIA**.**

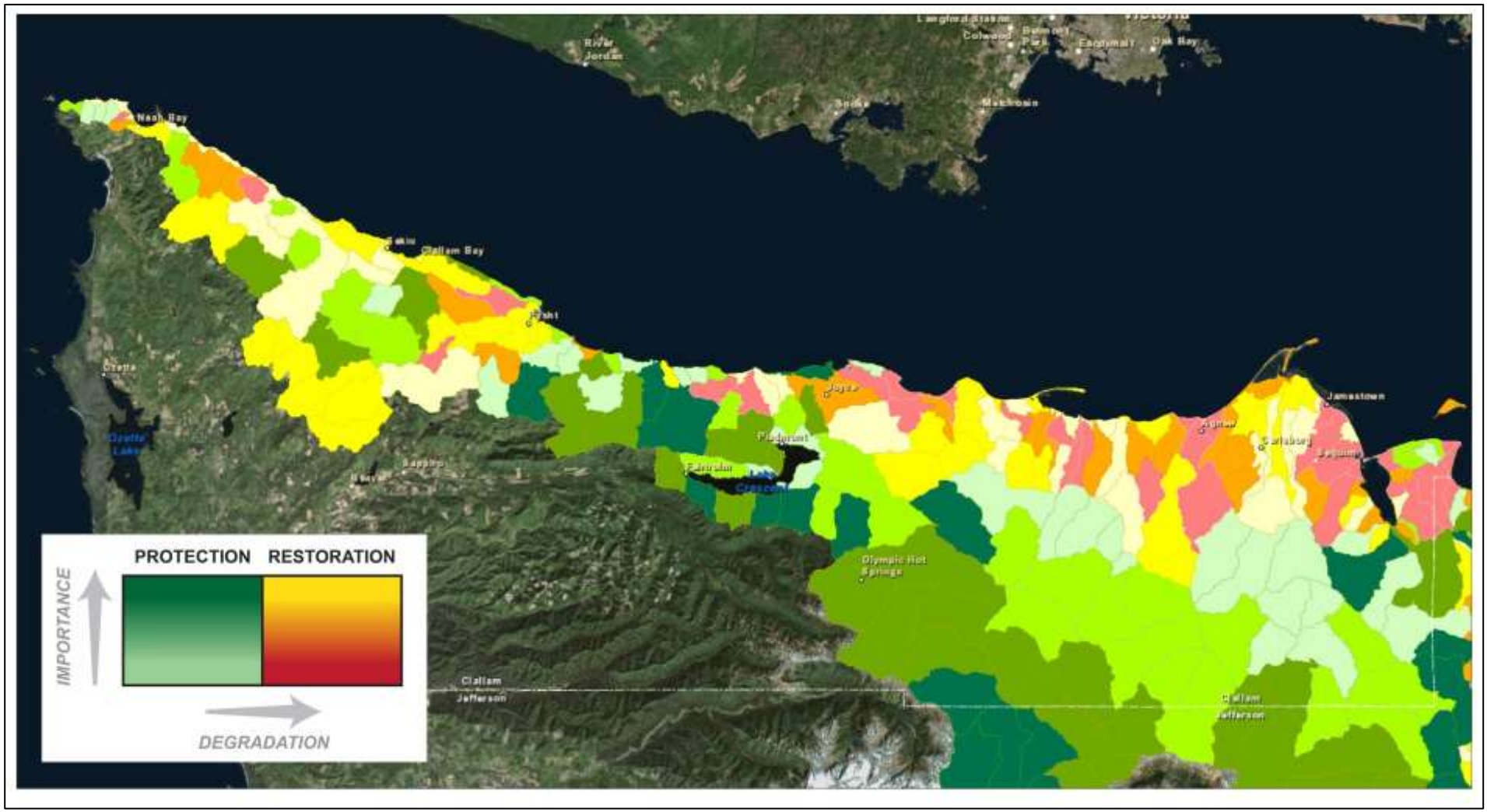
Yellow AUs are the highest priorities for restoration: These AUs are highly important for water flow but also highly degraded. Restoration activities in Yellow AUs have the most significant potential for improving watershed processes

Dark Green AUs are priorities for protection: These AUs rate relatively high for importance and have a relatively low level of degradation; preventing further degradation in these areas is vital for water flow processes.

Light Green AUs are priorities for conservation: The AUs are not as important to water flow processes. However, existing degradation is relatively low. Future development may be appropriate if conservation measures are implemented to minimize adverse effects

Red AUs are the lowest priorities for restoration, conservation, or protection: these AUs have the highest levels of degradation and have low importance to processes. Relative to other AUs, further development in these areas will have the least impact on water flow processes.

Figure C-1. Ecology's relative ranking of the overall water flow processes for each sub-basin draining to the Strait of Juan de Fuca.



The water flow characterization results for the sub-basins draining to the Strait of Juan de Fuca are shown in Figure C-1. Each AU is ranked relative to other AUs in the same WRIA, so comparisons across WRIA boundaries are not appropriate.

In general, AUs within the mountainous, higher-elevation areas of the County were determined to be priorities for conservation and protection of water flow processes. Most of the lowland AUs, which have typically experienced higher levels of development and alteration, were determined to be priorities for restoration. There are relatively few AUs in the county that were identified as low priority for protection, conservation, or restoration of water flow processes. Lowland AUs identified in this watershed characterization that ranked the highest for restoration include Clallam Bay/Clallam River, Pillar Point=Pysht River, Elwha River watershed, Green Point/Seibert Creek, Dungeness River watershed, and portions of west Sequim Bay (Bell Creek and Johnson Creek).

Characterization Results for Freshwater Wildlife Habitat

The fish and wildlife habitat assessment includes watershed characterization results for three habitat types: terrestrial, freshwater, and marine. The terrestrial and freshwater assessments results show the overall relative conservation value for each AU. In the marine habitat assessment, results are provided for shoreline segments.

For purposes of this project, we are relying on the freshwater habitat assessment, which focuses on the dominant property of lotic systems − connectivity. Aquatic habitat quality in a stream reach is affected by conditions occurring upstream, and the conditions of that same reach affect habitat quality downstream. Thus, relative conservation value of an area in terms of freshwater as a function of a place's total contribution to habitat conservation (i.e., the quantity a place contributes) as well as its most significant contribution (i.e., the quality a place contributes). The freshwater habitats assessment uses salmonids as an "umbrella species" meaning a species whose conservation protects numerous other co-occurring species. The index of relative conservation value considers: the density of hydro-geomorphic features, local salmonid habitats, and the accumulative downstream habitats. That is, the relative value of a watershed based on: (1) the density of wetlands and undeveloped floodplains inside it, (2) the quantity and quality of salmonid habitats inside it, and (3) the quantity and quality of salmonid habitats downstream of it. Quantity and quality of habitats are assessed for eight salmonid species.

The freshwater habitat characterization results for the sub-basins draining to the Strait of Juan de Fuca are shown in Figure C-2. Each AU is ranked relative to other AUs in the same WRIA, so comparisons across WRIA boundaries are not appropriate.

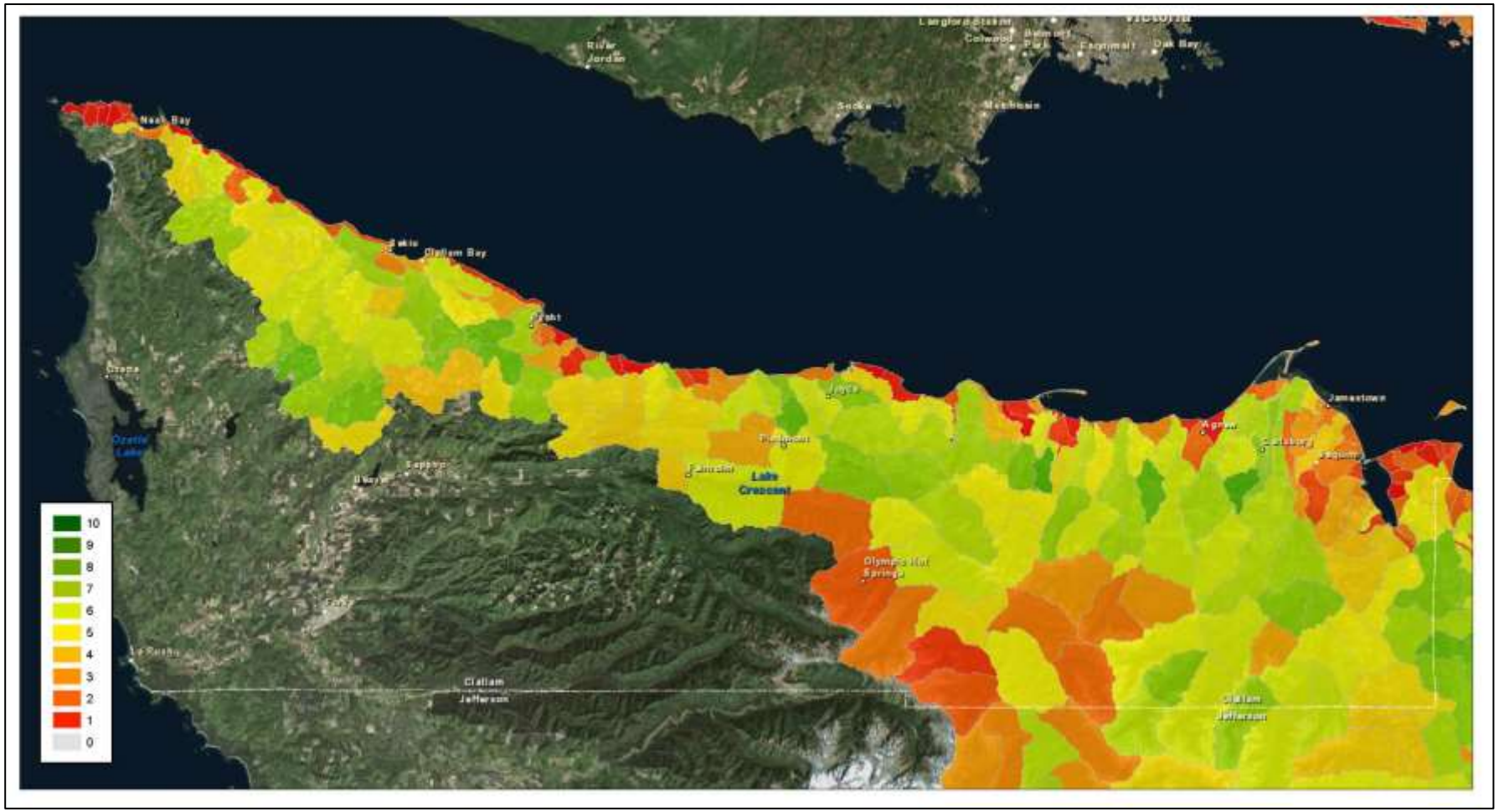


Figure C-2. Freshwater habitat conservation values for each sub-basin draining to the Strait of Juan de Fuca (10=highest conservation value, 0=lowest).

In general, the mid-elevation AUs in the County received the highest freshwater habitat conservation value scores. The lowland AUs, which have typically experienced higher levels of development and alteration, received lower scores. Scores in the mountainous AUs were also generally lower as compared to the mid-elevation AUs. While the mountainous AUs have experienced less alteration, streams in this landscape area are generally high-gradient and may lack important salmon life-cycle habitat features, such as off-channel habitat