RESTORATION PLAN
FOR SHORELINES IN WAKHIKUM COUNTY AND THE TOWN OF CATHLAMET

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Title page photo credits
Top Left: Blind Slough tidal restoration – Tom Josephson (CREST) Courtesy of LightHawk and Jane Roosevelt
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Bottom Right: Clear Creek Failed Culvert/Fish Passage Barrier – Wahkiakum County
1 Introduction
The Restoration Plan builds on the goals and policies proposed in the Wahkiakum County and Town of Cathlamet Shoreline Master Program (SMP). The Restoration Plan provides an important non-regulatory component of the SMP to ensure that shoreline functions are maintained or improved despite potential incremental losses that may occur in spite of SMP regulations and mitigation actions.

The Restoration Plan draws on multiple past planning efforts to identify possible restoration projects and reach-based priorities, key restoration partners, and funding opportunities. The Restoration Plan represents a long-term vision for voluntary restoration that will be implemented over time, resulting in ongoing improvement to the functions and processes in the County’s and Town’s shorelines. These improvements build on a history of land stewardship by local landowners who have a fundamental interest in maintaining the quality of their local environment.

Many of the restoration opportunities noted in this plan would occur on and/or affect private property. This plan will not require restoration on private property or commit privately owned land for restoration. Restoration projects cannot be imposed on private property owners, whether or not the project is listed in this Restoration Plan.

1.1 Purpose
The purpose of this plan is to provide a framework and guide for restoring Wahkiakum County’s and the Town of Cathlamet’s shoreline ecological functions, where they’ve been degraded or impaired. It is designed to achieve overall improvements in shoreline ecological functions over time, when compared to the current baseline conditions as described by the Wahkiakum County and Town of Cathlamet SMP Update Shoreline Inventory and Characterization Report (CREST 2016). The Restoration Plan, taken together with the provisions of the regional Shoreline Master Program for the County and Town, is intended to, at a minimum, ensure no net loss of shoreline ecological functions.

Restoration and mitigation are different but related, and one can sometimes be confused for the other. Restoration is a required component for the County and Town to meet the ‘no net loss’ standard but is not required of a landowner or project proponent. Mitigation is defined by WAC 197-11-768 as the required sequential process of avoiding, minimizing, rectifying and reducing impacts, as well as compensating for unavoidable impacts and monitoring the impact.

However, some uses and developments cannot be fully mitigated. This could occur when project impacts may not be mitigated in-kind on an individual project basis, such as a new bulkhead to protect a single-family home that can be offset, but not truly mitigated in-kind unless an equivalent area of bulkhead is removed somewhere else. Another possible loss in function could occur when impacts are sufficiently minor on an individual level, such that mitigation is not required, but are cumulatively significant. Additionally, unregulated activities (such as operation and maintenance of existing legal developments) may also degrade baseline conditions. Finally, the SMP applies only to activities in shoreline jurisdiction, yet activities upland of shoreline jurisdiction or upstream or downstream in the watershed may have offsite impacts on shoreline functions. The majority of the projects listed in this plan are within SMP jurisdiction. However, several project opportunities listed are not within SMP jurisdiction, but may have indirect or direct impacts on ecosystem function within SMP jurisdiction and are included in this plan as a result. Even though this Restoration Plan includes restoration projects and
activities that are outside of shoreline jurisdiction, it does not change the regulatory SMP jurisdiction boundaries established by the SMP.

Together, these different project impacts may result in cumulative, incremental, and unavoidable degradation of the overall baseline condition unless additional restoration of ecological function is undertaken. Accordingly, the Restoration Plan is intended to be a source of ecological improvements implemented voluntarily by the County, Town, and other government agencies, developers, non-profit groups, and property owners within shoreline jurisdiction to at least ensure no net loss of ecological function, and to even result in an improvement of ecological function (Figure 1).

![Diagram](image)

**Figure 1** Programmatic-level diagram of restoration actions relative to achieving the SMP standard of “no net loss” of ecological functions (Ecology 2010). Restoration is one part of the equation to help improve or ‘buoy’ baseline conditions against one-time and ongoing impacts and degradation.

### 1.2 Scope

The Restoration Plan has been prepared to meet the purposes outlined above as well as the requirements identified in the SMP Guidelines. Specifically, WAC Section 173-26-201(2)(f) of the Guidelines are listed below:

1. Identify degraded areas, impaired ecological functions, and sites with potential for ecological restoration;
2. Establish overall goals and priorities for restoration of degraded areas and impaired ecological functions;
3. Identify existing and ongoing projects and programs that are currently being implemented, or are reasonably assured of being implemented (based on an evaluation of funding likely in the foreseeable future), which are designed to contribute to local restoration goals;
4. Identify additional projects and programs needed to achieve local restoration goals, and implementation strategies including identifying prospective funding sources for those projects and programs;
5. Identify timelines and benchmarks for implementing restoration projects and programs and achieving local restoration goals;
6. Provide for mechanisms or strategies to ensure that restoration projects and programs will be implemented according to plans and to appropriately review the effectiveness of the projects and programs in meeting the overall restoration goals.

The Restoration Plan is a framework that identifies restoration opportunities and provides strategies for implementation. Restoration Plan implementation depends on voluntary public and private actions. It is not a tool for regulating private actions or requiring private landowners to conduct restoration, however it is referenced in some SMP regulatory provisions to ensure that development and land use impacts to restoration opportunities are understood in the permit review process. Landowners who are required to provide mitigation for development-related impacts may wish to implement actions noted in this plan to meet their mitigation obligations. In any case restoration on private property can only be undertaken with the permission of and in collaboration with the landowners.

This Restoration Plan is focused on restoration projects that are reasonably likely to occur in the foreseeable future, and restoration opportunities are not limited to those identified in this plan. Potential restoration opportunities were identified based on existing restoration planning document recommendations, including the Lower Columbia Salmon Recovery and Fish and Wildlife Subbasin Plan (LCFRB 2010), the Salmon and Steelhead Limiting Factors Reports, and other salmon recovery Lead Entity planning documents as well as input from Wahkiakum County, the Town of Cathlamet and restoration partners. Many of these restoration planning documents include protection of intact functions and processes as an integral component to restoration planning. Therefore, although protection is distinct from restoration at the site level, restoration opportunities presented in this document also include opportunities to protect high functioning areas. Additionally, Shoreline Environment Designations in the SMP protect ecosystem functions by tailoring use and development standards based on shoreline conditions.

Some recommendations apply broadly to whole watershed areas. For example, the Integrated Watershed Assessment in the Lower Columbia Salmon Recovery and Fish and Wildlife Subbasin Plan, as well as the Ecosystem Processes and Functional Analysis completed for this SMP update can be used to identify high function areas that could benefit from protection (through regulatory and/or voluntary measures), as well as low to moderately functioning areas that may benefit from restoration.

The restoration opportunities identified in this plan are primarily focused on publicly owned open spaces and undeveloped areas. Any restoration on private property would occur only through voluntary means.

1.3 Uses of this Restoration Plan
In addition to meeting Shoreline Management Act requirements, this Restoration Plan can be used by property owners and other interest groups as listed below:
• **Grant applications:** Programs and projects included in this plan may find it easier to obtain grant funding from sources that require or recommend inclusion in a publicly-vetted and adopted plan.

• **Informational resource:** This plan identifies a number of organizations that provide guidance, and in some cases funding, for a wide variety of restoration projects. These organizations can be consulted by property owners or others parties wishing to undertake a restoration.

• **Mitigation:** In development situations that require offsite mitigation, this plan can provide a source of programmatic or specific project ideas that maximize the regional benefits of the mitigation.

Depending on the scale and type of project, property owners and interest groups wishing to conduct a restoration action may need to obtain permits from the County or Town as well as the Department of Ecology (Ecology), the Washington Department of Fish and Wildlife (WDFW), the Washington Department of Natural Resources (WDNR), and/or the U.S. Army Corps of Engineers. Projects within shoreline jurisdiction would also need to comply with the County and Town SMP, including the critical areas regulations. Also, depending on the scale and type of project, professionals, including biologists, geologists or engineers, may need to assist in project design and implementation.

1.4 Background

1.4.1 Restoration Definition

This plan uses the Shoreline Management Act guidelines definition of restoration, which is: "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).

Restoring shoreline ecological processes - as opposed to only restoring physical forms - is critical to ensuring the long term sustainability of restoration projects, and to ensuring that the project outcomes are relevant within the landscape and watershed scale contexts.

Consistent with Ecology's definition, the use of the word “restore” in this document encompasses a suite of strategies that can be approximately delineated into five categories:

• **Re-establishment:** Restoration of a previously existing converted resource that no longer exhibits past functions.

• **Rehabilitation:** Restoration of functions that are significantly degraded.

• **Enhancement:** Improvement of functions that are somewhat degraded.

1.4.2 Restoration & No Net Loss

“No net loss of shoreline ecological functions” is a foundational principle of the Shoreline Management Act guidelines. No net loss is achieved primarily through SMP regulatory mechanisms including the mitigation requirements. Activities that will have adverse effects on the ecological functions and values of the shoreline must be mitigated (WAC 173-26-201(2)(e)). Proponents of development activities that require mitigation are individually required to address impacts to specific shoreline areas at the site, or to complete off-site mitigation, which as conditioned, is equal in ecological function to the baseline levels at the time each activity takes place. However some loss of shoreline ecological functions is
expected to occur from existing and new land uses, development and other activities. Given those unintended losses, restoration efforts other than the required mitigation sequencing actions are needed to create a net improvement in shoreline ecological functions. The relationship between losses and improvements to ecological function is illustrated in Figure 1. Finally, in considering the overall no net loss requirements of the SMA, the County and Town should consider how regulatory changes from the last several decades have created a trajectory of ecological function improvements that will continue into the future.

2 Goals & Priorities
The overarching goal of the Restoration Plan is to improve shoreline ecological functions over time when compared to existing conditions. The following goals have been identified in the County’s most recent draft Comprehensive Plan and the proposed Town and County SMP update. These may need to be updated once final, adopted document goals are available. The Restoration Plan must align with the locally adopted SMP prior to submittal to Ecology for final state review and approval. Additionally, salmonid limiting factors in the region are a primary driver for restoration efforts and much of the restoration efforts in this plan are based on restoring habitat and ecosystem functions that benefit salmonid species. However, many restoration efforts in the region, currently constructed, planned and/or conceptualized, benefit multiple species and serve to address multiple ecosystem functions while meeting public and/or private landowner and infrastructure needs. This includes projects that not only provide increased habitat features, but also provide some erosion protection, improved water quality, or flood capacity.

Restoration Goals
1. Restore the land and water environments essential to natural resource-based economic activities, fish and wildlife habitats, rural lifestyles, outdoor recreation and other open space benefits.
2. Protect, preserve and restore aquatic resources, shorelines, and related upland areas as local natural resources essential to maintaining the traditional resource-based economic developing value-added industry, maintaining working landscapes and scenic qualities fundamental to the rural character of Wahkiakum County.
3. Restore damaged features of ecosystems to a higher quality than may currently exist.
4. Maintain and restore natural dynamic processes of shoreline ecological function.
5. Protect and restore vegetation that contributes to ecological functions.
6. Habitat and natural system enhancement projects are a preferred use.

Restoration Priorities
Restoration priorities can be viewed in two ways:
1.) Priority restoration locations
2.) Priority restoration actions

Priority restoration locations have been identified in the SMP Inventory and Characterization Report (ICR) process. An analysis was completed to understand important ecosystem processes and functions and the relative degree to which they were impacted (ICR Appendix D Maps of Impaired and Ecosystem Function Priority Areas). These maps identify areas that have been impaired, areas that have varying degrees of priority for restoration, conservation, or protection, and areas identified for further development. Impaired areas and ecosystem function priority areas represented in these maps were also compared to existing reach priorities identified by the Lower Columbia Fish Recovery Board.
(LCFRB). Many of the instream/reach areas matched that of the priorities identified in the Appendix D Maps. Areas that did not match up directly were generally floodplain and/or associated wetland areas not specifically identified in the LCFRB priority rating process.

Additionally, the Northwest Power and Conservation Council commissioned a regional Recovery Plan (LCFRB 2010). The LCFRB Recovery Plan identifies waterways and watersheds important to salmon, steelhead, and other fish and wildlife species, and the ecosystem issues in the waterways/watersheds. Furthermore, LCFRB developed regional priority reaches in WRIA 25 (Wahkiakum and Cowlitz Counties) in SalmonPORT. These priority reaches are based on on-the-ground assessments, studies and the results from the original Northwest Power and Conservation Council subbasin plan (LCFRB 2002).

As part of this Restoration Plan, priority reaches identified in SalmonPORT were compared to the SMP Inventory and Characterization Report Ecosystem Process Analysis. Not surprisingly, there are many common areas prioritized in both the Ecosystem Process Analysis and the SalmonPORT priority reaches. The most common differences were due to impairments identified in Associated Wetlands and floodplains, off the channel reaches identified in the SalmonPORT priority reaches. The overlap in priorities reinforces the need to focus efforts in these areas to restore ecosystem processes, which in turn benefit a variety of species.

The priority restoration actions listed below are intended to address benefits to ecosystem processes, which in turn provide functional benefits such as species habitat, water quality improvements, sediment stabilization, increased flood capacity, etc. The following are a list of priority restoration actions:

1. Reclaim and restore areas which are biologically degraded to the greatest extent feasible.
2. Use short-term soft measures, where feasible, to provide bank stability until native riparian vegetation is fully established.
3. Protect and preserve the processes and functions of estuarine areas, freshwater and wetlands, including critical rearing and nursery areas for valuable recreational and commercial species.
4. Ensure a sustained yield of renewable resources of the shorelines while preserving, protecting, enhancing and restoring unique and nonrenewable shoreline resources, environments, or features.
5. Prevent new infestations and remove invasive, noxious species that cause substantial degradation to the shoreline environment.
6. Encourage community awareness, participation and support through education and outreach, and encourage voluntary restoration activities and improvement of ecological function.
7. Projects and programs should account for and mitigate impacts from future sea-level rise.
8. Sediment disposal and dredge sites should be thoughtfully managed to maximize beach nourishment benefits, avoid navigation impacts, avoid fisheries impacts, and avoid erosion caused by ship wakes.
9. Implement process-based, multiple-benefit restoration projects that protect the needs of existing landowners and that restore, protect, and/or enhance ecosystem functions and processes.
10. Evaluate, design, and implement enhancement projects that improve in-stream and off-channel fish habitat and access.
11. Recognize the importance of water quality and quantity for the County’s and Town’s interests.

Other Community Priorities
While discussing ecological restoration priorities, the following community priorities were also identified. To the extent that ecological functions can benefit from these activities, the County and Town should consider them as part of the whole suite of restoration projects and activities that can help achieve no net loss of ecological functions.

- Restore historic flow conditions, sediment flushing characteristics, and navigability to Grays River and Deep River and their mouths at the Columbia River, by dredging the lower river and mouth areas.
- Restore bank stability to shorelines in areas where sediment accumulation, deep draft ship wakes, and pile dikes are causing shoreline erosion.

### 3 Shoreline Impairments and Issues

The Inventory and Characterization Report (ICR) describes shoreline and contributing ecosystem conditions within County and Town limits. The ICR Ecosystem Process Analysis (see ICR Chapter 2 and Appendix D) identifies both lower and higher functioning areas and the relative degree of ecological impairment or degradation. Additionally, other past reports identifying limiting factors and the impairment of functions provide information on the current condition of shoreline functions. Based on these findings, degraded processes and functions in shoreline jurisdiction are generally described below and in further detail by specific drainage area. More detailed information at the shoreline reach scale is provided in Restoration Plan APPENDIX C, organized by HUC 10 watershed.

In addition to the specific impairments and issues identified in the following sections, other publications such as the Grays-Elochoman and Cowlitz Watershed Management Plan (WRIA 25-26) (2006) and the Northwest Power and Conservation Council’s Lower Columbia Salmon and Fish and Wildlife Recovery Plan (LCFRB 2010) identify broad threats and strategies that are common throughout WRIA 25, WRIA 26 and throughout the Lower Columbia River beyond County and Town limits. Below is a summary of the issues that impact shoreline ecological functions in Wahkiakum County and the Town of Cathlamet. It is important to note that most impairments occurred or were set in motion decades ago as Wahkiakum County’s communities were growing, sustaining themselves, and contributing large amounts of natural resources to the regional and national economy. Since then, some ecological functions have improved and will continue to do so as a result of voluntary restoration and regulations that take decades to produce their full ecological improvement potential.

**Derelict Vessels and in-water/over-water structures**

Wahkiakum County and the Town of Cathlamet have a history that is directly linked to the waterways in the region. As a result, many overwater structures and floating vessels have been utilized and abandoned throughout the County. These derelict structures pose a safety risk to humans, and may impair ecological functions. Derelict vessels, for example, may have fuels and other chemicals left on board that could leak into the waterway. Abandoned over-water structures include pilings, create shade that prevent plants from getting sunlight, and provide predators a place to hide as they wait for their prey. There are several derelict vessels and abandoned over-water structures in the County and Town that should be removed. These are specifically mentioned in Restoration Plan APPENDIX C Reach Priorities and Restoration Opportunities. The Washington Department of Natural Resources has a Derelict Vessel Removal program that may help list and removal priority derelict vessels. [http://www.dnr.wa.gov/programs-and-services/aquatics/recovering-derelict-vessels](http://www.dnr.wa.gov/programs-and-services/aquatics/recovering-derelict-vessels). While removal of derelict vessels and derelict over water structures can be considered voluntary restoration in some cases, it should be noted that abandoning vessels and allowing overwater structures to fall into disrepair is prohibited by state laws.
Invasive species

Invasive species are non-native species that are introduced into local habitats, aggressively propagate, and damage local flora and fauna. Invasive plants such as knotweed (*Polygonum*) in riparian corridors and Brazilian Elodea (*Egeria*) in stream beds are having the greatest negative effect in Wahkiakum County. Knotweed degrades native habitats by quickly overwhelming the soil, water, and nutrients, and it provides less shade than native plants. As a result, the physical environment changes and becomes very different from that in which the native plant and animal species have evolved and are able to flourish. Submerged invasive plants, such as Brazilian elodea, establish large mats of plant material that degrade dissolved oxygen levels in the water when they die off and decompose, preventing fish species from moving within the affected area.

The biggest invasive species issue in the Town of Cathlamet is likely reed canarygrass (*Phalaris arundinacea*). The grass is an upper wetland grass species that can easily monopolize plant communities. This grass occurs in Bernie Creek and its adjacent wetlands.

Invasive species are difficult to eradicate once they have established, however effective management or eradication of invasive species is possible. Treatment of knotweed using approved herbicides has been shown to be effective. A list of some of the most common non-native, invasive species in Wahkiakum County and the Town of Cathlamet is provided in Restoration Plan Appendix A. A list of noxious weeds is also available from the Washington State Noxious Weed Control Board [http://www.nwcb.wa.gov/printable.htm](http://www.nwcb.wa.gov/printable.htm). Washington Department of Fish and Wildlife maintains a list of non-native invasive fauna [http://wdfw.wa.gov/ais/](http://wdfw.wa.gov/ais/).

Loss of habitat

Old growth forest habitat has been lost, although the County is on a trajectory to having more old growth forst than it has had at some times in the past century. Wetland and floodplain habitat has been lost from ditching, draining, levee construction and installation of water control structures. These habitats have been improved in recent years through voluntary private restoration projects.

Salmon are limited to spawning and rearing locations by natural features of the landscape such as channel gradient, and physical features such as logjams. Stream flow also plays a role in activating landscape features as temporary barriers, and can act as a barrier itself (e.g. extreme low flows). For example, some falls may be impassable at low flows, but then become passable at higher flows.

Additionally, in stream structures become barriers that restrict or prevent juvenile and adult fish from gaining access to historically accessible habitat. For example, dams and diversions with no passage facilities prevent adult salmon from accessing historically used spawning grounds. Culverts, dikes and levees have also blocked off historically accessible rearing habitat.

Urban commercial, residential and industrial development has altered shoreline habitat, affecting riparian and upland species such as salamanders, deer and bird species such as osprey (*Pandion haliaetus*).

Timber harvest, land conversion to agriculture, and urban development has impacted water quality, which has impacted historic habitat utilized by a variety of species including salmon and macroinvertebrates.
Invasive species have also impacted habitats by impacting water quality and changing plant communities that species depend on.

**Sediment**
Dynamic stream channels naturally input, store, transport and deposit sediment materials. Processes vary spatially and temporarily and depend upon a number of landscape features such as stream order, gradient, stream size, basin size, geomorphic context, and hydrological regime.

Once sediment enters a stream channel it can be stored or transported depending upon particle size (cobbles, gravel, sand, silt), stream gradient (degree of elevation change), hydrological conditions, availability of storage sites, and channel type or morphology (main, side, braided, pool, riffle, bar). Finer sediments tend to be transported through the system as suspended load, and have relatively little effect on channel morphology. Coarser sediments (>2 mm diameter) often move as bedload, and have a greater impact on channel morphology as they move downstream. Large woody debris (LWD) recruitment into the stream provides a filter by physically altering water velocities in and around the LWD. This creates areas such as gravel drops where sediment drops off, creating important habitat features and helping to stabilize banks. This in turn prevents deposition of finer sediments downstream.

The channel network contains areas that are effective at either storing or transporting material. Sediment movement is based on temporal components such as seasonal flooding. One channel segment may function as a storage reach during one time of year and as a transport reach at other times as conditions change.

**Impacts to riparian areas**
Riparian areas provide a variety of functions including hydraulic diversity, structural complexity, and buffering the energy of runoff events and erosive forces. They are especially important as the source of nutrients to stream systems and they contribute to the health of food-web. Riparian areas also maintain low stream temperatures, which is important to stream chemistry, and is important to species that have a temperature tolerance range. Large woody debris (LWD) in streams directly influences several habitat attributes important to anadromous species. Loss of LWD from the degradation of riparian zones results in a significant reduction in the complexity of stream channels. In particular, LWD helps control the amount of pool habitat and can serve as a site for sediment and nutrient storage. Pools provide a refuge from predators and high-flow events for juvenile salmon.

Land use practices have detrimental impacts to riparian zones. In general, riparian forests can be completely removed, broken by roads, and their widths can be reduced. Species composition can be dramatically altered when riparian trees and native vegetation are replaced by exotic species, shrubs, and deciduous species. Deciduous trees are typically of smaller diameter than coniferous forests and decompose faster than conifers, so they do not persist as long in streams. Riparian zones can take many decades to recover from development impacts as the forest ground, shrub, and canopy cover regrows, and coniferous species colonize. Ongoing impacts individually and cumulatively slow and alter this recovery process.

**Floodplain connectivity and condition**
Floodplains are low lying areas that periodically flood when rivers overflow and overtop their banks. Healthy floodplains are typically structurally complex, and are characterized by a great deal of lateral aquatic connectivity by way of sloughs, backwaters, side-channels, oxbows, and lakes.
Floodplains often provide critical aquatic habitat and storage capacity that minimizes human health and safety risks. Aquatic habitats in floodplain areas can be very important for some species and life stages. Floodplains also help dissipate water energy during floods by allowing water to escape the channel and inundate the terrestrial landscape, lessening the impact of floods. Floodplains also provide coarse beds of alluvial sediments through which subsurface flow passes. This acts as a filter of nutrients and other chemicals to maintain water quality. Portions of the floodplains in Wahkiakum County have been lost or degraded.

There are two major types of human impacts to floodplain functions. First, channels are disconnected from their floodplain. This occurs as a result of the construction of dikes and levees, which often occur simultaneously with the construction of roads. Riparian vegetation is typically reduced or eliminated as levees and dikes are constructed. Second, channels become disconnected from their floodplains as a result of down-cutting and incision of the channel from losses of LWD, decreased sediment supplies, and increased high flow events.

The natural riparian and terrestrial vegetation in floodplain areas was historically coniferous forest. Conversion of these forested areas to impervious surfaces, deciduous forests, meadows, grasslands, and farmed fields (pasture and crops) has occurred. Degradation of riparian and terrestrial vegetation in floodplain has eliminated off-channel habitats such as sloughs and side channels, increased flow velocity during flood events due to the constriction of the channel, reduced subsurface flows, simplified channels due to the loss of in-channel LWD and straightened channels when levees are constructed.

**Water quality**

Water quality data is generally limited within WRIA 24 and 25 to specific reaches of a few major rivers. The State of Washington lists waters that are polluted to the extent that beneficial uses including drinking, recreation, aquatic habitat and industrial use are impaired. These listings meet the federal Clean Water Act Section 305b and 303d requirements. Map 23 in ICR Appendix E identifies impaired streams in Wahkiakum County. Elevated stream temperatures are consistent problems on most systems within WRIA 25, especially within the lower elevation watersheds where land-use impacts and hydrologic modifications have been extensive. Water quality, particularly in the Columbia River tributaries within Wahkiakum County and the Town of Cathlamet, pose potential passage barriers and limit the ability for species to complete life cycle stages. Water quality problems from both point sources (outfalls) and non-point sources (agricultural runoff) are the result of cumulative impacts from a variety of past and ongoing land uses.

Figure 3.1 below is a map of the HUC 10 watershed, WRIAs and SMA jurisdictional waterbodies in Wahkiakum County and the Town of Cathlamet. This Restoration Plan is focused on the SMA jurisdictional waterways found in Figure 3.1.
Figure 3.1 Map of the HUC 10 Watersheds and WRIAs in Wahkiakum County.
3.1 Upper Naselle River & Salmon Creek Drainage

Ecological functions in the upper Naselle River and Salmon Creek drainages are primarily influenced by forest harvest activities in the uplands and headwater areas as well as some agriculture and rural residential development. Much of the drainage area of the Naselle River and Salmon Creek is still dominated by commercial forest lands and continues to support salmon and steelhead populations (Smith 1999).

The ICR Ecosystem Process Analysis indicates that moderate to low impairments occur along the Naselle River, whereas areas in and along Salmon Creek contain a range of “highest” to “lowest” impaired areas. Additionally, fish passage barriers occur in these systems in Pacific County, outside the scope of this plan. Appendix D includes maps of the shoreline reaches that include the varying degrees of impaired areas along both the Naselle River and Salmon Creek.

**Loss of habitat**

Important salmon spawning, rearing, and migration habitat for several salmonid species is found throughout the upper Naselle River and Salmon Creek. Much of both the Naselle and Salmon mainstem is confined within a bedrock canyon. Road culverts, including those servicing logging roads pose potential fish passage barriers throughout the Naselle River and Salmon Creek drainages. (Smith 1999). Downstream barriers outside of Wahkiakum County still affect salmonid migration upstream. Additionally, riparian degradation has impacted bird habitat and instream cover and water quality for fish species.

**Sediment**

Soil disturbances resulting from past logging practices have the potential to increase sediment load through runoff or bank instability. Where large enough buffers have not been provided, there has been loss of larger tree recruitment from the riparian area into the channel, reducing LWD structure and functions. It is estimated that 100 or more years will be needed to restore appropriate tree species within a tree length of the current channel without active restoration efforts. (the standard for recruitability), both because of tree age and channel migration patterns (Wade 2002, Smith 1999).

Basalt geology makes up about 23 percent of the whole watershed including areas outside of Wahkiakum County. This geology type is capable of supplying spawning gravels (The Willapa Alliance 1998). Within the Naselle basin there is a moderate level of natural gravel recruitment potential. In-stream LWD availability is lacking resulting in a lack of gravel storage.

**Impact to riparian condition**

The current levels of LWD, one of the most important pool-forming features, were found to be low in past surveys (PCD Salmonid Habitat Survey 1997, The Willapa Alliance 1998). Most of the sampled areas (about 92 percent) did not meet target levels of functional LWD pieces.

Another riparian impact is the quantity of roads in the riparian area. Roads reduce the available forest vegetation, are a potential sediment source, and if constructed close to the stream, act as dikes, contributing to scour and channel instability (Wade 2002).

**Floodplain connectivity and condition**

The Naselle Watershed has lost an estimated 18 acres of off-channel habitat, accounting for about two percent of the total historical level (Willapa Alliance 1998). This includes areas within Wahkiakum and
Pacific Counties. The density of riparian roads is high, about three miles of riparian roads per square mile of watershed, and this may account for additional losses of off-channel habitat (Willapa Alliance 1998).

**Water quality**

Water quality in the basin indicates that water temperatures exceeding 16° C, the stream temperature threshold for salmonid survival, increased during the summer months (July and August). According to the 2012 Washington Department of Ecology 305b or 303d report/list, neither the Naselle River nor Salmon Creek have reaches in Wahkiakum County that are listed as 303(d) on their 2012 list for water temperature or dissolved oxygen impairments.

### 3.2 Deep River Drainage

Ecological functions in the Deep River drainage are primarily influenced by agriculture in the lower reaches and forest harvest activities in the uplands and headwater areas. The Ecosystem Process Analysis performed for the Inventory and Characterization Report indicates that the majority of the impairments occur in the majority of the lower reaches in the watershed where agricultural development, levees and tidegates that were initiated several decades ago have degraded floodplain structure and functions. The upper drainage basin has been impacted by forest practices, and may have improved since adoption of contemporary forest practices regulations. Deep River LWD presence and recruitment potential rated “poor” almost throughout the watershed (Wade 2002). This rating indicates that riparian vegetation, particularly in the lower and mid reaches, does not provide habitat complexity and diversity. Specific impairments and issues on a reach by reach basis can be reviewed in Appendix C. Several areas in the lower and upper reaches of Deep River where identified as being moderate to highly impaired according to the Ecosystem Process Analysis. Appendix D includes maps of the shoreline reaches that include the varying degrees of impaired reaches along the Deep River.

**Derelict Vessels and Over-Water Structures**

Reach 04 on Deep River contains a derelict vessel and dilapidated over water structures that present a potential ecological hazard and a safety hazard to boat traffic on the river.

**Loss of habitat**

Salmonid rearing habitat was historically provided by floodplain off-channel habitat. Rearing habitat in lower Deep river has been degraded and disconnected as a result of the construction of levees and tidegates. Historic logging practices in the upper reaches may have resulted in imports of fine sediment into the stream system resulting in a loss of some spawning habitat. Additionally, the presence of overwater structures likely altered habitat in areas where these structures occur. Low flows were identified as a concern in upper Deep River, but low flows may be a natural occurrence in the watershed (Wade 2002). Additionally, very little side-channel habitat exists throughout the watershed. Extensive stream channelization limits side channel development in the upper reaches of Deep River (WCD 2001).

**Streambed sediment**

Sediment transport regimes have been altered in Deep River due to logging practices upstream (upland clear-cutting and road construction), which increased fine sediment inputs. Lower reaches have been altered as higher flows are cut off from the floodplain preventing sediment from settling out in off-channel areas. Mass-wasting events occur in the upper reaches.

**Impact to riparian condition**
Riparian functions in Deep River have largely been degraded, particularly in the lower reaches, where the construction levees and tidegates have resulted in the removal of riparian plant species. Levee maintenance in these reaches often includes clearing to prevent vegetation from reestablishing. County roads exist on top of many of the levees further degrading the riparian functions. Historic logging in the upper reaches has degraded riparian conditions. Under the current WA Forest Practices Act (RCW 76.09) and Rules (WAC 222), minimum buffers are required in order to preserve some of the ecological functions that riparian areas provide. Additionally, livestock access to much of the floodplain reaches of Deep River has degraded riparian conditions. The lower and middle reaches of Deep River have degraded riparian conditions, including a lack of riparian vegetation, incised channels and eroded banks. In general, riparian conditions improve in the upper watershed (WCD 2001 and Wade 2002).

**Floodplain connectivity and condition**

Agricultural development and levee construction have impacted Deep River’s connection to its floodplain. Aquatic habitats in the floodplain have been degraded because of agricultural development and the disconnection from the mainstem channel. Disconnection has also prevented the floodplain’s ability to dissipate flow energy and filter out nutrients and sediments during higher flows.

**Water quality**

The Deep River watershed has 303(d) water quality streams under the Washington DEQ list (2012). These stream reaches occur upstream of SMA jurisdiction. However, levees and tidegates separate off-channel and floodplain areas that were historically tidally connected to the mainstem of Deep River allowing for system flushing and nutrient exchange in the off channel habitats. Without these natural processes in place and combined with agricultural development, some temperature, dissolved oxygen and nutrient loading issues occur in off-channel habitat/wetland areas.

### 3.3 Grays River Drainage

Ecological functions in the Grays River are primarily influenced by forest harvest activities in the uplands and headwater areas as well as some agriculture and rural residential development in the lower reach floodplains. The Ecosystem Analysis performed for the Inventory and Characterization Report indicates that high to moderate impairments occur along the lower Grays River where agriculture, levees and rural residential development has impacted ecosystem function. Up river along the South Fork of the Grays River, high to moderate impacts appear largely in forested areas that were logged as well as areas where roads intersect wetland and stream systems. Results of the biological assessment suggest that cumulative effects of past and ongoing human land-use activities in the watershed have compromised the biological integrity of the Grays River aquatic ecosystem.

Degraded ecosystem functions and processes are issues across the watershed. For example, historic logging practices in the upper watershed created runoff and mass wasting events in the upper reaches, which has resulted in deposition problems in the lower reaches. The river is considered flashy and as precipitation events move through the watershed, flooding events occur on a semi-regular basis in the lower reaches due to sediment deposition from historic forest practices and loss of river access to the floodplain. According to the Ecosystem Process Analysis, Grays River is considered highly impaired throughout many of its lower and upper reaches largely due to historic forest harvests in the upper Grays River and its impact on sediment load, and the levee system in lower Grays river and its impact on flood capacity and historic tidal wetland habitat that has been disconnected from the main river. Appendix D includes maps of the shoreline reaches that include the varying degrees of impaired reaches along the Grays River.
**Loss of habitat**

The Grays River is a known productive salmonid spawning and rearing watershed. Instream habitat is considered to be of moderate quality due to a lack of a riparian zone, significant channel instability, uniform channel habitat (lack of complexity such as pools), lack of instream cover, and continued high sediment deposition.

Timber harvest decreased the maximum duration of spawning period low flows in chum and fall Chinook salmon spawning areas in the basin. Spawning habitat quality rather than habitat quantity may limit chum and fall Chinook salmon production and recovery in the Grays River. The majority of aquatic habitat in the Grays River study area appears suitable for chum and fall Chinook salmon spawning based on velocity, depth, and substrate. However, much of the available habitat may be of relatively poor quality (May et al 2007).

**Streambed sediment**

The upper Grays River watershed has erosive soils and is susceptible to mass-wasting events when vegetation is disturbed or removed. Relatively steep, confined channels in upper Grays River efficiently route sediment to the lower Grays River valleys (May et al 2007). Current sediment production in the watershed is significantly greater than the erosion rate typical of forested watersheds in the coastal region. Channel incision primarily occurs in areas where agricultural development exists, where riparian vegetation has been degraded and bank sediment is eroding.

The large increase in sediment supply has had the most noticeable impact in the Grays River, particularly in the Gorley reach upstream of State Route 4 (Reaches GB_GraysRiver_03 and GB_GraysRiver_02) where much of the sediment from the upper watershed is deposited. Channel response in the Grays River lags behind forest harvest by approximately 30 to 50 years. In the lower reaches, channel response has been influenced by dike and levee construction intended to control channel migration and flooding. This type of confinement and high sediment loads combined to create unstable conditions that led to the catastrophic 1999 channel avulsion. Without significant efforts to implement more sustainable land management practices, it is likely that excess sediment delivery, instability of the lower river channel, and detrimental impacts on habitat and property will continue. If historical levels of timber harvest are not significantly reduced, soil loss may severely reduce the long-term productivity of the upper watershed. The increased sediment production resulting from timber harvest and associated road construction has significantly affected downstream channel processes.

Aggradation and natural straightening of a channel are typical morphological responses to an increase in sediment loading. The local increase in slope caused by continued aggradation (as well as confinement by levees) will shift the depositional front of a mainstem downstream.

**Impact to riparian condition**

In addition, channel instability due to aggradation and riparian corridor clearing, loss of riparian function, and separation of the active Grays River channel from its floodplain have led to instream habitat degradation. Bank stability is an issue, particularly where agricultural development exists in the lower and middle reaches. These areas have degraded riparian vegetation, which has resulted in bank erosion.

The loss of instream LWD and LWD recruitment potential from degraded riparian areas has had a significant impact on instream habitat quality, complexity, diversity, and channel geomorphology. The interaction of LWD, sediment, and water has profound effects on channel form and instream processes.
Instream LWD provides for local sediment storage and transport capacity by increasing hydraulic roughness and capturing sediment behind channel-spanning LWD and logjams. Additional channel instability has resulted from the harvest of riparian forest vegetation and the loss of instream LWD.

**Floodplain connectivity and condition**

Deforestation and construction of floodplain levees and dikes within the Grays River watershed have altered fluvial processes. Flood-control measures in lower reaches have resulted in a loss of floodplain connectivity and side-channel development, which reduce channel habitat complexity and fish access to historical off-channel habitats. Floodplain discontinuity has also caused semi-frequent flood events near the Town of Grays River.

**Water quality**

The channel in the lower river is also tending to widen out and become shallower as a result of increased sediment delivery, potentially contributing to water quality issues such as higher temperatures (Tetra Tech 2009). The Grays River is listed on the State of Washington’s 303(d) list of impaired waterbodies for high water temperatures that exceed the state standards (WDOE 2012). The listed reaches include the vicinity of SR-4, above the hatchery on the West Fork and near the confluence with the South Fork.

### 3.4 Crooked Creek Drainage

Ecological functions in the Crooked Creek drainage are primarily influenced by forest harvest activities in the uplands and headwater areas as well as some agriculture and rural residential development in the lower reaches. Roads intersecting and immediately adjacent to the creek also result in negative ecosystem function impacts. The Ecological Process Analysis for Crooked Creek identified the middle and upper sections of the creek to have the highest impaired areas, likely due to the intensive agriculture occurring in the floodplain areas. Many of the floodplain wetlands have been ditched and drained. Appendix D includes maps of the shoreline reaches that include the varying degrees of impaired reaches along Crooked Creek.

**Loss of habitat**

Chum salmon are known to spawn in Crooked Creek and it is likely that coho spawn in the upper basin as well (LCFRB 2010). There are several potential fish passage barriers that include several tidegates and culverts that may limit or prevent fish passage up or down stream and to off- or side-channel habitat. Additionally, there is a 30’ cascade at around RM 7 that provides a natural fish passage barrier upstream (Wade 2002).

**Streambed sediment**

Bank erosion problems were identified in the lower reaches of Crooked Creek. The segments with bank erosion problems are all low gradient, highly meandering, and unconfined channels with limited riparian vegetation flowing through alluvial floodplains. Bank erosion becomes less of an issue in the upper reaches (WCD 2001 and Wade 2002). Crooked Creek contains a large amount of fine sediment in-stream throughout the basin (Wade 2002). Mass-wasting events are also fairly common in the watershed due to degraded riparian vegetation and upland logging operations.

**Impact to riparian condition**
The construction of levees in the floodplain valley for agricultural development and the existence of the road that follows Crooked Creek up the watershed have impacted the riparian condition in the lower and mid reaches, but Wade (2002) noted that riparian conditions improved further up the watershed. Livestock also have had access to the stream which has contributed to riparian degradation. Dominant plant species in the lower riparian areas are predominantly young deciduous vegetation (WCD 2001 and Wade 2002). As a result, instream LWD and LWD recruitment potential has been degraded which has had a significant impact on instream habitat quality and channel geomorphology.

**Floodplain connectivity and condition**

Crooked Creek has been channelized throughout the lower 2 miles and is considered highly entrenched (WCD 2001 and Wade 2002). Deforestation and construction of floodplain levees and dikes within the Crooked Creek watershed have altered fluvial processes. Flood-control measures in lower reaches have resulted in a loss of floodplain connectivity and side-channel development, which have reduced channel habitat complexity and access to historical off-channel habitats. Side channel availability is considered “poor” throughout Crooked Creek (TAG and Wade 2002). In the lower reaches, extensive stream channelization limits side channel development. Although limited in number, side channels were observed in a few of the stream segments surveyed on the mainstem Crooked Creek (Wade 2002).

**Water quality**

The floodplain along lower Crooked Creek is dominated by agriculture where riparian vegetation along the shoreline has been degraded. Eden Valley Road also runs along Crooked Creek. The upper watershed continues to experience disturbance from logging operations. Washington DOE lists the upper reaches of Crooked Creek as a 303(d) stream for temperature. The combination of degraded riparian areas and upland clear-cuts may also contribute to turbidity issues.

**3.5 Columbia River (Grays Bay to Jim Crow Creek)**

Ecological functions in this region of the Columbia River are primarily influenced by access to intertidal wetlands, flow regimes from the hydropower system upriver and sediment transport resulting from navigation channel infrastructure and dredge material management. These factors are largely beyond the County’s and Town’s control, and present additional challenges to achieving no net loss of ecological functions while maintaining viable working landscapes that support the local communities. The ecosystem analysis performed for the Inventory and Characterization Report indicates that impairments are a function of road and rural development along the shoreline of the Columbia River. Priority areas indicate that areas near the mouth of Deep River, Grays River and Crooked Creek should be further investigated for protection as ecosystem functions are intact and have minimal impairments in these areas. The Ecological Process Analysis for the downstream end of the Columbia River has identified some smaller impaired areas on the shoreline likely due to water control structures in these reaches that have allowed floodplains to drain, but not be inundated with tidal waters. Appendix D includes maps of the shoreline reaches that include the varying degrees of impaired reaches along the lower Columbia River/Grays Bay area.

**Loss of habitat**

Access to rearing habitat (inter-tidal marsh, side and off-channel habitat) has been largely degraded and access cut off in this portion of the Columbia River due to the construction of roads (Altoona Pillar Rock Road) along the river and rural development in isolated floodplains along the shoreline. Pilings may also encourage increased predation in areas where they occur. Steep bluffs along much of the shoreline east of Grays Bay limit available rearing habitat. However, in Grays Bay there are several locations where prime intertidal habitat provides quality rearing habitat to salmonids and other fish species. Accretion in
Grays Bay may change these habitats and/or create other intertidal habitat in other locations within the bay.

**Streambed sediment**
The establishment and maintenance of the navigation channel and dredge disposal islands (e.g. Rice Island) has resulted in slower moving waters in Grays Bay creating large depositional areas within the bay. Sediment transport in this reach of the Columbia River is highly manipulated by the hydropower system upriver and by channel dredging in the Lower Columbia River. This has resulted in some mudflat and intertidal habitat creation in the past.

**Impact to riparian condition**
Riparian condition has been degraded along much of mainstem of the Columbia River. Shoreline riparian areas have been impacted by the construction of levees, agricultural development and the constructions of roads. Additionally, many areas also contain invasive species such as Japanese knotweed (*Fallopia japonica*) that can impact the vegetation community, soil structure, and overall habitat quality.

**Floodplain connectivity and condition**
Floodplains along the Columbia River exist in small pockets east of Grays Bay. Much of the shoreline in this area locations consist of steep bluffs. Floodplains in these areas often contain small pockets of rural development or are cut off by roads. However, there are a few locations where floodplains are connected with the mainstem of the Columbia River. In Grays Bay, levees have cut off access to the floodplain and limited hydraulic connectivity exists through a series of tidegates.

**Water quality**
WA DOE has identified several areas with degraded conditions within this stretch of the river in the 305(b) report (2012). Tri- and dichlorobenzene are identified pollutants in this segment of the Columbia River.

### 3.6 Jim Crow Creek Drainage
Ecological functions in Jim Crow Creek drainage are primarily influenced by forest harvest activities in the uplands as little/no other land use is present. The Ecosystem Analysis performed for the Inventory and Characterization Report indicates that moderate to low impairments occurs along Jim Crow Creek where roads follow and/or crisscross the creek. Overall, the ecosystem analysis identified many areas within the Jim Crow Creek drainage worthy of protection. Appendix D includes maps of the shoreline reaches that include the varying degrees of impaired reaches along Jim Crow Creek.

**Loss of habitat**
According to Wade (2002), no fish access issues were identified within the Jim Crow Creek watershed. However, pool habitat is considered lacking in the basin (Wade 2002 and LCFRB 2010). This is likely due to a lack of LWD/logjams in the system, since pools are often associated with LWD (Wade 2002).

**Streambed sediment**
Jim Crow Creek has a relatively high road density (5.14 miles/square mile) and relatively high number of past mass-wasting events (Wade 2002). These parameters give some indication as to the sediment inputs into the system. Additionally, Jim Crow Creek had few signs of bank erosion due to the amount of quality riparian habitat in the system.
Impact to riparian condition
Riparian condition is likely impacted by the road infrastructure along the creek. Most of these roads are logging roads and riparian buffers are in place. Riparian vegetation along the lower reaches of Jim Crow Creek includes mostly deciduous species, yet conifer species are intermixed throughout these lower segments (Wade 2002). Some areas, particularly in the upper watershed appear to be well vegetated with a good mix of conifers. The lower watershed is tidally influenced for the first mile and also appears to be in relatively good shape. Lateral impacts to riparian areas near road crossings likely impact riparian vegetation in these areas.

Floodplain connectivity and condition
Jim Crow Creek is not diked and large wetland areas exist in the lower reaches suggesting good floodplain connectivity (Wade 2002). Upper segments of the creek are entrenched, suggesting that the stream is disconnected with any floodplains and wetlands in the upper reaches (WCD 2001 and Wade 2002).

Water quality
Middle Jim Crow Creek is a 303(d) listed stream for temperature according to Washington DOE (2012). This is likely due to the logging operations occurring in the upland and the existence of roads that follow and crisscross Jim Crow Creek, both result in reduced or missing riparian cover that provides shade.

3.7 Skamokawa Creek Drainage
Ecological functions in Skamokawa Creek drainage are influenced by forest harvest activities in the uplands and headwater areas as well as agriculture and rural residential development throughout the drainage. The Ecosystem Analysis performed for the Inventory and Characterization Report indicates that Skamokawa Creek is heavily impaired throughout the basin. The most impaired areas are along SR-4 and at the mouth of Skamokawa Creek where the largest concentration of development occurs. Priority restoration areas in the Skamokawa Creek drainage, according to the Ecosystem Analysis, emphasize protection in several areas, particularly in the lower reaches between the West Fork and the mainstem Skamokawa Creek. Highest priority for restoration is along the West Fork and in the middle reaches between the West Fork and the mainstem. Appendix D includes maps of the shoreline reaches that include the varying degrees of impaired reaches along Skamokawa Drainage.

Loss of habitat
Fish passage barriers block a little over 6 miles of the 59 miles, or approximately 10 percent of the presumed, and potential anadromous habitat in Skamokawa Creek Subbasin (Wade 2002). Since 2002 several projects in the basin have been implemented to improve fish passage and water quality. Several areas throughout the basin are entrenched and therefore disconnected from the floodplain, particularly in areas with agricultural development (WCD 2001 and Wade 2002). Pool habitat is considered lacking in the Skamokawa basin (Wade 2002 and LCFRB 2010). The Skamokawa subbasin was also mostly rated as poor for LWD (Wade 2002). Where wood does exist it is typically small and deciduous. There are some log jams in places. Standard and McDonald Creeks have good LWD and recruitment potential, however, some areas have no wood whatsoever (Wade 2002). The Wahkiakum Conservation District (WCD) has been working with landowners to help implement some LWD structures in the Skamokawa drainage.

Streambed sediment
Surveys completed in the watershed by the Wahkiakum Conservation District between 1994 and 1996 found that less than 10 percent of the streambanks were actively eroding. From the mouth to RM 6.6,
Skamokawa Creek has been hardened with riprap in numerous locations. Active eroding banks largely occur in the floodplain in and around agricultural land, where riparian areas have been degraded. Additionally, in agricultural areas, there are several locations where the channel has incised. Timber harvest in the upland and the headwaters have also resulted in bank stability problems in the upper reaches. Lastly, high road densities in the drainage basin add to the potential for mass wasting. However, restoration efforts have been occurring throughout the basin to stabilize banks and restore riparian vegetation. Banks in some of these areas have been regraded and replanted to stabilize the soil.

**Impact to riparian condition**

There has been a significant decrease in vegetative cover in the Skamokawa watershed that may have impacts on runoff. Road densities are also high, which may have an impact on flow regimes (LCFRB 2010). According to LCFRB 2010, as part of their Integrated Watershed Assessment (IWA) watersheds process modeling, the Skamokawa subbasin was rated as impaired for riparian function. As a result, as a whole, the subbasin was listed as “not functional” for riparian habitat condition. In fact, surveys by the WCD in 2000 noted that approximately 74 percent of the riparian areas surveyed were in “poor condition” (Wade 2002). Poor riparian areas are found in the lower river segments. Upper reaches contain relatively young riparian vegetation age classes with a relatively high deciduous tree composition.

In the lower and middle reaches of the Skamokawa, a basin-wide restoration effort is underway to restore riparian vegetation, particularly in areas where agricultural development exists.

**Floodplain connectivity and condition**

Skamokawa Creek has been channelized from its mouth to RM 1.7. This reach of stream has been diverted from its original, naturally-meandering channel (Wade 2002). The Wahkiakum County Conservation District in collaboration with local landowners has recently reconnected Dead Slough to the mainstem of Skamokawa Creek through a self-adjusting tidegate system to improve hydraulic circulation, habitat connectivity, and passage for rearing salmonids. This project achieves multiple ecosystem function benefits while also helping to achieve other goals of local landowners. Levees occur along Brooks Slough near the confluence with Skamokawa Creek, along the lower mainstem and the West Fork. Levees have disconnected floodplain processes from Skamokawa Creek and its tributaries, preventing flood storage capacity, access to habitat, food-web connections and nutrient cycling functions.

**Water quality**

In 2000, stream temperatures in lower Wilson Creek regularly exceeded state standards in August. In 1997 monitoring identified high levels of fecal coliform and nitrate levels believed to be attributed to septic systems and agricultural practices (Wade 2002 and LCFRB 2010).

### 3.8 Elochoman River Drainage

Ecological functions in the Elochoman River drainages are primarily influenced by forest harvest activities in the uplands and headwater areas and agriculture and rural residential development in the mid and lower reaches. The Ecosystem Process Analysis performed for the Inventory and Characterization Report indicates that the highest impacted areas are in the lower and mid reaches containing the floodplain valleys where agriculture and rural development is occurring. Throughout the drainage basin, public and logging road infrastructures limit the river’s ability to migrate throughout the floodplain. Roads throughout the drainage have resulted in impairments to ecosystem functions.
Priority areas for protection are in the floodplain wetlands in the lower reaches of the river near the mouth. Much of the floodplain area throughout the drainage is rated for development due to the highly impaired and/or low quality ecosystem functions. Some restoration priorities are emphasized in the upper basin. Appendix D includes maps of the shoreline reaches that include the varying degrees of impaired reaches within the Elochoman Drainage.

**Loss of habitat**

Salmonid rearing and spawning habitat are limited by fine sediment loading, reduced habitat diversity, loss of key habitat, reduced channel stability and altered flow brought on by land use practices. Predation and poaching is also a factor identified by LCFRB (2010), particularly for chum salmon. Due to the lack of LWD, pool habitat is considered lacking in the Elochoman basin (Wade 2002 and LCFRB 2010).

**Streambed sediment**

In the Elochoman watershed, substrate fine conditions are highly variable. Fines content is generally high in the mainstem and in the lower reaches of tributaries. Gravel content increases as gradient increases. Multiple reaches in the Nelson Creek and North Fork Elochoman have elevated substrate fine conditions (WCD surveys, Wade 2002, LCFRB 2010).

Mass-wasting events result in elevated volumes of sediment delivered to stream channels in a short amount of time. In the Elochoman watershed, forest practices have contributed to many mass failures, however, road erosion is probably responsible for most of the sediment delivery to streams (WDNR 1996, LCFRB 2010).

Sediment supply conditions were evaluated as part of the Integrated Watershed Assessment (IWA) watershed process modeling. The results suggest that nearly the majority of the Elochoman basin is “moderately impaired” with respect to sediment supply influenced by landscape conditions. Relatively high road densities and naturally unstable soils are the primary drivers of the sediment supply impairment (LCFRB 2010). Sediment production from private forest roads is expected to decline over the next 15 years as roads are updated to meet the new forest practices standards, which include ditchline disconnect from streams and culvert upgrades. The frequency of mass wasting events should also decline due to the new regulations, which require geotechnical review and mitigation measures to minimize the impact of forest practices activities on unstable slopes (LCFRB 2010).

Bank stability in the Elochoman watershed is generally good. However, in some areas bank erosion is high in and around agricultural areas due to incision, alluvial soils, and a lack of riparian vegetation on the streambanks. There is some erosion related to road development on the mainstem and some erosion problems on the West Fork and on Nelson Creek. Mass-wasting events are seen as the bigger problem in the Elochoman watershed. In the West Fork, mass wasting is often associated with roads. In the North Elochoman basin, landslide surveys concluded that many landslides were related to forest practices activities (WDNR 1996).

**Impact to riparian condition**

Surveys by the WCD in 2000 noted that approximately 78 percent of the riparian areas surveyed were in “poor” condition (Wade 2002). Poor riparian areas are found in the lower river segments due to impacts from agriculture, grazing, roads, diking, channel straightening and altered species composition. Upper reaches contain riparian vegetation of relatively young age classes with a relatively high deciduous tree composition due to selective harvest of conifers and/or lack of regrowth. Poor riparian
conditions in the Elochoman watershed have also been attributed to mass wasting and debris flows (WDNR 1996).

**Floodplain connectivity and condition**

The Elochoman is diked for the first 1.4 miles upstream from the mouth, and roads and railroads adjacent to the stream limit floodplain connectivity on the lower mainstem Elochoman and the lower portions of lower mainstem tributaries. The lower part of the tributary Nelson Creek is also diked and incised. The Elochoman is highly entrenched within the floodplain where there is a lot of agricultural use. Entrenchment from splash damming is apparent on the middle reaches of the Elochoman, but floodplain connectivity improves in the upper watershed. (Wade 2002).

**Water quality**

Several reaches within the Elochoman River and its tributaries were listed on the State’s 303(d) list of impaired water bodies due to exceedance of temperature standards (WDOE 2012). Water temperature monitoring by WDFW on the Elochoman at the hatchery has recorded numerous excursions beyond temperature criteria. Wahkiakum Conservation District (WCD) monitoring in the summer of 2000 revealed that temperatures in the Lower Elochoman regularly exceed state standards in August and the first half of September. Monitoring in the Upper Elochoman and tributaries revealed cooler temperatures with no exceedance of state standards in 2000 (Wade 2002 and LCFRB 2010). However, more recent 303(d) listings did include upper reaches of the Elochoman River and the West Fork for temperature exceedance (WDOE 2012).

**3.9 Columbia River including Town of Cathlamet and Puget Island**

Ecological functions in and around the Columbia River between Jim Crow Creek and the eastern county boundary is primarily influenced by forest harvest activities in the uplands and by rural residential and agricultural development along the shorelines of the mainland and on Little and Puget Islands. The Ecosystem Process Analysis performed for the Inventory and Characterization Report indicates that the most heavily impacted areas include the shoreline near the mouth of Skamokawa Creek, the Town of Cathlamet, areas surrounding Elochoman Slough, and Little and Puget Islands. Priority areas for protection include wetland areas on either side of the mouth of the Elochoman River and several areas in some of the relatively unimpaired Columbia River Island complexes. Priority restoration areas are primarily on wetlands within the Julia Butler Hansen National Wildlife Refuge. Appendix D includes maps of the shoreline reaches that include the varying degrees of impaired reaches along the Columbia River and in the Town of Cathlamet.

**Loss of habitat**

Access to salmonid rearing habitat (inter-tidal marsh, side and off-channel habitat) has been largely degraded and access cut off in this portion of the Columbia River due to the construction of roads along the river, levee construction (particularly on Puget Island and between Skamokawa and the Town of Cathlamet) and agricultural development. The use of tidegates has also limited access to salmonids and created water quality barriers in some areas including side-channel habitat around the lower Elochoman River and on Puget Island.

**Streambed sediment**

Sediment transport in this reach of the Columbia River is highly manipulated by the hydropower system located up-river outside the County, and by channel dredging in the Lower Columbia River. The river is continuously dredged to maintain the navigation channel. Known sediment erosion issues occur at Cape
Horn on the Wahkiakum County mainland and at Sunny Sands on Puget Island. Wave action from cargo ships and fluvial processes erode the bank resulting in private property issues for landowners.

Pile dikes and shoreline hardening also contribute to channel straightening to keep the navigation channel at the necessary depths. This has resulted in the changes to erosion and depositional processes in this reach of the river.

**Impact to riparian condition**

Riparian condition has been degraded along much of mainstem of the Columbia River. Shoreline riparian areas have been impacted by the construction of levees, agricultural development and the construction of roads along the river. Additionally, many areas also contain invasive species such as Japanese knotweed (*Fallopia japonica*) that can impact the vegetation community, soil structure, and overall habitat quality.

More intensive urban development within the Town of Cathlamet has impacted the shoreline. Shoreline hardening, in-water and over-water structures, impervious roads and structures have degraded the shoreline functions. On Puget and Little Island, development along the shoreline has been particularly impactful as homes, roads, and other structures have changed the structure and riparian function on the islands.

While Wahkiakum County and Town of Cathlamet shoreline has been impacted by various degrees of development, island complexes to the south (in Oregon) provide a variety of riparian and floodplain habitat that is tidally influenced providing salmonids and other species refuge and rearing habit.

**Floodplain connectivity and condition**

Floodplains along the Columbia River exist only in small pockets between Jim Crow Creek and Skamokawa and east of the Town of Cathlamet as much of the shoreline between these locations consists of steep bluffs. Between Skamokawa and the Town of Cathlamet are more extensive floodplain areas that have been largely impacted by the construction of dikes, levees and roads as well as the past development of agriculture in the region. Much of that floodplain is now managed as a National Wildlife Refuge for the Columbia white-tailed deer.

Wahkiakum County also has a series of island complexes from Price Island to Whites Island which have little to no development, with the exception of Puget and Little Islands. These islands, with the exception of notable infestations of invasive species, provide quality habitat structure and function including: nutrient and sediment cycling, fish access and food-web connections.

The Puget and Little Island floodplain has been extensively impacted by agriculture and the construction of levees and dikes. More intensive rural residential development has also appeared on Puget Island, particularly along Birnie Slough, Welcome Slough, and Sunny Sands Road. Rural residential and agricultural development have impacted the floodplain condition by eliminating and/or changing vegetation communities, increased impervious surface area, cutting off the river’s tidal and fluvial influence on the Island’s interior.

**Water quality**

WA DOE has identified several areas within this stretch of the river as both 303(d) and 305(b) listed stretches (2012). Upstream and localized agricultural and urban development contributes to
contaminate and temperature impacts. These listed areas include areas near Skamokawa, the Town of Cathlamet, on the east end of Little Island and east of White’s Island.

On Puget Island, the pump station separating Grove Slough from the mainstem of the Columbia River has resulted in severe water quality issues including temperature and dissolved oxygen. Inputs from nearby farms likely contribute nutrients into the system that cannot be cycled out of the slough due to the pump station.

3.9.1 Town of Cathlamet
Shoreline functions have been significantly impacted in and around the Town of Cathlamet. The Town’s shoreline along the Columbia River is lined with levees and/or other shoreline armoring and shoreline vegetation is substantially limited. Over- and in-water structures are present throughout the Columbia River reaches, often associated with Port properties and private commercial/industrial operations, some active, some relics. An Associated Wetland to the north, along Bernie Creek (a non-SMA stream) near the Town center, has important habitat and water quality functions. However, riparian vegetation is degraded, the creek is slightly entrenched and the floodplain wetland is full of reed canary grass and other invasive species. Additionally, an abandoned fish hatchery structure still exists near the pedestrian crossing potentially causing some fish passage issues. There is impervious development on either side of the wetland that impairs the wetland’s ecological functions.

Settling ponds just south of the Marina were decommissioned in the early 2000’s, and are currently being targeted for a variety of development opportunities including a park. The ponds and the surrounding area present an opportunity both for restoration and public access.

3.10 Germany Creek Drainage
A relatively small section of Mill Creek and the South Fork of Mill Creek, part of the Germany Creek Drainage, are located in Wahkiakum County. Ecological functions in Mill Creek watershed are primarily influenced by forest harvest activities within Wahkiakum County. The Ecosystem Process Analysis included as part of the Inventory and Characterization Report did not identify any particularly low functioning/impaired reaches except areas where Mill Creek are near or intersect logging road infrastructure. Priority areas identified include areas with ecosystem functions largely intact indicating the need for protection/conservation throughout the basin. Appendix D includes maps of the shoreline reaches that include the varying degrees of impaired reaches along Mill Creek.

Loss of habitat
The Mill Creek basin only has one culvert (located downstream of reaches under County shoreline jurisdiction) that is known to restrict fish passage. However, low flow passage problems are believed to be related to channel incision from past splash damming. This issue prevents fish species from moving to spawning habitats above the culvert in Wahkiakum County. Upper reaches have limited side channels due to natural channel and valley confinement. Mill Creek has poor pool habitat in almost 90% of reaches (WCD surveys), with bedrock substrate limiting pool development (LCFRB 2010). Additionally, approximately 90% of Mill Creek lacks adequate quantities of instream LWD due to the overharvest of riparian vegetation.

Streambed sediment
High road densities and naturally unstable soils create a risk of elevated sediment supply from hillslopes. The Mill, basins all have road densities greater than four mi/sq. mi. The frequency of mass wasting events should decline due to updated forestry regulations, which require geotechnical review and
mitigation measures to minimize the impact of forest practices activities on unstable slopes (LCFRB 2010). Sediment production from private forest roads is expected to decline over the next 15 years as roads are updated to meet the new forest practices standards. This includes ditchline disconnection from streams and culvert upgrades (LCFRB 2010).

Impact to riparian condition
The upper basin was harvested extensively in the mid-20th century and is now maturing. As such, riparian function is expected to improve over time on both public and private forestlands. This is due to the requirements under the Washington State Forest Practices Rules Riparian protection has increased dramatically today compared to past regulations and practices.

Floodplain connectivity and condition
Little is known about the floodplain condition in the upper reaches of Mill Creek. Although conditions in the upper reaches are believed to be better than the lower segment located in Cowlitz County, as it was subjected to historic splash damming and currently is restricted from moving within the floodplain due to the presence of Mill Creek Road (Wade 2002 and LCFRB 2010). Degraded downstream conditions present habitat and water quality barriers for migrating fish species.

Water quality
Currently, no SMA reaches in Wahkiakum County are listed as a 303(d) stream. Temperature monitoring of Mill Creek in 2000 determined exceedance of state standards on portions of lower Mill Creek not in Wahkiakum County and on the South Fork of Mill Creek. Temperatures tended to be cooler in upper reaches. WDOE 2012 303(d) list indicates that the mainstem of Mill Creek, above SMA jurisdiction is listed for temperature exceedance. However high temperatures may be an issue in the late summer when flow levels are lowest (Wade 2002). Aluminum toxicity has been identified as a water quality issue in lower Mill Creek (in Cowlitz County).
3.11 Restoration Need Summary

The Table 3.1 summarizes restoration needs based on the information presented above and on LCFRB’s SalmonPORT. This table summarizes restoration priorities based on SMA streams; specific reaches are not called out. Ratings in this table use the highest rating given to a restoration need within that stream. To view specific reaches please view the LCFRB SalmonPORT interactive map. H = High Priority, M = Medium Priority, L = Low Priority. Priority for each waterbody is based on the need for protection and/or restoration. Low priority, for example, may mean that ecosystem functions and habitat are minimally impaired compared to other areas, and/or are protected lands and waterbodies. Additionally, the Ecosystem Process Analysis priorities can be found on a reach by reach basis in Appendix C. Many of the SalmonPORT priorities for Wahkiakum County have also been assessed on a reach by reach basis (SalmonPORT map: http://www.lowercolumbiasalmonrecovery.org/mappage#b), and coincide with the priority areas determined in the Ecosystem Process Analysis. Exceptions include wetland areas beyond the stream reach. The Ecosystem Process Analysis also evaluated associated wetlands.

Table 3.1 Stream Restoration Priorities in Wahkiakum County

<table>
<thead>
<tr>
<th>Restoration Needs</th>
<th>Mill Creek</th>
<th>Naselle River</th>
<th>Salmon Creek</th>
<th>Deep R.</th>
<th>Columbia R. (Both Segments)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Floodplain function and channel Migration Processes</td>
<td>H</td>
<td>M</td>
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<td>Instream Flows</td>
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<td>Off channel and side channel habitat</td>
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<td>Riparian conditions and functions</td>
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<td>Stream channel habitat structure and bank stability</td>
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<td>Regulated stream management for habitat functions</td>
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Table 3.1 Skamokawa Creek Drainage

<table>
<thead>
<tr>
<th>Restoration Needs</th>
<th>Skamokawa Creek</th>
<th>West Valley Creek</th>
<th>Dead Slough</th>
<th>Wilson Creek</th>
<th>Falk Creek</th>
<th>Standard Creek</th>
<th>Skamokawa WF</th>
<th>Skamokawa LF</th>
<th>McDonald Creek</th>
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<tr>
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<td>Klints Creek</td>
<td>Hull Creek</td>
<td>Grays River WF</td>
<td>Fossil Creek</td>
<td>Grays River SF</td>
<td>Crooked Creek</td>
<td>Jim Crow Cr.</td>
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4 Implementation

4.1 Regional Coordination

Many partners are actively engaged in the restoration and protection of shoreline ecological functions in Wahkiakum County. Budget and staff limitations limit the County’s and Town’s ability to independently implement a comprehensive restoration program; however, coordination with the multiple active and interested parties makes the implementation of ecological restoration feasible. Projects can be implemented through partnerships with other agencies, by non-governmental organizations, or private entities. Potential partners include local, state, and federal agencies; non-governmental organizations; private companies; and private land owners.

Currently much of the funding and restoration effort are based on the goals and objectives identified in the Lower Columbia Salmon Recovery and Fish and Wildlife Subbasin Plan (Recovery Plan) (LCFRB 2010). However the SMP and this Restoration Plan are not intended to be solely salmon focused. Many of the LCFRB Recovery Plan projects are “process-focused” projects that help fish, but also serve multiple benefits to a variety of ecosystem functions. The Recovery Plan describes a vision, strategy, and actions for recovery of listed salmon and steelhead species to healthy and harvestable levels, and mitigation of the effects of the Columbia River Hydro system. Recovery of listed species and hydropower mitigation is accomplished at a regional scale. The Recovery Plan for the Lower Columbia Mainstem and Estuary region describes implementation of a restoration and protection approach within several subbasins including WRIA 25, as well as assessments of local fish populations, limiting factors, and ongoing activities that underlie local recovery or mitigation actions. The Recovery Plan was developed in a partnership between the Lower Columbia Fish Recovery Board (Board), Northwest Power and Conservation Council, federal agencies, state agencies, tribal nations, local governments, and stakeholders. [http://www.lcfrb.gen.wa.us/#!library/c1tqm](http://www.lcfrb.gen.wa.us/#!library/c1tqm).

The Lower Columbia Fish Recovery Board has identified priority reaches in WRIA 25 as a continuation of the salmon and wildlife recovery work completed for the Northwest Power and Conservation Council based on the subbasin plan in WRIA 25 (LCFRB 2010). [http://www.lcfrb.gen.wa.us/#!undefined/c1833](http://www.lcfrb.gen.wa.us/#!undefined/c1833)

In WRIA 24, the Washington Coast Sustainable Salmon Partnership (WCSSP) has an updated Washington Coast Salmon Recovery Plan (2013). Most of the plan focuses on areas in Pacific County, but the plan does have applications for the Naselle River and Salmon Creek in Wahkiakum County. [http://www.wcssp.org/index.php/salmon/plan](http://www.wcssp.org/index.php/salmon/plan).

Projects in WRIA 24 and 25 should be process based and provide multiple benefits, rather than only benefit a particular species or habitat. This multiple benefit approach can leverage funds from different funding sources satisfy landowners’ needs to reduce erosion and flood risks, and provide improved water quality and habitat benefits.

One example of the process based approach is the on-going community-based basin-wide effort in both the Skamokawa Creek and Elochoman River basins between private landowners and the Wahkiakum Conservation District. These efforts are largely landowner driven and are multiple benefit projects that address the following:
• Bank stability,
• Salmon habitat enhancement/recovery,
• Riparian revegetation,
• Implementation of agriculture best management practices
• Water quality,
• Sediment delivery, and
• Agricultural/economic viability.

Figure 4.1 and 4.2 below identify priorities according to the community stakeholders in the Skomokowa and Elochoman basins. Similar coordinated efforts could also occur in other basins, particularly in the Grays River watershed where there are problems with bank erosion, flooding, loss of habitat and riparian function.

The Columbia Land Trust (CLT) is pursuing a basin-wide approach in the Grays River to address sediment transport, water quality, degraded riparian zones, bank stability, in-stream habitat, and off-and side-channel habitat issues. The planning effort will draw on community input and is primarily focused on CLT’s past, present and planned work in the Grays River basin.

Lastly, the Wahkiakum County Restoration Partnership could help the Town and County track restoration activities and progress, as well as reassess goals and priorities. This information could, in turn, be reported to Ecology during the eight year review of the Town and County SMP and provide insight into the restoration progress being made in the Town and County.

The Wahkiakum County Restoration Partnership includes Wahkiakum County, the Cowlitz Tribe, Wahkiakum Conservation District, Columbia Land Trust, Lower Columbia Fish Recovery Board, Columbia Land Trust, Lower Columbia Estuary Partnership, Washington Department of Fish and Wildlife, Washington Department of Ecology, National Oceanic and Atmospheric Administration, the U.S. Fish and Wildlife Service and Columbia River Estuary Study Taskforce. At their twice-annual meetings, partners will review and discuss options for restoration efforts, including implementing the recommended actions in this plan. The goal of these meetings will be to match and align priority restoration actions with available resources and funding, ongoing capital improvement projects, and community needs and interests in a systematic and objective way. Projects and actions that are in watersheds or reaches that are noted as having the best potential for restoration (highest priority) would be emphasized. Ideally, the meeting participants would agree on one or more projects/actions to implement in the coming year and assign responsibility for the implementation. Progress toward fulfilling this plan would be tracked and recorded on an annual basis and Wahkiakum County and the Town of Cathlamet would provide a written status report to Ecology by December of each year. The status report would document progress made based on the benchmarks offered in sections 4.5.
Figure 4.1 Skamokawa Creek Community Watershed Project: Status of projects through 2015 and based on LCFRB priority reaches
**Figure 4.2** Elochoman River Community Watershed Project: Project Status through 2015 and based on LCFRB priority reaches
4.2 Funding

Funding to support restoration, protection, monitoring, education, and adaptive management is a key factor limiting the rate and extent of ecological restoration in the County and Town. Available grant funding in the State of Washington is often concentrated on restoring federally listed salmonid populations. There are several state and federal funding sources available for planning and implementing restoration projects. A partial list of public and private funding sources can be found in Table 4.1 and Table 4.2 below.

**Table 4.1 Partial list of public funding sources**

<table>
<thead>
<tr>
<th>Agency</th>
<th>Grant/Program Name</th>
<th>Description</th>
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<tbody>
<tr>
<td>FEMA</td>
<td>Hazard Mitigation Assistance</td>
<td>Funds property and structure relocation, and levee, dike or other flood risk reduction projects.</td>
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<tr>
<td>National Oceanic and Atmospheric Administration (NOAA)</td>
<td>Coastal and Marine Habitat Restoration Project Grants</td>
<td>Funding focuses on coastal habitat restoration projects that aid in recovering listed species and rebuilding sustainable fish populations or their prey.</td>
</tr>
<tr>
<td></td>
<td>Coastal Ecosystem Resiliency Grants</td>
<td>Funds projects supporting resilient coastal ecosystems and communities.</td>
</tr>
<tr>
<td>US Fish and Wildlife Service</td>
<td>Cooperative Endangered Species Conservation Fund (Section 6 of the ESA)</td>
<td>Grants to states to participate in a wide array of voluntary conservation projects for candidate, proposed, and listed species</td>
</tr>
<tr>
<td></td>
<td>Puget Sound Coastal Program (PSCP)</td>
<td>Funds restoration and protection of state, tribal, private or federal lands through interagency projects by providing technical assistance; as well as provide cost-share where appropriate. Funds may be available for work outside of the Puget Sound.</td>
</tr>
<tr>
<td>National Coastal Wetlands Conservation Grant Program (NCWCGP)</td>
<td>NCWCGP funds restoration and protection of coastal wetlands. Local governments and non-profits partner with the state of Washington to develop projects and receive federal funds, which are formally passed through the state.</td>
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<tr>
<td>Recovery Implementation Program</td>
<td>The Recovery Program funds projects in Washington that implement recovery actions which directly contribute to the recovery and conservation of listed threatened or endangered species. Any entity can apply for recovery funds. High priority species and activities which specifically benefit them are the target of this program.</td>
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</tr>
<tr>
<td>Partners for Fish and Wildlife Restoration</td>
<td>Technical assistance and cost-share incentives to private landowners to restore fish and wildlife habitats</td>
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<tr>
<td>USDA Farm Service Agency</td>
<td>Conservation Reserve Enhancement Program</td>
<td>A voluntary, incentive program for private property owners to establish forested buffers along streams where riparian habitat is a significant limiting factor for salmonids. In return, landowners receive annual rental, incentive, maintenance and cost-share payments.</td>
</tr>
<tr>
<td>Natural Resource Conservation Service</td>
<td>Agricultural Conservation Easement Program</td>
<td>Financial assistance to eligible partners for purchasing Agricultural Land Easements that protect the agricultural use and conservation values of eligible land. Eligible partners include Indian tribes, state and local governments and non-governmental organizations. NRCS also provides technical and financial assistance directly to private landowners and Indian tribes to restore, protect, and enhance wetlands through the purchase of a wetland reserve easement.</td>
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<td></td>
<td>Healthy Forests Reserve Program</td>
<td>Provides forest landowners with 10-year restoration agreements and 30-year or permanent easements for specific conservation actions that enhance or measurable increase the recovery of threatened or endangered species improve biological diversity or increase carbon storage.</td>
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<td></td>
<td>Conservation Stewardship Program</td>
<td>Provides payments to private landowners for installing new conservation activities and maintaining existing practices; and supplemental payments for adopting a resource conserving crop rotation</td>
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<td></td>
<td>Environmental Quality Incentives Program</td>
<td>Provides financial and technical assistance to agricultural producers to help land and implement conservation practices that address natural resource concerns and for opportunities to improve soil, water, plant, animal, air and related resources on agricultural land and non-industrial private forestland.</td>
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<td>Agency</td>
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<tr>
<td>Washington Department of Ecology</td>
<td>Floodplains by Design</td>
<td>Funding for projects that restore floodplain habitat and reduce flooding risks.</td>
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<td></td>
<td>Centennial Grants</td>
<td>Provides grants for water quality infrastructure and nonpoint source pollution projects to improve and protect water quality. Eligible infrastructure projects are limited to waste water treatment construction for financially distressed communities. Eligible nonpoint projects include stream restoration and buffers, on-site septic repair and replacement, education and outreach, and other eligible nonpoint activities.</td>
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<tr>
<td></td>
<td>Clean Water State Revolving Fund Loans</td>
<td>The program provides low interest and forgivable principal loan funding for waste water treatment construction projects, eligible nonpoint source pollution control projects and eligible Green projects.</td>
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<td></td>
<td>Coastal Protection Fund, Terry Husseman Account (THA) Grants</td>
<td>Grants from the THA are issued to local governments to restore or enhance the natural environment. Typical projects address water quality issues and fish and wildlife habitat protection or enhancement related needs.</td>
</tr>
<tr>
<td></td>
<td>Clean Water Act Section 319 Grants</td>
<td>The Environmental Protection Agency (EPA) provides Section 319 grant funds to Washington State, and the state is required to provide 40 percent match. The Section 319 program provides grants to eligible nonpoint source pollution control projects similar to the state Centennial program.</td>
</tr>
<tr>
<td></td>
<td>Freshwater Aquatic Invasive Plan Management Program</td>
<td>Funding for technical assistance, public education, and control of aquatic invasive plants.</td>
</tr>
<tr>
<td></td>
<td>Water Pollution Control State Revolving Fund</td>
<td>Provides low interest loans to counties and cities to, in turn, loan money to landowners to repair or replace their failing on site sewer systems.</td>
</tr>
<tr>
<td>Washington Department of Fish and Wildlife</td>
<td>Aquatic Lands Enhancement Account (ALEA) Grants</td>
<td>Funding to buy, protect, and restore aquatic lands habitat and to provide public access to the shoreline.</td>
</tr>
<tr>
<td>Washington Department of Natural Resources</td>
<td>Family Forest Fish Passage Program (FFFPP)</td>
<td>Assists private forestland owners in replacing culverts and other stream crossing structures.</td>
</tr>
<tr>
<td>Washington Recreation and Conservation Office</td>
<td>Land and Water Conservation Fund (LWCF)</td>
<td>Funding to preserve and develop outdoor recreation resources including parks, trails, and wildlife lands.</td>
</tr>
<tr>
<td></td>
<td>Salmon Recovery Funding Board Grants</td>
<td>Funds projects that protect and restore salmon habitat.</td>
</tr>
<tr>
<td></td>
<td>Washington Wildlife and Recreation Program</td>
<td>Provides funding for a broad range of land protection and outdoor recreation, including park acquisition and development, habitat conservation farmland preservation, and construction of outdoor recreation facilities.</td>
</tr>
</tbody>
</table>

### Table 4.2 Partial list of private funding sources

<table>
<thead>
<tr>
<th>Group</th>
<th>Grant Focus</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Burning Foundation</td>
<td>Grants to protect threatened rivers, forests, and native fish populations</td>
</tr>
<tr>
<td>EcoTrust</td>
<td>Whole Watershed Restoration Initiative for projects in Priority Basins including WRIA 25.</td>
</tr>
<tr>
<td>Fish America Foundation</td>
<td>In partnership with the NOAA Restoration Center, grants for community based restoration of marine and anadromous fish species</td>
</tr>
<tr>
<td>National Fish and Wildlife Foundation</td>
<td>Technical Assistance to farmers, ranchers, foresters, and other private landowners to optimize wildlife habitat conservation on private lands. Provides funding on a competitive basis to projects that sustain, restore and enhance the Nation’s fish, wildlife, plants and their habitats.</td>
</tr>
<tr>
<td>Group</td>
<td>Grant Focus</td>
</tr>
<tr>
<td>------------------------------------------------</td>
<td>----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>the Konsgaard-Goldman Foundation</td>
<td>Grants for forest protection and initiatives addressing climate change in Washington State</td>
</tr>
<tr>
<td>The Northwest Fund for the Environment</td>
<td>Grants to protect and restore aquatic ecosystems</td>
</tr>
<tr>
<td>Washington State Parks Foundation</td>
<td>Provides Small and Simple Grants, Individual Grants, and Program Support grants for restoration and education at Washington’s State Parks</td>
</tr>
<tr>
<td>Lower Columbia Estuary Partnership</td>
<td>Funding to support habitat restoration projects. Design and Implementation project funds can be used to support multiple phases of restoration projects including planning and design, permitting, and implementation. Funding is also available for technical assistance. Funding sources are provided by the Bonneville Power Administration, NOAA’s Community-Based Restoration Program and EPA’s Targeted watersheds Grant Program</td>
</tr>
</tbody>
</table>

A key partner group and additional source of funding for projects is the Wahkiakum County Marine Resource Committee (MRC). It is a county-based committee supported by WDFW that carries out local projects and activities and advises county staff and elected officials on issues pertaining to marine resources. The Wahkiakum County MRC is guided by the Washington Ocean Action Plan and is intended to improve scientific knowledge, public understanding, protection and restoration, and management of marine habitats and species and compliment ongoing efforts to preserve and enhance coastal and ocean resources. Information about the Wahkiakum County Marine Resource Committee can be found by visiting [http://wdfw.wa.gov/about/volunteer/mrc/files/Wahkiakum_MR_%20Brochure.pdf](http://wdfw.wa.gov/about/volunteer/mrc/files/Wahkiakum_MR_%20Brochure.pdf). Examples of possible MRC projects include:

- Fish and marine mammal surveys and monitoring
- Lost or derelict fishing gear surveys and removal
- Public workshops
- Providing local schools with marine science field training
- Invasive species identification training and monitoring
- Columbia River estuary debris survey and removal
- Landowner education
- Marine resource based tourism and education
- Water quality monitoring
Funding sources typically apply criteria for scoring and awarding grants. The specific criteria used will depend on the funding source and its priorities. Many of these scoring criteria apply to shoreline functions generally. As an example, Table 4.3 draws from the scoring criteria in the WRIA 24 and WRIA 25 Lead Entity Manuals to propose general criteria for evaluating projects or programs to restore shoreline ecological functions.

Table 4.3 Proposed criteria for evaluating potential actions relative to shoreline ecological functions

<table>
<thead>
<tr>
<th>Project Action</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Restoration Projects</td>
<td>Project addresses and known limiting factor, ecological impairment, or issue identified in Section 3 of this Restoration Plan.</td>
</tr>
<tr>
<td></td>
<td>Project supports the permanent recovery of ecological processes and functions (preferred and/or the project results in a short term improvement in a significantly degraded function.</td>
</tr>
<tr>
<td></td>
<td>Project outcome will be resilient to anticipated changes in ecosystem conditions over time.</td>
</tr>
<tr>
<td>Resource Assessments</td>
<td>The assessment addresses a data gap, which could affect future management decisions.</td>
</tr>
<tr>
<td>Education &amp; Outreach</td>
<td>The program is primarily oriented to residents of Wahkiakum County and/or the Town of Cathlamet</td>
</tr>
<tr>
<td></td>
<td>The program is expected to improve practices of the targeted audience related to the shoreline environment.</td>
</tr>
<tr>
<td>All Actions</td>
<td>The action addresses ecologically sensitive species or habitats.</td>
</tr>
<tr>
<td></td>
<td>The action is cost effective.</td>
</tr>
<tr>
<td></td>
<td>The action is supported by the community.</td>
</tr>
</tbody>
</table>

Many of the grants listed above require match funding. The County and Town could also develop a restoration assistance program to provide seed funding for stakeholders looking to improve ecosystem functions through multiple benefit restoration projects.

4.4 Active and Proposed Restoration Projects

Restoration activities have been constructed and/or planned in all of the basins discussed in this plan. Basins such as the Grays River, Skamokawa Creek and Elochoman River have been a focus for many groups including the Columbia Land Trust and the Wahkiakum Conservation District. The consulting firms Tetratech, ENTRIX, Inc., and Waterfall Engineering, LLC prepared a Grays River Community Habitat Restoration Plan (2009) for the Grays River Work Group, a subgroup of the Lower Columbia Fish Enhancement Board. The plan identifies reaches and restoration project types to address specific issues. The reaches and restoration project types are prioritized based on expected salmonid benefits, consistency with the Columbia River Basin Salmon Recovery Plan and certainty of success (See Appendix B).
Additionally, the Columbia Land Trust (CLT) has been working in lower Deep River, in the upper and lower Grays River basin, between Crooked Creek and Grays River in Grays Bay and in the Elochoman Basin. The Wahkiakum Conservation District (WCD) has been doing invasive species management and working collaboratively with landowners to implement a variety of in-stream and streambank projects in the Skamokawa Creek and Elochoman Basins as discussed in Section 4.1 above.

Recently completed, active and proposed projects throughout the County are listed in Appendix C Reach Priorities and Restoration Opportunities. Restoration opportunities identified in Appendix C are identified by reach. These projects are potential opportunities and would require voluntary permission from landowners and assistance from other partners. Potential projects should ensure that upstream and downstream landowners are not affected by the project without their expressed consent.

While a significant portion of the funding for restoration efforts comes from sources that fund salmonid projects, restoration measures and activities throughout the County should be process-based. Suggested measures and activities include:

**Riparian Restoration and Non-native Vegetation Removal**
These projects are intended for areas that either lack riparian vegetation or have significant non-native vegetation populations. In many cases, riparian plantings and non-native vegetation removal will be part of a larger restoration project effort. However, there are instances when it may be the only proposed treatment. Fencing may be included in this type of project if necessary to keep livestock out of a newly restored riparian area. To achieve the maximum fish and wildlife benefits from riparian restoration it would involve planting native tree and shrub species up to the maximum tree height potential immediately adjacent to the mainstem or tributaries (150 to 200 feet wide); however, this is not always feasible, and narrower riparian restoration should also be considered. In some cases, banks may need to be sloped back to provide a suitable area for planting, or revetments may need to be modified through rock removal and replacement with bioengineered materials and riparian plantings. Additionally, private landowners could utilize the resources of the Marine Resource Committee and the Wahkiakum Conservation District to help control invasive species and plant native species in riparian areas. Overall restoration of riparian areas would benefit water quality, long-term channel morphology, streambank stability and riparian and instream habitat. Planting native vegetation and removing non-native species can likely does occur by local landowners who are merely stewarding their land, however their efforts are not necessarily part of a program and are not tracked. None-the-less, these activities deserve some acknowledgement. They can be seen as a partial counter-balance to the unintended and difficult to track losses of ecological functions that this restoration plan is intended to address.

**Floodplain Restoration and Enhancement**
This would involve enhancing or reconnecting existing floodplain areas that may include side channels, backwaters, or wetlands. Enhancement could include excavation to create channels and/or provide incremental additional frequent flood storage, placement of instream structures to promote scour or stabilize bars, and planting of riparian vegetation.

Floodplain restoration can range from passive to significantly engineered and is a function of adjacent land uses and the flood risk and the level of disturbance that may have occurred on-site. For example, simple reconnection of a side channel through notching of a bank or excavation of a bar in an undeveloped area could be relatively passive, whereas removal and setback of a revetment could require more significant engineering. (Tetratech et al 2009). Floodplain restoration, mentioned above,
would provide additional flood storage capacity, off-channel habitat, food-web connections, nutrient cycling, improvement of water quality in the floodplain, and sediment storage.

**Channel Complexity**
Projects could involve the placement of varying sizes of natural or engineered wood structures, LWD, log jams, or rock/boulders structures. These structures could be designed to create habitat complexity, trap sediment to increase channel stability, scour pools, sort spawning gravel and provide cover. These structures would require engineering to ensure they do not raise flood elevations or cause undesired effects on adjacent properties. In addition to engineered wood structures, riparian vegetation should accompany these types of projects to ensure long-term self-maintenance and inputs of woody debris in the system. (Tetratech et. al 2009).

**Bank Regrading and Stabilization**
This technique is being applied primarily in the Skamokawa basin where agricultural development and historic forestry practices have resulted in large sediment inputs, degraded riparian areas and bank erosion/channel incision. Landowners in the basin have identified bank stability and function as an important concern that needs to be addressed. Landowners, with the help of the Wahkiakum Conservation District, have been regrading banks to reduce incision, and installing large woody debris on the banks to provide short-term bank stability and in-stream habitat. The LWD placed on the banks provides short-term bank stability until riparian vegetation can get established. Bank stabilization enhancement/restoration projects have the potential to provide short-term bank stability and habitat complexity, while providing long-term riparian vegetation benefits that include improved water quality, sediment-trapping, instream and riparian habitat improvements, and long-term wood inputs.

**Tributary Enhancement**
Tributary enhancement projects focus on the lower ends of tributaries and their deltas along the mainstem river. These areas provide a range of habitats for migrating fish. For juveniles, the tributary floodplain deltas provide refuge, cover and foraging areas during downstream migration. Alluvial tributary confluences are dynamic and complex floodplain environments with active sedimentation and channel dynamics that can provide a variety of habitat features including side channels, sloughs, and wetlands. Enhancement features could include placement of in-stream structures, setback of banks to create benches, riparian plantings or bioengineered banks (Tetratech et. al 2009). These projects have the potential to provide multiple benefits including bank stabilization through LWD placement and riparian vegetation succession, water quality improvements, instream and riparian habitat improvements, and long-term wood inputs.

**Side Channel Restoration and Enhancement**
These projects involve restoring and/or reconnecting side channel features, or enhancing an existing side channel. The scale and restoration approach may also vary from project to project. The simplest type of project would involve excavation to remove excess deposited materials to reconnect a remnant side channel. However, because of the heavy sediment load in some river systems, such as the Grays River, it would be necessary to analyze and design a side channel to maintain an opening. A side channel reconnection that is associated with a levee setback or located near adjacent floodplain infrastructure (bridges, houses, pipelines) could require significant engineering and construction work. Restoration can involve restoring historic overflow connections that are currently blocked and enhancement involves placement of cover and riparian plantings. Other types of side channel enhancement include creation of more stable groundwater fed channels for chum and coho spawning and rearing. They can turn into active channels over time and serve multiple functions. (Tetratech et al 2009).
Channel Migration Zone Easements
These projects would involve acquiring conservation easements on properties that are in naturally active channel migration zones to provide fish habitat and flood and sediment storage, and to reduce flood damage risks. Project sponsors would work with landowners on a voluntary basis to determine if there is an opportunity for an acquisition or conservation easement. In general, this type of project will involve only minor engineering and construction (such as riparian plantings) and primarily let the river continue to migrate within a specific area. A setback revetment or levee could also be constructed to protect other lands behind the easement where channel migration is not desired (Tetratech et al 2009).

Removal of Debris, Derelict Structures and Derelict Vessels
Wahkiakum County and the Town of Cathlamet have several areas where derelict over-water structures, piling structures, and derelict vessels create a potential environmental hazard and a health and safety hazard. Abandoning vessels and allowing over-water structures to fall into disrepair in a way that violates SMP standards is not allowed, and there are enforcement mechanisms at the state and local levels that should be used accordingly. However, removal of derelict vessels and abandoned over-water structures can also be considered voluntary restoration. The County and Town should work with the Washington Department of Natural Resources and other partners to prioritize these structures for removal. Garbage and other debris often enter the waterways and impact local wildlife and the aesthetics of Wahkiakum Count’s waterways. Individual responsibility is important, but organizations such as the MCR, school groups, the town, and the County can organize periodic “stream clean-ups”. Finally, debris removal can and does occur outside of programs by landowners and local residents.

4.5 Timing and Benchmarks for Implementation
It is difficult to establish meaningful timelines and measurable benchmarks in the SMP by which to evaluate the effectiveness of restoration planning or actions. Nonetheless, the legislature has provided and overall timeframe for future amendments to the SMP. Once Wahkiakum County and the Town of Cathlamet complete the SMP update, the Town and County are required to review, and if necessary amend, the SMP once every eight years (RCW 90.58.080 (4)). By the time the SMP is up for its next review, the Town and County should have documented progress toward achieving shoreline restoration goals. Restoration projects, goals, and priorities should be documented and discussed in the interim so as to have the information readily available for the eight-year review. With the help of the Wahkiakum County Restoration Partnership, as discussed in Section 4.1, the County and Town can easily compile the information for an SMP Restoration Plan review. Elements in the Restoration Plan review document could include:

- Reevaluating adopted restoration goals, objectives, and policies;
- Summarizing both planning efforts (including application for and securing grant funds) and on-the-ground actions undertaken in the interim to meet those goals; and
- Revising the SMP restoration planning element to reflect changes in priorities or objectives.

Washington Administrative Code (WAC) 173-26-201(2f) requires that the Restoration Plan include timelines and benchmarks for restoration projects in order to achieve the restoration goals identified in Chapter 2 of this Restoration Plan. The projects benchmarks and timelines mentioned below can be carried out by the County or Town; as part of a partnership between the County, Town, tribe, state and/or federal agency, with a non-profit organization; or as an individual (non-County or Town) entity.
While the WAC requires the identification of suggested projects and a timeline and benchmarks to be included in the Restoration Plan, the Town and County are not responsible for implementing projects identified within the Restoration Plan. The County and Town are required to meet the “No Net Loss” requirement and restoration is a suggested way to meet that requirement. As mentioned above, the Town and County could track the progress made by other entities in the County and report that progress during the SMP review periods every eight years. A suggested timeline for implementation of the Restoration Plan is as follows:

Within in one year of adoption of this plan:

- Identify at least two shoreline biostabilization projects within the SalmonPORT priority reaches, apply for funding and initiate steps towards implementation.
- Identify at least two culvert/tidegate replacement projects and apply for funding for feasibility and design of the projects along high priority shorelines.
- Identify at least three potential riparian enhancement projects on high priority shorelines, apply for funding and initiate steps toward implementation.
- Work with WDFW to help identify potential uses/developers for the Elochoman fish hatchery, help with the design and implementation of the side channel creation for chum salmon and remove the passage barrier at the Elochoman fish hatchery
- Work with the Wahkiakum County Restoration Partnership to identify additional projects to pursue.

Within five years of adoption of this plan (assuming funding is available)

- Initiate technical work to support at least one additional large-scale intertidal fill removal, tidegate or culvert removal/replacement on a high priority reaches.
- Begin developing a comprehensive restoration strategy for the Grays River that involves a variety of partners, is basinwide, addresses upstream and downstream sediment issues, fish habitat restoration/enhancement and mitigates the effects of flooding as best as possible, and restores important riparian structures and functions within the watershed.
- Pursue funding for park/trail features, riparian enhancements and invasive species management at Cathlamet’s former sewage lagoons.
- Pursue funding to enhance Bernie Creek and its adjacent wetland areas, to treat for invasive species, remove fish passage barriers and do wetland/riparian native vegetation planting.
- Work with federal and state agencies to strategize and develop a way to utilize dredge disposal material to protect banks along the Columbia River from wave action from shipping traffic and fetch.

Within seven years of the adoption of this plan:

- Complete at least three riparian enhancement projects in priority reaches
- Complete at least two additional biostabilization and instream habitat improvement projects in priority reaches
- Complete technical work to support at least one potential large-scale intertidal fill removal, tidegate or culvert removal/replacement on a high priority reaches.
- Identify two additional riparian enhancement projects in priority reaches
- Identify two additional biostabilization and instream habitat improvement projects on priority reaches.
• Implement actions to protect landowner property along the Columbia River utilizing dredge material to protect from wave action from ships and fetch.

Over time restoration efforts must be evaluated against a set of benchmarks to determine if adequate progress is being made. One way to assess progress will be to track and report on the following general benchmarks:

• Acres of riparian enhancement
• Linear feet of bulkhead removed
• Acres of reconnected floodplain
• Linear feet of road decommissioned
• Acres of wetland restored
• Acres of native vegetation planted
• Acres of invasive vegetation successfully treated
• Number of culverts/tide gates replaced or number of miles of stream open to migration
• Number of creosote structures/pilings removed
• Acres of riparian/nearshore enhancement
• Fewer exceedances of water quality criteria as measured in the state water quality assessment
• Number of restoration actions implemented in conjunction with other projects i.e. same or nearby reaches within the same watershed.
• Number of collaborative projects implemented
• Number of projects tracked via database i.e. SalmonPORT
• Number of landowners participating in stewardship workshops
• Number of partners participating in joint efforts

More specific benchmarks should be developed for specific projects. For example, a project that involves fill removal and intertidal restoration might be evaluated based on the number of acres of upper intertidal habitat, the number of different plant species present or the degree of use by shorebirds. Restoration of estuarine habitat might be evaluated based on the number of fish present or the development of habitat conditions over time.

4.6 Programs
This section describes ongoing or planned programmatic measures identified in the County that are designed to inform and foster shoreline restoration. This section does not address the many assessments that have been completed in the past. The programs identified below are not comprehensive, since additional monitoring, studies, and outreach, beyond those described below, may be planned and would be helpful to understand ecological conditions, inform restoration actions, fill data gaps in the understanding of ecological interactions, and engage private landowners in restoration and protection of ecological functions in the County and Town.

4.6.1 Outreach, Education & Technical Assistance
Based on the Inventory and Characterization Report, approximately 72 percent of the area in shoreline jurisdiction in Wahkiakum County is privately owned. Additionally, land use activities on privately owned lands outside of shoreline jurisdiction are known to play a significant role in hydrologic, water quality, and geomorphic functions and processes of a watershed. As a result, private landowners play a critical role in the condition of shoreline ecological functions. Outreach and education measures that help inform and engage the public to make voluntary actions that limit degradation and/or improve shoreline functions are essential to effectively maintain and restore ecological functions.
Several agencies such as US Fish and Wildlife Service, WDFW, Wahkiakum County Marine Resource Committee, and the Washington State University Extension office are actively involved in public outreach and education. In the future, development of a coordinated natural resource education center or program in the County could be considered. Additionally, the County and its partners could support a program to inform new landowners of shoreline functions and values, shoreline and critical area regulations, and best management practices to conserve shoreline processes and functions. There are similar programs in other jurisdictions that could serve as useful examples.

4.6.2 Incentives
The County could consider offering economic incentives for voluntary restoration efforts. One example of an incentive based program that could be implemented is current use taxation through the Public Benefit Rating System (PBRS). Current use taxation allows property to be taxed at a reduced level based on its worth as agriculture, forestry, or open space. This helps support the continued use of the resource activities that are implemented with a conservation plan in place. Current use taxation parameters are established in Chapter 84.34 RCW and are applied by County assessors across the state. The Open Space current use portion of the program provides enrollees the greatest amount of benefit (value reduction per acre). Counties have the option to install a PBRS that creates a weighted evaluation method that is tied to the percentage reduction the properties taxable assessed value.

The County and Town may provide development incentives for restoration, including development code incentives (e.g., height, density, impervious area or lot coverage). This may serve to encourage developers to try to be more imaginative or innovative in their development designs to include conservation efforts. Examples include:

- installation of rain gardens or other Low Impact Development (LID) stormwater management methods that meet or even go above and beyond DOE requirements,
- shared parking,
- exceeding minimum landscape or open space requirements, or
- other innovative measures that benefit the environment and the community.

Other economic incentives are available through the Natural Resource Conservation Service, which offers a number of programs that offer financial incentives and technical assistance for conservation easements or implementation of specific conservation practices. These programs are typically focused on agricultural and forestry practices. More information on available programs can be found in the Resources for Restoration section below.

4.7 Floodplain Development
Development continues to occur in the floodplain, which reduces the opportunity to systematically reduce flood risk and implement restoration projects. Standards from the National Flood Insurance Program (NFIP) do not necessarily result in reduced flood risk. Local and individual accountability has been supplanted by federal programs for flood control, disaster assistance, and financial incentives that encourage and subsidize floodplain occupation and development. The general pattern of federal disaster response has become firmly entrenched. The minimum floodplain management standards of the National Flood Insurance Program have been accepted by many as the default standards for communities, even though they were designed for the purposes of an insurance program and not necessarily to effectively mitigate flood risks to human life. In view of this nationwide system of federal programs, many local governments, including Wahkiakum County, assume that the minimum NFIP standards provide acceptable flood protection and also allow themselves to become financially
disconnected from the consequences and impacts of their land use decisions. The burden of those impacts-increased flood damage and flood disasters-is transferred from those who make (and benefit from) the local decisions about land use to those who pay for the flood disaster-principally the federal taxpayers.

The Association of State Floodplain Manager’s No Adverse Impact Floodplain Management (NAI) is a floodplain management principle that attempts to address this. The No Adverse Impact philosophy is centered on a community adopted comprehensive plan to manage development that identifies acceptable levels of impact, specifies appropriate measures to mitigate those adverse impacts, and establishes a plan for implementation. No Adverse Impact criteria can be extended to entire watersheds. The plan could be specific only to flood damage or be more robust, encompassing related objectives such as water quality protection, groundwater recharge, or the management of stormwater, wetlands, and riparian zones. Because it is a local initiative, an NAI-based plan moves beyond the concept that floodplain management is something imposed by the federal government. Instead, it promotes local accountability for developing and implementing a comprehensive strategy and plan. With the flexibility to adopt comprehensive, locally tailored management plans (which would be recognized by FEMA and other federal programs as the acceptable management approach in that community) the community gains control of its land use decision-making process and is supported in adopting innovative approaches it considers appropriate for its situation.

The NFIP Community Rating System (CRS) is a voluntary incentive program that recognizes and encourages community floodplain management activities that exceed the minimum NFIP requirements. National flood insurance premiums are discounted to reflect the reduced flood risk resulting from the community actions (classes) that meet the following three CRS Goals:

- Reduced flood damage to insurable property;
- Strengthen and support the insurance aspects of the NFIP, and
- Encourage a comprehensive approach to floodplain management.

Activities that pertain to this restoration plan include floodplain management planning, acquisition and relocation (this may include channel migration zone easements as mentioned in Section 4), hazard disclosure, open space preservation (to provide flood capacity), and higher regulatory standards that address development in floodplains. The No Adverse Impact floodplain management principle could be incorporated in an update of the 2005 Wahkiakum County Comprehensive Flood Hazard Management Plan (CFHMP).

**4.8 Maximizing Mitigation Actions**

Although projects identified in this plan are identified as restoration opportunities, this document may serve as a source to identify large-scale opportunities that could be used to optimize mitigation outcomes where on-site mitigation opportunities are limited due to building site constraints, limited potential ecological gains, or other site-specific factors.

These large-scale mitigation projects could be implemented through concurrent, permittee responsible mitigation, or through mitigation banking or an in-lieu fee program where the permittee pays into a collective fund rather than completing an on-the-ground project. It should be noted that the application of mitigation banking and in-lieu fee programs is not limited to wetlands and could be applied to mitigation for impacts to shorelines and endangered species. Whereas mitigation banking requires capital investment and ecological enhancement prior to the exchange of mitigation debits and credits, an in-lieu-fee program establishes a system in which funds are collected from permittees for
unavoidable impacts, and these funds are pooled and used to implement mitigation projects within
three growing seasons of the impact.

4.8 Tracking, Monitoring, and Adaptive Management

4.8.1 Tracking
The Shoreline Management Act guidelines require that Restoration Plans “…provide for mechanisms or
strategies to ensure that restoration projects and programs will be implemented according to plans and
to appropriately review the effectiveness of the projects and programs in meeting the overall
restoration goals.”

The Habitat Work Schedule (HWS) provides the primary mechanism to track development and
implementation of salmon habitat conservation projects. The Lead Entities in the County continue to
develop their use of the HWS. The HWS has the potential to track restoration actions and funding. The
state’s Project Information System (PRISM) database also provides a means of tracking proposed and
funded projects, and HWS and PRISM are increasingly integrated in the grant application process.

The Lower Columbia Fish Recovery Board tracks projects and identifies priority reaches for restoration
through Salmon On-going Partners Recovery Tracking (SalmonPORT). SalmonPORT provides a
centralized data management system for planning, implementing, tracking and reporting progress in the
Lower Columbia. Information collected in the system is provided for a variety of needs. The website
supports the implementation of the salmon recovery and watershed management plans. The Habitat
Strategy includes reach-specific information on key life-history stages and limiting factors of salmon and
steelhead present in the stream

Additionally, the Washington State Conservation Commission’s Conservation Practice Data System
(CPDS) provides a database that tracks projects and conservation practices on private lands. Together,
these databases provide an overall view of the projects that are proposed, active, and recently
completed in the County.

4.8.2 Monitoring
To ensure no-net loss of ecological functions, monitoring of individual restoration projects and
watershed scale ecological processes is needed. Pre-project monitoring to establish a baseline of
ecological functions at the site scale is needed in order to measure a project’s success in restoring local
ecological functions. Restoration project monitoring should include some investigation of neighboring,
downstream, and regional monitoring results to understand a project’s impact on ecosystem functions
and processes beyond the restoration project site.

Wahkiakum County and the Town of Cathlamet do not have dedicated staff or funds to monitor or
evaluate restoration projects systematically, and will rely on efforts by organizations involved in
restoration activities to supply information on progress toward restoration goals, objectives, and
priorities. While completing the periodic review of the SMP, required every eight years after adoption,
Wahkiakum County and the Town of Cathlamet will evaluate the status and performance of the
restoration opportunities identified in this restoration plan, and other significant restoration projects
that may not be included in this plan.

Restoration projects do typically include monitoring. Restoration project funding sources require some
form of monitoring as a condition of funding. The Wahkiakum County and Town of Cathlamet SMP also
requires that most voluntary restoration projects include at least three years of monitoring as a condition of project regulatory approval. Other SMP provisions address monitoring of restoration projects that are required as a condition of development approval through the mitigation sequence. Monitoring of various watershed and landscape scale ecological functions, processes, and conditions is performed by the Lower Columbia River Estuary Partnership, WDFW, and other agencies.

The Salmon Recovery Funding Board also supports statewide effectiveness monitoring, which is meant to inform future activities to maximize project impacts. Monitoring existing and emergent programs within Wahkiakum County to assess results of different approaches, locations, and concentrations of restoration actions will be helpful to inform adaptive management of restoration actions and strategies. Additionally, the Lower Columbia Estuary Partnership (LCEP) manages a programmatic approach to effectiveness monitoring for projects in the Columbia Estuary to support the Columbia Estuary Ecosystem Restoration Program (CEERP) and the broader estuary restoration effort. Effectiveness monitoring in the Columbia Estuary has established monitoring protocols that project sponsors can use so that collected data can be comparable across restoration projects. However, effectiveness monitoring is not generally required for individual projects, and funding for effectiveness monitoring is generally limited (and depends on the funding source).

4.8.3 Adaptive Management
In addition to regional effectiveness monitoring, the County and its restoration partners should continue to periodically re-assess and refine restoration criteria and regional strategies. This type of adaptive management acknowledges that our current understanding of fish, wildlife, plants, habitats and the ecological processes supporting them is incomplete but continually expanding and improving. Additionally, natural variability occurs and may contribute to ecological resilience. Adaptive management should occur on an ongoing basis to ensure that management responds to emerging science, such as changing climatic conditions and conservation needs.

4.9 Obstacles & Challenges
Obstacles and challenges to implementing this restoration plan are described below.

- **Lack of project funding:** Restoration funding opportunities are limited and allocation of these monies is competitive. Some state allocated restoration funds are prioritized for other regions.

- **Lack of start-up and exploratory support:** This restoration plan is intended to be implemented on a voluntary basis, and as such the projects typically require substantial landowner and stakeholder collaboration. Significant time and effort go into building the relationships needed to design and implement projects. Even though funding may be available to design or implement restoration, support for the organizers and coordinators to work with landowners on initial project development is limited.

- **Perception of negative impacts and value conflicts:** Some County residents including some landowners and neighbors of potential restoration sites may have concerns that restoration projects may increase flood risks, lead to more regulation, or reduce the local government tax base. Others are concerned that restoration projects reduce the amount of land available to support traditional agricultural livelihoods or other valued opportunities such as residential subdivisions.

- **Project permitting:** Obtaining necessary permits from regulatory agencies requires substantial time and effort. Restoration projects may take a year or more to secure permits. In some cases,
certain types of restoration projects may not be permittable. For example, Wahkiakum County adopted a moratorium on levee and dike breaching projects in 2014. The moratorium has since expired.

- **Future development:** Shoreline restoration project success may be influenced by activities taking place outside of the shoreline jurisdiction. Knowing where alternative types and intensities of development will be permitted to occur in the future both in and outside of the shoreline jurisdiction should inform restoration priorities. Currently, Wahkiakum County is working towards updating its Comprehensive Plan, which should help restoration implementers understand potential interactions between future development and potential restoration projects.

**Literature Cited**

CREST, 2016. Shoreline Inventory and Characterization Report, prepared for Wahkiakum County and Town of Cathlamet Shoreline Master Program Update.


WDFW Stream Habitat Restoration Guidelines (2012)