

City of Duvall Shoreline Master Program Update Final Draft Restoration Plan

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Deliverable for Task 4.1

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Committee and King County comments)



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CHAPTER 1. INTRODUCTION

The City of Duvall (City) is conducting a comprehensive Shoreline Master Program (SMP) update with the assistance of a grant administered by the Washington State Department of Ecology (Ecology) (SMA Grant No.G100025). According to Substitute Senate Bill (SSB) 6012, passed by the 2003 Washington State Legislature, cities and counties are required to update their SMPs consistent with the state Shoreline Management Act (SMA), Revised Code of Washington (RCW) 90.58 and its implementing guidelines, Washington Administrative Code (WAC) 173-26 (Ecology SMA Guidelines). The City, along with other local jurisdictions, is required to develop a shoreline restoration plan as part of the SMP update process.

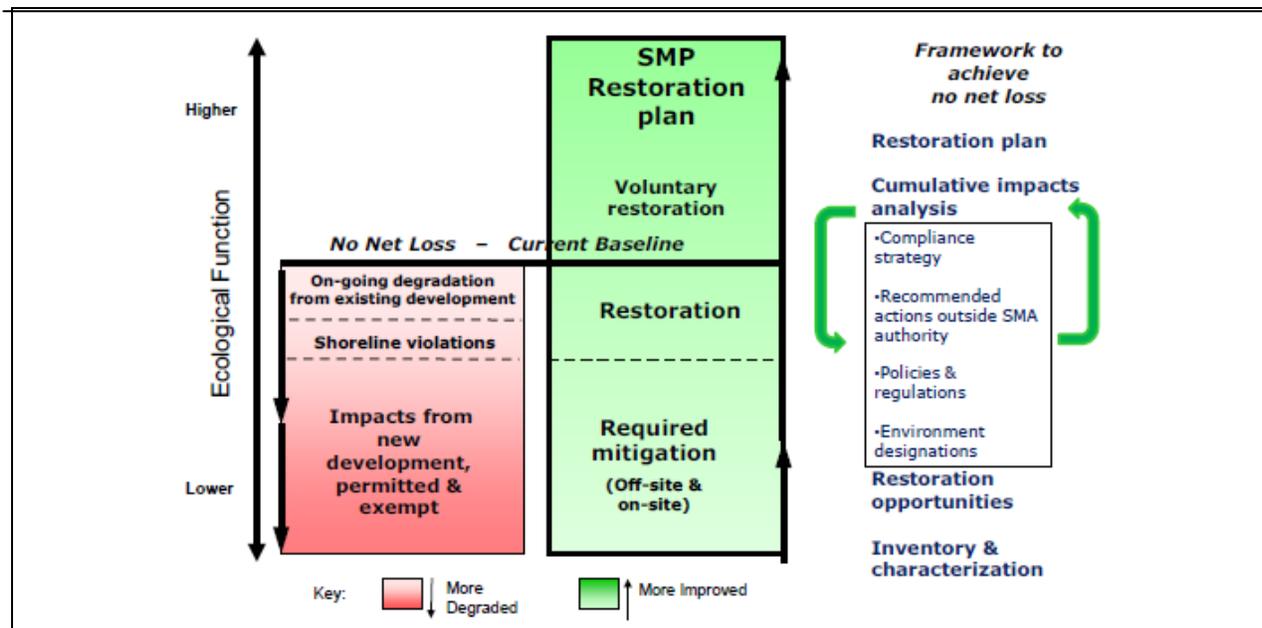
Regulatory Background

The State has directed local governments to develop SMP provisions “...to achieve overall improvements in shoreline ecological functions over time when compared to the status upon adoption of the master program.” This overarching goal is accomplished primarily through two distinct objectives:

- **Protection** of existing shoreline functions through regulations and mitigation requirements to ensure “no net loss” of ecological functions from baseline environmental conditions; and
- **Restoration** of shoreline ecological functions that have been impaired from past development practices or alterations.

This distinction is illustrated in Figure 1 below.

Figure 1. Mitigation versus Restoration in Shoreline Master Programs



Source: Department of Ecology

The concept of no net loss of shoreline ecological function is embedded in the SMA and in the goals, policies and governing principles of the shoreline guidelines. The State's general policy goals for shorelines of the state include the "protection and restoration of ecological functions of shoreline natural resources." This goal derives from the SMA, which states, "permitted uses in the shoreline shall be designed and conducted in a manner that minimizes insofar as practical, any resultant damage to the ecology and environment of the shoreline area." The governing principles of the guidelines further clarify that protection of shoreline ecological functions is accomplished through the following (WAC 173-26-186):

- Meaningful understanding of the current shoreline ecological conditions;
- Regulations and mitigation standards that ensure that permitted developments do not cause a net loss of ecological functions;
- Regulations that ensure exempt developments in the aggregate do not result in net loss of ecological functions;
- Goals and policies for restoring ecologically impaired shorelines;
- Regulations and programs that fairly allocate the burden of mitigating cumulative impacts among development opportunities; and
- Incentives or voluntary measures designed to restore and protect ecological functions.

The restoration planning component of the SMP is focused on voluntary mechanisms, not regulatory provisions. However, the restoration framework developed for these non-compensatory mitigation projects can also be applied to compensatory mitigation projects. In this way, all efforts to improve ecosystem functioning are coordinated, and will be designed to work together.

Defining Restoration

There are numerous definitions for "restoration" in scientific and regulatory publications. Specific elements of these definitions often differ, but the core element of repairing damage to an existing, degraded ecosystem remains consistent. In the SMP context, the WAC defines "restoration" or "ecological restoration" as:

"...the reestablishment or upgrading of impaired ecological shoreline processes or functions. This may be accomplished through measures including, but not limited to, revegetation, 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(27)).

The emphasis in the WAC is to achieve overall improvement in existing shoreline processes or functions, if these functions are impaired. Therefore, the goal is not to restore historic conditions, but rather to improve on existing, degraded conditions. In this context, restoration can be implemented through a combination of programmatic measures (such as surface water management; water quality improvement; public education) and site-specific projects (such as

culvert removal and/or riparian plantings). This restoration plan focuses on the City as a whole rather than parcel by parcel, or permit by permit.

Key Elements of Restoration Planning in the SMP Update Process

The State guidelines provide six key elements for shoreline restoration planning as part of a local jurisdiction’s master program, as outlined in WAC 173-26-201(2)(f). These elements are summarized below in Table 1-1, and provide the organization and content for this report.

Table 1-1. WAC Requirements for Restoration Plans

Key elements for the shoreline restoration planning process WAC 173-26-201(2)(f)	Where addressed in this report
Identify degraded areas, impaired ecological functions, and sites with potential for ecological restoration.	Chapter 2 – Summary of Existing Shoreline Functions
Establish overall goals and priorities for restoration of degraded areas and impaired ecological functions.	Chapter 4 – Restoration Goals, Priorities, Sites, Projects, and Programs
Identify existing and ongoing projects and programs that are currently being implemented which are designed to contribute to local restoration goals.	Chapter 3 – Existing Restoration Projects and Programs
Identify timelines and benchmarks for implementing restoration projects and programs and achieving local restoration goals.	Chapter 6 – Timelines, Benchmarks, and Measuring Effectiveness
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 (e.g., monitoring of restoration project sites).	Chapter 6 – Timelines, Benchmarks, and Measuring Effectiveness
Identify additional projects and programs needed to achieve local restoration goals, and implementation strategies including identifying prospective funding sources for those projects and programs.	Chapter 4 – Restoration Goals, Priorities, Sites, Projects, and Programs Chapter 5 – Implementation Strategies and Funding Sources

CHAPTER 2. SUMMARY OF EXISTING SHORELINE FUNCTIONS

Shoreline restoration planning begins with the identification of “degraded areas” or areas with “impaired ecological functions.” The following summary relies on the *City of Duvall Shoreline Inventory and Characterization Report* (ESA, 2011) and the findings of the following reports: *Salmonid Habitat Limiting Factors Analysis: Snohomish River Watershed, WRIA 7* (Haring, 2002); *Stream Habitat Assessment for the City of Duvall* (Herrera Environmental Consultants, 2006); *Fish Restoration Plan for the City of Duvall* (Herrera Environmental Consultants, 2002); and *Landscape Analysis for Critical Areas Ordinance Update* (Parametrix, 2005).

Regional and Watershed Overview

The City of Duvall is situated in the lower Snoqualmie River Watershed in King County on the east side of the Snoqualmie River at river mile (RM) 9. From the mouth of the river to Snoqualmie Falls (RM 40.3), the main stem is a meandering, partially confined, low gradient river (Haring, 2002). Upstream of the falls, which is a barrier to anadromous fish, the stream gradient is much greater. The Snoqualmie River originates in the forested hills of the Cascade Mountain Range, flows for approximately 50 miles and is fed by several tributaries including the South, Middle, and North Forks of the Snoqualmie above the falls, and Tokul Creek, Raging River, Patterson Creek, Griffin Creek, Harris Creek, Tolt River, Tucker Creek, and Cherry Creek below the falls.

Immediately downstream (north) of Duvall, Cherry Creek drains to the mainstem from the east. Cherry Creek is the lowest significant tributary of the Snoqualmie River, and the only significant tributary that drains areas of the City. The Cherry Creek system provides significant Chinook spawning and juvenile rearing habitat within the lower Snoqualmie Watershed. The mainstem of Cherry Creek never passes into the City or UGA; non-shoreline tributaries to Cherry Creek drain the northeastern portion of the City. North of the City of Duvall, the Snoqualmie River flows through valley bottom, agricultural lands for approximately nine miles before joining the Skykomish River; downstream of the convergence, the rivers together are named the Snohomish River. The Snohomish River drains to Puget Sound at Everett. These three rivers—Snohomish, Skykomish, and Snoqualmie—and their tributaries together drain a watershed (Water Resource Inventory Area (WRIA) 7) of 1,856 square miles located in both Snohomish and King Counties (Snohomish County, 2006).

Existing Shoreline Ecological Functions in the City of Duvall

Shoreline habitat within the City of Duvall includes the east bank (or right bank) of the Snoqualmie River, floodplain wetlands, as well as Coe-Clemens Creek and Thayer Creek. The Cherry Creek drainages and Rasmussen Lake are not included in the shoreline habitat analysis, but they are discussed in later sections that discuss watershed restoration projects. Existing shoreline ecological functions for the City are summarized as follows:

- Riparian cover along the Snoqualmie River and tributary streams stabilizes banks, filters out pollutants, lowers water temperature due to shading, provides a source for woody

debris that benefits fish habitat. Riparian vegetation along the Snoqualmie in Duvall has been described as in “better condition” than reaches upstream and downstream, however is also detailed as degraded (Solomon and Boles, 2002). Forested riparian vegetation varies along the City’s shoreline, from non-existent to approximately 100 feet in width.

- The entire Duvall floodplain area provides water storage during overbank flood events, dampening downstream flooding effects.
- Permeable soils in the floodplain and in riparian areas provide infiltration and ground water recharge.
- Groundwater that moves through the Duvall hillside provides a source of hydrology for wetlands mapped at lower elevations which feeds into the larger network of the Snoqualmie River watershed.

Impairment of Shoreline Ecological Functions

An examination of impaired shoreline functions warrants a brief look at the historical conditions of Snoqualmie River from a watershed and reach perspective. Prior to European settlement, large, permanent Native American winter villages were located along the Snoqualmie and Snohomish Rivers where people thrived by fishing for salmon, hunting mammals over land, and gathering native fruits, vegetables, and berries (City of Duvall, 2006). Historical records indicate that the main stem river from RM 2 to 12 (including what is now Duvall) was a large scrub-shrub wetland that covered the valley floor and absorbed up to eight feet of flood waters for many months of the year (Haring, 2002). Another large wetland was located along the main stem between Duvall and Carnation. These wetlands were once important rearing habitats for juvenile salmon (Haring, 2002).

Beginning in the 1870s, when the first Euro-Americans settled in the Duvall vicinity, the Snoqualmie River Valley gradually transformed from vast forest land and scrub-shrub land to agricultural fields and, more recently, to expanding suburban growth from the Seattle urban area. Native vegetation was cleared, wetlands were diked and drained to create pastures and cropland; and the Snoqualmie River banks were hardened. Shoreline hardening and bank simplification was in most instances informal, likely completed by agricultural property owners, as well as documented placement of automobiles and other hardening structures along the banks of the river.

Agricultural activities remain a significant regional economy and floodplain-wide land use today, with cattle and dairy operations, produce and crop farms, and greenhouse operations extending up and down the valley. However, residential housing and associated service businesses have come to characterize Duvall and other urbanized areas of the watershed.

Table 2-1 summarizes impairments to the ecological functions of the shoreline habitat in the city caused by human activities. As indicated in the second column of the table, some of these changes are a result of urbanization across the entire watershed, while others can be linked more closely to local changes within the shoreline planning area.

Table 2-1. Summary of Shoreline Ecological Processes and Impairments – City of Duvall

Ecosystem Process	Causes of Impairment to Ecosystem Process
Hydrology	<p>Diking, draining, and bank armoring has reduced channel complexity, decreased floodplain connectivity and caused higher flow velocity and water depths. Snoqualmie River is incised through Duvall and banks are actively eroding.</p> <p>Increased impervious surfaces in developed areas have increased surface runoff and sedimentation.</p> <p>In-stream gravel mining upstream of Duvall and other upstream basin development may have caused incision of the riverbed.</p>
Water Quality	<p>Loss of riparian canopy and impoundments contribute to elevated water temperatures in tributary streams (Coe-Clemons Creek and Thayer Creek).</p> <p>Changes in land use have depleted forest resources and increased input of pollutants to the river, including metals (roadway runoff) and potentially phenols and other pollutants.</p> <p>Fecal coliform and excess nutrients in runoff from agricultural and residential areas are likely due to livestock and possibly septic system sources outside of the City.</p>
Biological Resources	<p>Construction of revetments and the railroad corridor has disconnected the Snoqualmie River from its floodplain and reduced off-channel habitat. (These changes also impair hydrologic functions)</p> <p>Filling and draining of wetlands has reduced fish refugia as well as habitat for amphibian and terrestrial species associated with the river.</p> <p>Channelization, undersized culverts, lack of riparian vegetation and LWD degrade fish habitat in Coe Clemens and Thayer Creeks.</p>
Sediment Generation and Transport	<p>Disconnection of river from its floodplain and some associated wetlands has altered sediment supply and transport.</p> <p>Changes in land use have increased input of sediment to the river through tributary systems.</p>

CHAPTER 3. EXISTING RESTORATION PROJECTS AND PROGRAMS

This chapter describes recent and ongoing projects and programs, undertaken by the City and other entities, to protect and restore aquatic resources in the City's Snoqualmie River shoreline area, as well as within the Coe-Clemons, Thayer, and Cherry Valley watersheds.

City of Duvall

Stormwater Management

The City manages the conveyance and treatment of stormwater runoff according to the 1997 City of Duvall Stormwater Management Plan and subsequent updates. New residential and commercial development and redevelopment follows the standards of the adopted stormwater regulations. Stormwater improvements planned for 2011 to 2016 are outlined in the City's Capital Facilities Element (2010), which is a 6-year, comprehensive capital improvement plan. Coe-Clemens Creek from 3rd Street to Main Street is targeted to receive \$300,000 in local funds for stormwater improvements.

The City received a Phase II municipal stormwater permit in 2007 under the National Pollutant Discharge Elimination System (NPDES) program administered by Ecology in conjunction with the U.S. Environmental Protection Agency. The City complies with the education, maintenance, mapping, and monitoring elements of the NPDES Phase II permit. Additionally, the City incorporates operation and maintenance measures such as street sweeping, catch basin and pipeline cleaning, detention pond and tank cleaning, and emergency spill response to benefit the water quality of downstream receiving waters. Details of the NPDES permit and permit compliance are summarized in the City's NPDES Annual Report which can be found at the City's website or City Hall.

Coe-Clemens Creek and Wetlands Restoration

The City is restoring lower Coe-Clemens Creek and associated wetlands in a multi-phased, long-term approach. The first phase involved planting approximately 200 lineal feet of native vegetation in the Coe-Clemons wetland complex and 600 lineal feet of native vegetation along Coe-Clemons Creek. Two beaver deceiver devices were installed to discourage beaver dam construction that may impede fish migration in the stream. The upstream end of the devices were submerged and protected from beaver blockage by wire fencing. The next phase of this project are in need of funding; restoration components under consideration for the next phases include enhancing 165 feet of stream channel upstream of the Snoqualmie Valley Trail, installing large wood structures, preparing a sediment budget survey, and acquiring land.

In 2009, the City of Duvall (utilizing a Snoqualmie Watershed Forum-King Conservation District grant) planted a half acre of wetland and stream buffer along Coe Clemmons Creek in Depot Park. The project also showcased interpretive signage and a pervious concrete walkway.

Thayer Creek Culvert Removal

In 2003 and 2004, the City removed two Thayer Creek culverts within the Snoqualmie floodplain, restoring the channel and surrounding riparian vegetation and replacing the culverts with precast concrete bridge spans. The one lane bridges maintained essential maintenance access to McCormick Park and City utility facilities, while improving fish passage through the lower portions of the stream. The project was completed primarily with King Conservation District (KCD) funds.

Invasive Plant Removal

The City received a minor grant (\$4799) in 2010 from the Snoqualmie Watershed Forum for knotweed removal along the Snoqualmie River and in the floodplain. The City has utilized grant funding for implementing knotweed removal on publically owned lands, and has been coordinating and providing outreach to private property owners to extend control efforts.

Snoqualmie Watershed Forum

The Snoqualmie Watershed Forum is a partnership between King County, the Snoqualmie Tribe, and the cities of Duvall, Carnation, North Bend and Snoqualmie. These partners have entered into an agreement to work together on watershed recovery issues. Members include elected officials from each of the six jurisdictions, three citizen representatives, a non-profit representative and a KCD representative. The Forum provides a mechanism for coordinating and implementing water resource and habitat projects in the Snoqualmie and South Fork Skykomish Watersheds. In collaboration with KCD, Forum provides nearly \$700,000 annually in conservation grants to habitat restoration, acquisition, stewardship and education projects in the Snoqualmie and South Fork Watersheds. The Snoqualmie Watershed Forum has been an active partner in the Snohomish Basin (WRIA 7) Salmon Recovery Forum since 1998 and was a core contributor to the Snohomish Basin Salmon Conservation Plan.

Several restoration projects for the Snoqualmie Watershed are outlined in *Snoqualmie 2015: Building for Salmon Recovery and Watershed Health* (King County, 2006), a 10-year visioning document for protecting and restoring natural resources that benefit salmon populations, including floodplain recovery and reconnecting off-channel habitat. The report provides descriptions, maps, status, budget and contact information for 41 restoration projects and 10 habitat protection projects in the Snoqualmie River Watershed. One of the identified restoration projects in the report is the Coe-Clemens Creek and Wetland Restoration project described above under the list of City efforts. Two other restoration projects in the Snoqualmie Watershed are noted, upstream of Duvall: floodplain restoration efforts along the lower Tolt River, immediately upstream of the confluence with the Snoqualmie, and at the Chinook Bend Natural Area, a 59-acre site immediately downstream of the Carnation Farm Road Bridge. .

Puget Sound Salmon Recovery

The City of Duvall is one of 44 jurisdictions participating in the Puget Sound Salmon Recovery Plan (Shared Strategy for Puget Sound, 2005). The plan provides regional strategies to address in-stream flow, water quality, forest management and other issues that affect salmon recovery across multiple watersheds. While the plan does not identify site-specific restoration actions

within the City of Duvall, restoration actions in the shoreline management area and surrounding areas have indirect benefits to salmon habitat in the Puget Sound basin.

Non-profit Organizations and Agricultural Landowner Partnerships

A number of non-profit organizations are active in restoration activities and public education in the vicinity of Duvall and in the greater Snoqualmie Watershed. **Stewardship Partners** work with agricultural landowners throughout the lower Snoqualmie Valley to implement habitat enhancement projects such as invasive species removal, native plant installation and maintenance, fish passage improvements, and wetland and riparian restoration. One of their projects partnered with the Snoqualmie Watershed Forum and HerbCo Farms, involving removal of Japanese knotweed and Himalayan blackberry on the west bank of the Snoqualmie River across from the City. Efforts extended along Tuck Creek, and included voluntary riparian plantings. Another local Stewardship Partners project is with Cherry Valley Dairy (agricultural landowner) and involves removing fish barriers on Rasmussen Creek and planting native vegetation along 1,200 feet of stream bank. This project is located at the north end of the City and is also being completed in partnership with the Washington Department of Fish and Wildlife (WDFW).

The **Wild Fish Conservancy** has completed stream habitat enhancement projects on Weiss Creek between Duvall and Carnation. Wild Fish Conservancy has completed extensive water quality and fish monitoring projects in Cherry Valley on the north boundary of Duvall. They are also planning restoration projects including: the Cherry Creek Relict Channel, Waterwheel Creek floodplain restoration, and Upper Waterwheel Creek stream restoration projects. The conservancy conducts research and monitoring projects in rivers, on lakes, and in near-shore marine habitats throughout the Pacific Northwest.

Sound Salmon Solutions (formerly the Stilly Snohomish Fisheries Enhancement Task Force) worked with the City of Duvall to re-establish native riparian vegetation, provide education on public land, and lead community-based habitat restoration. Community and student volunteers planted thousands of native trees and shrubs on 12 acres at McCormick Park, primarily within a 200 foot riparian zone along the Snoqualmie. Planting efforts extended throughout the majority of the riparian corridor within McCormick Park; however flood flows in late 2009 damaged and killed a significant portion of the installed vegetation. Funding for this project came from King County Conservation District, US Fish and Wildlife Service, and Hong Kong Shanghai Banking Corporation.

Restoration Logistics, a private restoration contractor, is currently implementing an invasive weed control and riparian restoration along Rasmussen Creek. The project encompasses private land and the City's 4th Ave. Open Space.

CHAPTER 4. RESTORATION GOALS, PRIORITIES, PROJECTS, AND PROGRAMS

This chapter describes the shoreline restoration goals, objectives, and priorities for Duvall. These represent a combination of issues identified in: *Snohomish River Basin Salmon Conservation Plan* (Snohomish Basin Salmon Recovery Forum, 2005); *Salmonid Habitat Limiting Factors Analysis: Snohomish River Watershed, WRIA 7* (Haring, 2002); *Fish Restoration Plan for the City of Duvall* (Herrera Environmental Consultants, 2002); *Landscape Analysis for Critical Areas Ordinance Update* (Parametrix, 2005); and *McCormick Park Reconnaissance / Opportunities and Constraints Assessment* (ESA Adolfson, 2009), plus other degraded shoreline functions identified in the Inventory and Characterization Report.

By necessity, some of the goals and objectives extend beyond the City's shoreline jurisdiction to the entire Thayer, Coe-Clemons, and Cherry Valley subbasins draining the City. For example, restoration of hydrologic functions in lower reaches of Co-Clemons Creek will require continued efforts to address stormwater and recharge issues across the entirety of the stream basin. Likewise, Cherry Creek and many of the tributaries draining the northern portions of the City, provide important Chinook spawning and / or rearing habitat.

For each goal listed below, this plan provides potential restoration sites, projects, and/or programs that the City can use to achieve the objectives. Prioritization is provided for each objective. Prioritization is rated as 'high', 'medium', 'or 'low' based on emphasis within existing watershed- and city- focused restoration planning documents as well as best professional judgment. Potential restoration focus areas for each goal are depicted on Maps 9a and 9b in the Inventory and Characterization – Appendix A, Shoreline Map Folio.

High priority projects will typically:

- a) Address multiple ecosystem processes and/or functions (e.g., habitat and water quality process);
- b) Have substantial opportunity for multiple funding sources; and / or
- c) Be included and highly prioritized in WRIA and City restoration plans.

Medium priority projects will typically:

- a) Address limited ecosystem processes and/or functions;
- b) Be eligible for multiple funding sources; and / or
- c) Be included and moderately prioritized in WRIA and City restoration plans.

Low priority projects will typically:

- a) Benefit single ecosystem functions;
- b) Not be eligible for multiple funding sources due to minimal prioritization in WRIA and City restoration planning reports; and / or
- c) Require property acquisition or be outside of the City's control (e.g., UGA).

In addition to prioritization, feasibility is identified for each restoration objective. Feasibility (rated as ‘straightforward’, ‘moderately complex’, and ‘challenging’) provides an assessment of the scale and potential length of time required to implement restoration opportunities.

- **Straightforward** restoration projects include those that could be implemented by local landowners and volunteers and could occur with minimal need for planning and agency (other than City) permitting. These projects could be implemented in the near term, depending on grant cycles and coordination with volunteer and community organizations.
- **Moderately complex** restoration projects include those objectives with high to moderate prioritization, however would require significant resources for planning, permitting and implementation.
- **Challenging** restoration projects could be those that require coordination with other jurisdictions or that cover larger land areas. These projects would be very difficult to implement and would require significant planning and permitting.

As detailed restoration assessment and prioritization occurs consistent with this plan, the initial assessment of timelines should be re-focused to create detailed schedules and benchmarks for those actions and areas with the greatest restoration potential. Partner organizations that can provide technical assistance or funding for restoration projects are discussed in the next chapter.

Goal 1: Protect, maintain, and enhance the existing shoreline and riparian functions along the Snoqualmie River

Objective 1-B: Restore shoreline bank conditions on the Snoqualmie River to enhance edge conditions.

Priority: High

Potential Restoration Sites, Projects, or Programs: Improving edge condition along the Snoqualmie River is identified as a high priority within the Snohomish Basin Salmon Conservation Plan (2005). Shoreline hardening and bank simplification is common along the City’s Snoqualmie River shoreline. Existing bank protection consists primarily of rip rap and is focused along the Taylor’s Landing Park and Riverside Village shorelines; minimal large woody structure is present along the shoreline throughout the City. One priority project could include removal of any unnecessary rip rap along the Snoqualmie River, such as the revetment located downstream of the Taylor’s Landing boat ramp. Shoreline restoration projects could be completed near tributary stream mouths and during redevelopment of areas with existing hardened shorelines, and could incorporate bioengineering techniques to provide channel edge

Feasibility: Moderately complex

Objective 1-B: Remove invasive plants and install native riparian trees, shrubs, and groundcover.

Priority: Moderate (invasive plant control and removal) / High (riparian restoration)

Potential Restoration Sites, Projects, or Programs: Increase of riparian forest cover is identified as a high priority within the Snohomish Basin Salmon Conservation Plan (2005). The southern shoreline between Thayer Creek and the unnamed channel has been identified as lacking riparian cover (ESA, 2011). This area would benefit from dense native plantings of shrubs and trees to increase shading and a future source of LWD. Other locations that would benefit from riparian plantings include open space areas at Taylor's Landing, adjacent to the river within the northern portion of McCormick Park, and along the Snoqualmie Valley Trail corridor.

The shoreline throughout Duvall has patches of non-native invasive weeds such as Himalayan blackberry, Japanese knotweed (just upstream of NE Woodinville-Duvall Road as well as other locations), and reed canarygrass. For restoration efforts entirely focused on control and removal of invasive plants, removal of Japanese knotweed should be prioritized over the more established invaders (blackberry and reed canarygrass). Watershed-wide knotweed control efforts place higher priority on upstream areas (well south of Duvall); however, City efforts to control the spread of knotweed within the tributary streams will help control the prevalence of knotweed throughout the Duvall landscape. Native plant installation and establishment of a native canopy and understory should be the primary approach to suppress invasive species growth and prevent recolonization.

Feasibility: Straightforward

Goal 2: Enhance existing and evaluate creation of new off-channel habitat along the main stem river through Duvall for the benefit of salmon recovery.

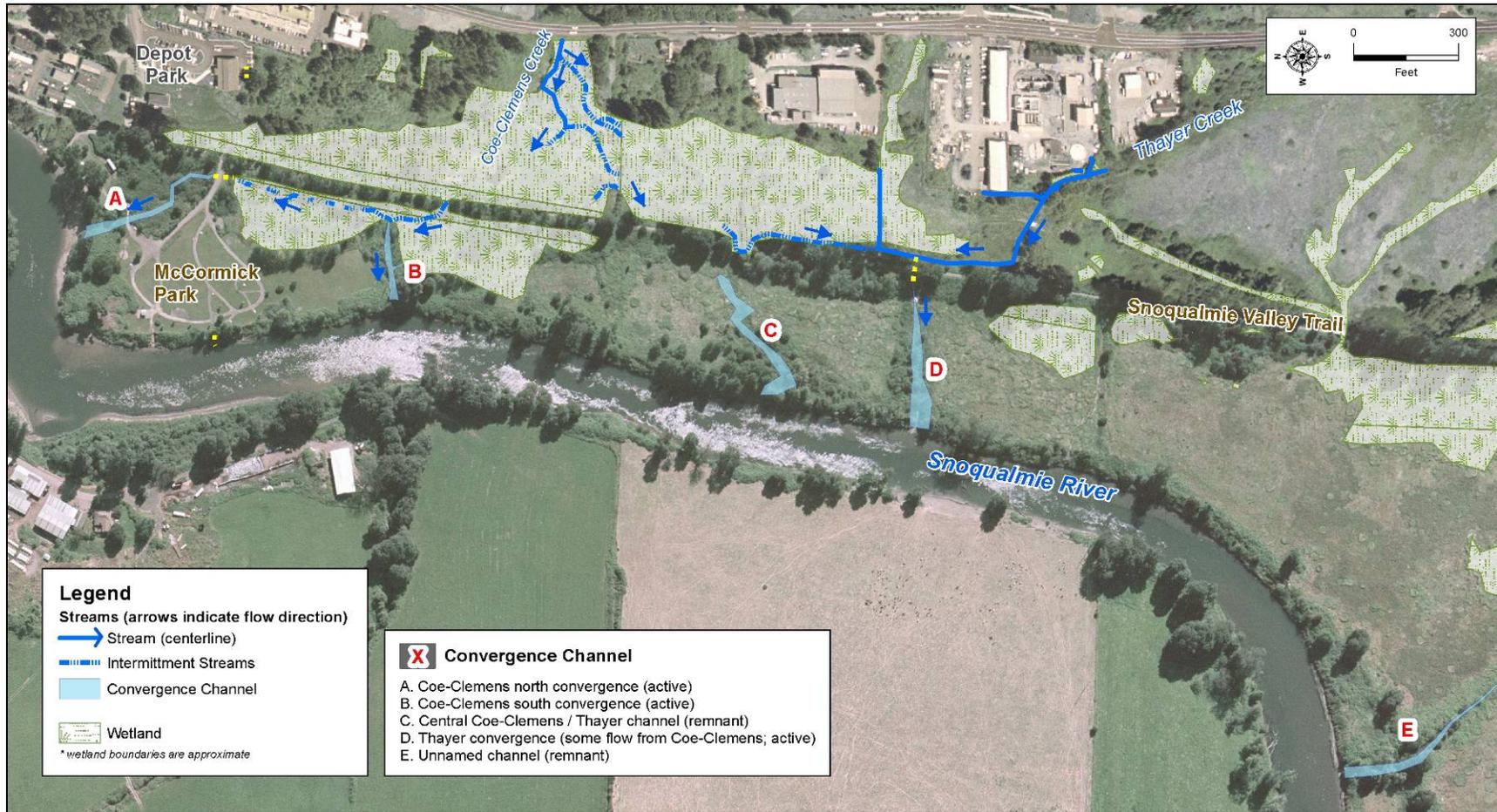
Objective 2-A: Enhance fish habitat in Coe-Clemens Creek.

Priority: High

Potential Restoration Sites, Projects, or Programs: The City has begun restoration efforts in Coe-Clemens Creek to improve water quality and biological functions at the Coe-Clemens wetland complex. Herrera (2002) has identified several restoration options along Coe-Clemens Creek including two options for the lowest reach (Segment 1); the ambitious option involves significant re-grading to create channel sinuosity, stabilize the stream banks, and improve riparian habitat (see Figure 2 for existing Coe-Clemens channel locations). The lowest reaches of Coe-Clemens diverge into multiple channels, two of which (A and B on Figure 2) are currently the primary active pathways. Any channel creation or re-grading efforts within lower Coe-Clemens Creek would require significant additional planning and analysis to evaluate implications for associated wetlands and channels.

Feasibility: Moderately complex to challenging

Figure 2. Convergence of tributary streams and remnant channels along the City of Duvall's Snoqualmie River shoreline.



Objective 2-B: Enhance fish habitat in Thayer Creek downstream of State Route 202 in a phased approach, beginning with the lowest reach first.

Priority: High

Potential Restoration Sites, Projects, or Programs: Herrera (2002) identified specific enhancement and restoration activities for three segments of Thayer Creek. Restoration for the lowest reach of Thayer Creek (identified as Segment 1) could enhance and/or create 440 linear feet of stream channel, remove two fish barriers, and enhance 2 acres of riparian habitat in the floodplain through native plantings. Restoring the natural channel configuration, floodplain function, and riparian function of lower Thayer Creek is also identified as a priority by Haring (2002).

Feasibility: Moderately complex

Objective 2-C: Evaluate the central Thayer / Coe-Clemens channel and the unnamed channel south of Thayer Creek for fish habitat enhancement opportunities.

Priority: Medium

Potential Restoration Sites, Projects, or Programs: The central Thayer / Coe-Clemens channel (currently without flow; 'Channel C' on Figure 2) and the unnamed channel south of Thayer (identified by Haring 2002 as Unnamed 07.0267Z; 'Unnamed Channel' on Figure 2), may provide some off-channel fish habitat opportunities. The central channel, more sinuous than any of the active tributary convergence channels within the City, appears to be a remnant channel from Coe-Clemens and/or Thayer Creeks. Evaluation of re-activating or enhancing the channel to improve fish habitat should be considered for both remnant channels. Higher restoration priority should likely be focused on the central Thayer / Coe-Clemens channel. Benefits from enhancing the unnamed southern channel, however, might not out-weigh the cost of design and implementation compared to other potential projects on Thayer Creek and Coe-Clemens Creek.

Feasibility: Moderately complex to challenging

Objective 2-D: Evaluate creation of new off-channel habitat in the Snoqualmie River floodplain.

Priority: Low

Potential Restoration Sites, Projects, or Programs: There are several potential opportunities for off-channel habitat in the open space area in southern McCormick Park due to the large amount of publically owned space; however, creating off-channel habitat would require significant design and construction effort. Additionally, feasibility-level design would be necessary and would involve in-depth hydrological analysis.

Feasibility: Challenging

Goal 3: Improve and maintain water quality and hydrology functions in tributary streams

Objective 3-A: Protect existing riparian trees and shrubs and promote additional plantings along Thayer Creek, Coe-Clemens Creek, and Cherry Creeks A and B.

Priority: Medium

Potential Restoration Sites, Projects, or Programs: Several reaches in Thayer Creek (Segments 1 to 6), Coe-Clemens Creek (Segments 1, 3, and 6), and Cherry Creek A (Segments 1 to 5) and B (Segments 1 and 2) have limited or no riparian forest cover (Parametrix, 2005). Protect and restore vegetation by enforcing critical areas regulations and implementing protection incentives, as well as implementing riparian restoration projects.

Feasibility: Straightforward

Objective 3-B: Reduce sediment loading, erosion, and stormwater impacts to Thayer Creek, Coe-Clemens Creek, and Cherry Creeks A and B.

Priority: High

Potential Restoration Sites, Projects, or Programs: Restoration sites or projects to meet this objective would be located in the Thayer Creek, Coe-Clemens Creek, and Cherry Creek sub-basins where development or redevelopment is proposed. Programs to use to meet this objective include the City's stormwater management plan and development standards that promote the use of low impact development (LID) techniques. LID strategies should focus on retrofitting existing residential stormwater systems that discharge to tributary streams.

Feasibility: Straightforward to moderately complex

Objective 3-C: Educate residents and businesses in the watershed about methods to reduce erosion and use of chemicals (e.g., fertilizers, pesticides).

Priority: Medium-Low

Potential Restoration Sites, Projects, or Programs: Provide a link on the City's web page to resources on low impact development practices and non-chemical maintenance alternatives. Host a workshop or series of workshops on these practices for local residents.

Feasibility: Straightforward

Goal 4: Address shoreline erosion issues where adjacent to active park and public infrastructure areas while restoring shoreline and riparian conditions.

Objective 4-A: Stabilize banks along the Snoqualmie River within the northern portion of McCormick Park and at the Taylor's Landing boat ramp.

Priority: Medium (High with consideration of public shoreline access / public recreation)

Potential Restoration Sites, Projects, or Programs: Stabilize the shoreline within McCormick Park (the west facing shoreline) that is actively failing and establish a vegetated buffer extending back from the bank. Bank protection along this reach could include grading back the banks and incorporating bioengineering techniques along with native plant installation in the riparian zone. Another location for bank stabilization is at the boat ramp within Taylor's Landing Park, where active erosion is occurring. The Snohomish River Basin Salmon Recovery Plan (2005) recommends that new bank stabilization only be allowed with geotechnical and/or hydrologic analysis when needed to provide protection from certain existing uses under imminent threat from shoreline erosion. The Plan goes on to suggest, "bioengineering techniques...[that] includes the use of vegetation and large woody debris, creating vegetated benches." Any stabilization plan should include elements to control public access, including use of a split rail fence, native vegetation, and planned shoreline access points / view areas.

Feasibility: Moderately complex

DRAFT

CHAPTER 5. POLICY DEVELOPMENT

One mechanism for promoting the implementation of habitat protection and enhancement efforts is through the adoption of comprehensive plan goals that target multiple benefits. The following land use and natural resource management policies should be adopted into the Shoreline Master Program, and incorporated into the City Comprehensive Plan, in order to contribute to the maintenance, protection, and restoration of shoreline health.

Restoration Policies:

1. The City should continue to encourage and facilitate cooperative restoration and enhancement programs between local, state and federal public agencies, tribes, non-profit organizations, and landowners.
2. The City should continue to implement approved restoration plans to facilitate the restoration of impaired ecological functions through a variety of techniques, including seeking restoration partners, incentives for projects that incorporate restoration components, and securing available restoration grants and funding.
3. The City should formalize and expand a public outreach and education program for property owners adjacent to the shoreline to promote shoreline-friendly practices.

Water Quality Focused Policies

4. The City should continue to manage stormwater consistent with DMC 9.06, the City's stormwater management and erosion control regulations and the Comprehensive Plan.
5. The City should promote the use of low impact development techniques through incentives, permit requirements, and adopted City plans and policies.
6. The City should continue to require effective erosion/sedimentation controls for construction in shoreline areas.
7. The City should discourage the use of fertilizers and herbicides, both within the shoreline and throughout the City.

Shoreline Vegetation Conservation

8. The City should require that all new shoreline development and/or uses retain existing native shoreline buffer vegetation, with the overall purpose of protecting and maintaining functions and processes.
9. The City should ensure that vegetation conservation and management in shoreline areas include removal of non-native invasive plant species and noxious weeds as needed to facilitate establishment of stable native plant communities.

10. The City should require that large woody debris be left in stream corridors to enhance wildlife habitat and shoreline ecological functions, except where it threatens personal safety or public infrastructure such as bridge pilings, roads or flood control structures.
11. The City should ensure that native shoreline vegetation be integrated with bioengineering to stabilize streambanks and minimize erosion.
12. The City should require that vegetation clearing be limited to the minimum necessary to accommodate shoreline uses/development.

Environmental / Sensitive Areas Protection

13. The City should preserve, enhance, and/or protect critical areas in shoreline jurisdiction for their ecological functions and values, as well as their aesthetic, scenic, and educational qualities.
14. The City should continue to require that development provide a level of protection to critical areas within the shoreline that achieves no net loss of ecological functions, with project specific and cumulative impacts considered in assessing the potential for net loss of ecological functions.
15. The City's implementation of the SMP, including the integrated Sensitive Area Code, should ensure that shoreline ecological functions are maintained or improved in the long term.

CHAPTER 6. FUNDING SOURCES AND IMPLEMENTATION STRATEGIES

Potential Funding Sources

Funding opportunities for restoration projects in the City of Duvall include local and state grants, and potentially federal funds that are administered through state or local programs. For potential projects in the City and surrounding area, the greatest likelihood of obtaining funding would result from continued partnerships with the King Conservation District, the Snoqualmie Watershed Forum, and non-profit organizations such as the Sound Salmon Solutions (formerly known as the Stilly Snohomish Fisheries Enhancement Task Force). Potential grant sources are described below.

Snoqualmie Watershed Forum / King Conservation District

KCD Opportunity Fund and Regular Round

Attn: Perry Falcone
KC DNRP WLRD
201 S. Jackson St., Ste. 600
Seattle, WA 98104
perry.falcone@kingcounty.gov

The King Conservation District in partnership with the Snoqualmie Watershed Forum provides two grant programs. A small grant program, called the “Opportunity Fund” provides small grants to private and public landowners of up to \$30,000 for projects that improve habitat conditions in the tributaries and headwaters of the Snoqualmie Watershed. Examples of eligible projects include: removing fish barriers, planting native trees and shrubs along streams and in wetlands, and removing invasive weeds. Eligible recipients are private landowners, community groups, non-profit organizations, and government agencies. The larger “Regular Round” grant program provides grants that have reached up to \$250,000 in the past for individual projects. Approximately \$500,000 is available each year to non-profits and government agencies. The focus of this program is on undertaking larger salmon recovery projects throughout the Snoqualmie Watershed.

Washington State Department of Ecology

P.O. Box 47600
Olympia, Washington 98504-7600
360-407-6300
<http://www.ecy.wa.gov/fap.html>

Ecology's Water Quality Program administers four major funding programs that provide low-interest loans and grants for projects that protect and improve water quality in Washington State. Ecology acts in partnership with state agencies, local governments, and Native American nations by providing financial and administrative support for their water quality efforts. As much as possible, Ecology manages the four programs as one; there is one funding cycle, application form, and offer list. The four programs are: The Centennial Clean Water Program, The Water

Pollution Control Revolving Fund, The Clean Water Section 319 Program, and Stormwater Retrofit and Low Impact Development Grant Program. Local governments, Native American nations, conservation districts, and non-profit groups are eligible for funding. Grants and loans are available for point source and nonpoint source projects, for example, treatment facilities, stormwater control and treatment, stream restoration and protection, and on-site septic repair and replacement.

Environmental Protection Agency

Region 10: Pacific Northwest

Grants Administration Unit

Bob Phillips

phillips.bob@epa.gov

(206) 553-6367

<http://www.epa.gov/epahome/grants.htm>

The Environmental Protection Agency funds a variety of projects that aim to safeguard the natural environment and protect human health. Potential opportunities specific to watershed protection and restoration are listed below.

The Clean Water State Revolving Fund Program: Under this program, EPA provides grants or “seed money” to all 50 states plus Puerto Rico to capitalize state loan funds. The states, in turn, make loans to communities, individuals, and others for high-priority water-quality activities. Types of projects funded include protecting and restoring wetlands and riparian buffers.

Nonpoint Source Implementation Grant (319) Program: Clean Water Act Section 319(h) funds are provided only to designated state and tribal agencies to implement their approved nonpoint source management programs. State and tribal nonpoint source programs have a variety of components such as technical assistance, financial assistance, education, training, demonstration projects, and technology transfer. Each year, EPA awards Section 319(h) funds to states in accordance with an allocation formula that EPA has developed.

Wetland Protection, Restoration, and Stewardship Discretionary Funding: This program provides support for studies and activities related to implementation of Section 404 of the Clean Water Act for both wetlands and sediment management. Projects can support regulatory, planning, restoration or outreach issues. Typical grant awards range from \$5,000 to \$20,000.

Environmental Education Grants: This program funds a broad variety of environmental education, training, and outreach activities. Grant awards of up to \$50,000 are provided to universities, state, local, and tribal education agencies, and nonprofit organizations.

National Fish and Wildlife Foundation

1120 Connecticut Avenue, NW, #900

Washington, DC 20036

Kathleen Pickering 202-857-0166

<http://www.nfwf.org/AM/Template.cfm?Section=GrantPrograms>

Non-profit organizations, local, state or federal government agencies are eligible to apply for funds for community-based projects that improve and restore native salmon habitat, remove

barriers to fish passage, or for the acquisition of land/ conservation easements on private lands where the habitat is critical to salmon species. The National Fish and Wildlife Foundation's primary grant program, The Five-Star Restoration Program, provides modest financial assistance on a competitive basis to support community-based wetland, riparian and coastal habitat restoration projects that build diverse partnerships and foster local natural resource stewardship through education, outreach and training activities.

**Trout Unlimited
Embrace-A-Stream**

406-543-1192

<http://www.tu.org/conservation/watershed-restoration-home-rivers-initiative/embrace-a-stream>

Embrace-A-Stream (EAS) is the flagship grant program for funding Trout Unlimited's conservation efforts to conserve, protect, and restore coldwater fisheries and their watersheds. Trout Unlimited annually raises money from TU members, corporate and agency partners, and foundations to distribute as small grants to local TU projects. The goal of EAS is to conserve coldwater fisheries through innovative grassroots conservation projects. Successful projects are based on sound science, benefit the resource, strengthen the local TU chapter and council, and help build the constituency for protecting trout and salmon. TU volunteers are actively involved in project work and are expected to provide matching funds. An Embrace-A-Stream Committee comprised of TU volunteer representatives and scientific advisors evaluates all proposed projects.

Washington State Recreation and Conservation Office (RCO)

1111 Washington St. SE

PO Box 40917

Olympia, WA 98504

360-902-3000

<http://www.rco.wa.gov/grants/index.shtml>

info@rco.wa.gov

The RCO (formerly Interagency for Outdoor Recreation [IAC]) supports the work of several organizations such as the *Recreation and Conservation Funding Board* and the *Salmon Recovery Funding Board*.

The Recreation and Conservation Funding Board provides funds for the acquisition and development of recreation and conservation lands. The board distributes funds through eight grant programs, for instance:

Land and Water Conservation Fund: This program provides funding to preserve and develop outdoor recreation resources, such as parks, trails, and wildlife lands.

Washington Wildlife Recreation Program: The Washington Wildlife Recreation Program Account involves support for critical habitat, natural areas, urban wildlife, local parks, state parks, trails, and water access categories.

Aquatic Lands Enhancement Account: This program funds acquisition, restoration, and public access projects that benefit wildlife habitat and aquatic conservation in waterfront areas.

The Recreation and Conservation Funding Board's grant process is open and competitive. Applications are submitted annually for some grant programs and every two years for others. The grant applications are reviewed by board staff and citizen committees. Letters of intent are usually due March 1. Applications are usually due May 1.

The Salmon Recovery Funding Board (SRFB) supports salmon recovery by funding habitat protection and restoration projects. It also supports related programs and activities that produce sustainable and measurable benefits for fish and their habitat. *Salmon Recovery Grants* can be used for buying salmon habitat, restoring areas along streams and other waterways, replacing barriers to fish passage, and creating fish habitat. The grants from SRFB range from \$10,000 to nearly \$900,000. They have been awarded to organizations in 28 counties for work ranging from planting trees along streams to cool the water for salmon, to replacing culverts that prevent salmon from migrating to spawning habitat, to restoring entire floodplains. SRFB, along with Puget Sound Acquisition and Restoration (PSAR), funds are typically distributed by watershed and in this case through the Snohomish Basin Salmon Recovery Forum (approximately \$565,000 will be awarded in 2011).

Depending on the grant program, eligible applicants may include municipal subdivisions (cities, towns, counties, and special districts such as port, conservation, utility, park and recreation, and school), tribal governments, state agencies, nonprofit organizations, regional fisheries enhancement groups, and private landowners. To be considered for funding, acquisition projects must be operated and maintained in perpetuity for the purposes for which funding is sought. Restoration projects must be operated and maintained for ten years after construction is completed. All projects require lead entity approval and must address the goals and actions defined in the lead entity strategy or regional recovery plan.

Grants are awarded by the Salmon Recovery Funding Board based on a public, competitive process that weighs the merits of proposed projects against established program criteria.

Sources of Technical and Coordination Assistance

Snoqualmie Watershed Forum

The Snoqualmie Watershed Forum is a partnership between the Snoqualmie Tribe, King County, and the cities of Duvall, Carnation, North Bend and Snoqualmie. Duvall is an active participant in the forum.

According to the Forum webpage, the goal *is to protect and restore the health of the Snoqualmie Watershed in harmony with the cultural and community needs of the Valley*. The Forum implements this goal by providing leadership on key issues, including Snoqualmie restoration, by implementing projects that aid in salmon recovery, protect water quality and address flooding. The City should continue to rely on forum technical and coordinating resources to plan and implement restoration actions within the City. (<http://www.govlink.org/watersheds/7/>)

King Conservation District

In addition to offering a funding source for City and other Snoqualmie watershed restoration projects, the King Conservation District has several programs – including the Wetland Plant Cooperative and other technical assistance programs – that could provide technical assistance to the City and other groups implementing restoration projects. As well, the KCD provides direct landowner technical assistance like farm planning, riparian restoration, and education.

(http://www.kingcd.org/pro_fis.htm)

Sound Salmon Solutions (formerly the Stilly Snohomish Fisheries Enhancement Task Force)

Sound Salmon Solutions worked with the City of Duvall to re-establish native riparian vegetation, provide education on public land, and lead community-based habitat restoration. This organization will also provide technical and project coordination assistance.

Wild Fish Conservancy – Northwest

Wild Fish Conservancy – Northwest is a nonprofit conservation group based in Duvall. Wild Fish Conservancy staff have been active both in the City and in other areas of the Snoqualmie watershed in implementing their mission – to conduct research on wild fish populations and habitats, to advocate for improved land use and fisheries management, and to develop restoration projects.

The City should continue to coordinate with the Wild Fish Conservancy during restoration planning and project implementation efforts. (<http://wildfishconservancy.org/>)

Cascade Land Conservancy

The Cascade Land Conservancy is a non-profit organization working to conserve land in Pierce, King, Mason, Kittitas, and Snohomish Counties. The Conservancy has led the conservation of more than 150,000 acres over the last decade including approximately 21 properties in Snohomish County. The Conservancy works with landowners using tools such as land purchase or donation, conservation easements, and stewardship endowments to preserve high-quality ecosystems. (<http://www.cascadeland.org/>)

Puget Sound Partnership

The Puget Sound Partnership is a coalition of citizens, governments, tribes, scientists and businesses working together to restore and protect Puget Sound. While the Partnership's focus is on the marine waters of the Sound, its web page compiles helpful information on topics such as low impact development, rain gardens, erosion control, etc. from both local and national sources.

(http://www.psparchives.com/our_work/stormwater/stormwater_resources.htm)

Implementation Strategies

There are several opportunities and constraints to consider in the implementation of restoration projects. The City is fortunate to have a majority of the regulated shoreline area within public ownership, but community support of protecting and enhancing shoreline habitat will contribute

to the long-term success of the projects. The overall strategy for implementation is to protect existing shoreline habitat, gain public support for policy updates that protect or enhance natural areas, and pursue funding for habitat restoration projects listed identified in

A general sequence of implementation for restoration projects is as follows:

1. Protect existing shoreline and riparian habitat through incentives, regulations, land acquisitions and easements.
2. Conduct public outreach via the NPDES Phase 2 permit to educate residents, businesses, industries, elected officials, policy makers, and planning staff with the aim of reducing or eliminating behaviors that cause or contribute to adverse stormwater impacts.
3. Enhance off-channel habitat in lower Thayer Creek and Coe-Clemens Creek.
4. Enhance shoreline and edge habitat conditions along the Snoqualmie River mainstem.
5. Enhance riparian areas (e.g. riparian plantings and invasive species removal).
6. Address water quality impacts and sources of the impacts in the upper tributary basins.

Some of the challenges to implementing restoration projects include securing funding, designing and permitting successful projects, and understanding the larger watershed influences on local shoreline conditions. These challenges are summarized as follows:

- Scarcity of funding: Designing, carrying out, and monitoring the success of restoration efforts can be an expensive undertaking, particularly at larger (e.g., watershed or reach) scales. In general, funding for restoration is limited and competition for funds extensive.
- Project permitting: Obtaining necessary permits from local, state, and federal regulatory agencies can require substantial time and effort. Although encouraged and allowed by the SMP, complicated restoration projects may take a year or more to permit.
- Scale of issues: Many of the shoreline management issues facing Duvall extend across the entire watershed and beyond the City's boundaries. To a certain extent, complete solutions to these issues are beyond the City's control. However, the Snoqualmie Watershed Forum provides a mechanism for working with other local governments. It will be necessary to engage the public throughout the watershed and in neighboring jurisdictions to address issues such as flooding.

CHAPTER 7. TIMELINES, BENCHMARKS, AND MEASURING EFFECTIVENESS

In the context of the SMP update, restoration planning is a long-term effort. The SMP guidelines include the general goal that local master programs “include planning elements that, when implemented, serve to improve the overall condition of habitat and resources within the shoreline area” (WAC 173-26-201(c)). The guidelines for restoration planning state that local programs should “...appropriately review the effectiveness of the projects and programs in meeting the overall restoration goals” (WAC 173-26-201(2)(f)).

As a long-range policy plan, 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 an overall timeframe for future amendments to the SMP. In 2003, Substitute Senate Bill 6012 amended the Shoreline Management Act (RCW 90.58.080) to establish an amendment schedule for all jurisdictions in the state. Once the City of Duvall updates its SMP, the City is required to review, and amend if necessary, its SMP once every seven years (RCW 90.58.080(4)). During this review period, the City could document progress toward achieving shoreline restoration goals. The review could include:

- Re-evaluating 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.

Another mechanism that may serve to establish timelines and benchmarks would be establishment of a shoreline restoration program organized like or integrated with the City’s capital improvement program (CIP). Similar to an infrastructure CIP, a shoreline restoration CIP would be evaluated and updated regularly. The shoreline CIP would be focused on site-specific projects and could be funded through grants or a fee-in-lieu program developed as part of the shoreline permitting process. Further, other CIP projects, such as stormwater facility improvements, could be evaluated to determine if their design could advance shoreline restoration goals.

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